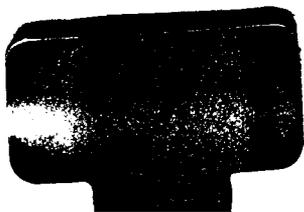




Consideration of the Nutrition Components of The Sick Child Initiative



Consideration of the Nutrition Components of the Sick Child Initiative

Committee on International Nutrition

Food and Nutrition Board

Board on International Health

INSTITUTE OF MEDICINE

Lindsay H. Allen and Christopher P. Howson, *Editors*



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The serpent has been a symbol of long life, healing, and knowledge among almost all cultures and religions since the beginning of recorded history. The image adopted as a logotype by the Institute of Medicine is based on a relief carving from ancient Greece, now held by the Staatlichemuseum in Berlin.

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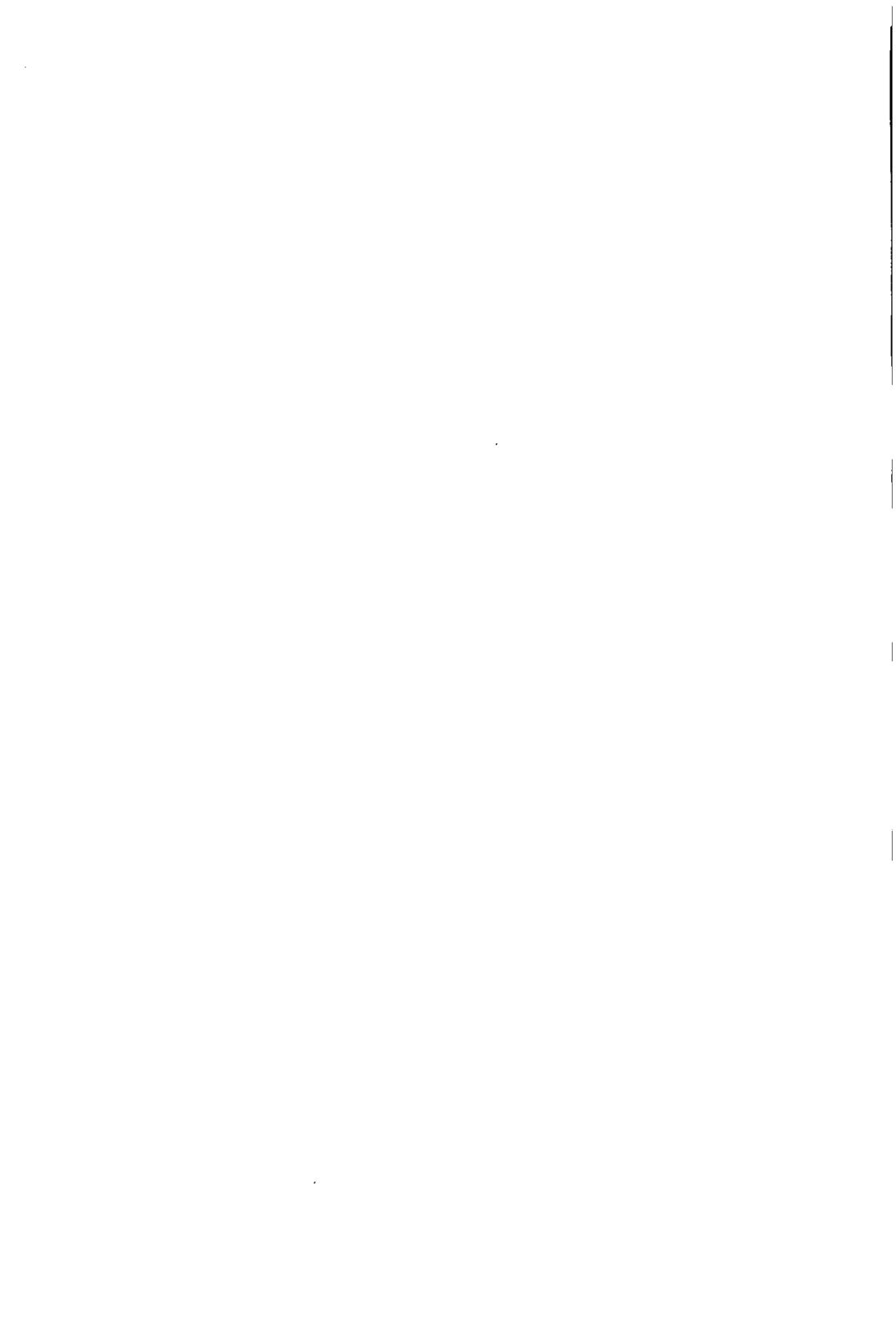
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Preface

Over the past 2 years there has been a growing awareness of the potential value for the U.S. Agency for International Development (USAID) to have a standing capability in the Institute of Medicine (IOM) for a more flexible, less costly response to agency needs for advice in the areas of nutrition, food, and health science policy. With support from USAID, the IOM responded in October 1993 by establishing the Committee on International Nutrition (CIN) under the aegis of the Food and Nutrition Board (FNB) and the Board on International Health (BIH).

The CIN's mandate is to answer questions of interest and concern, evaluate current nutrition activities undertaken by the agency, and make recommendations for future activities based on this review. Topics are chosen through systematic consultation with the Office of Nutrition in USAID's Bureau for Research and Development. Representing the areas of human nutrition, maternal and child health, epidemiology, economics, and program design and evaluation, the committee's six members will convene three times to produce brief reports that review specific programs, research projects, or project designs. With an initial project life of 18 months, the CIN is designed to be flexible (that is, capable of responding to specific nutrition concerns that arise abruptly) and to provide quick report turnaround.

This report is the result of the third meeting of the CIN, which was held on 19–20 January 1995. The purpose was to comment on the nutrition components of the World Health Organization's (WHO) initiative to integrate the management of childhood illness. This is often called the "Sick Child Initiative" (SCI). The report was requested by USAID's Office of Health and Nutrition, a primary funding source for the initiative, on 8 December 1994. The CIN wishes

to emphasize that the report was not requested by WHO and that WHO was not represented at the CIN meeting. Also, in spite of a major effort on WHO's part to share its latest documents with the CIN, the committee is aware that it did not have access to much of the relevant documentation. This report, then, does not represent a thorough scientific review of WHO's contribution to the nutrition components of the SCI. Rather, it should be viewed as a series of general observations concerning the draft documents available to the committee that are intended to expand the process of thinking about how to combine nutrition assessment, treatment, and advice into the integrated management of sick children and the maintenance of adequate nutrition and health.

CHARGE TO THE COMMITTEE

The initial charge to the committee by USAID was as follows:

Drawing on the scientific and technical knowledge of individual members, background information and other pertinent data, the Committee is requested to make recommendations as to: (1) practicality of the nutrition components of the (SCI) algorithm; (2) whether the nutrition components of the algorithm should or should not be modified, and if to be modified, how; and (3) the additional information or data required to improve the performance of the integrated management of childhood illness algorithm's nutritional effectiveness.

Further background information and details on USAID's initial request to the CIN can be found in the memorandum to the committee from Samuel G. Kahn, USAID Office of Health and Nutrition (Appendix A). In addition to this initial request, on the first day of the meeting Caryn Miller of the USAID Office of Health and Nutrition requested that two additional questions be considered: (4) how can nutritional components be monitored during field testing or introductions, and (5) what should the role be for those with experience and expertise in nutrition as field testing or introduction evolves?

During the 2-day meeting, the CIN reviewed background information supplied by USAID. The documents that will be referred to most frequently are: "Assess and Classify the Sick Child Age 2 Months up to 5 Years"; "Advise the Mother"; "Treat the Child"; "Management of Childhood Illness," February 1995 drafts; "An Integrated Approach to Management of Childhood Illness: Development and Research Activities," 4 March 1994 draft; and "Integrated Management of Childhood Illness: Research Priorities," January 1995 draft. These documents were all generated by WHO. Additional documents available to the committee are listed in Appendix B.

ORGANIZATION OF THE REPORT

The report contains four chapters and four appendixes. Chapter 1 provides background information on the SCI, the charge to the committee, and the scope of the committee's deliberations. Chapter 2 describes the nutrition algorithms in the SCI. In Chapter 3, the committee presents its responses to the five questions posed by USAID. Although the committee was not asked specifically to consider SCI in the larger context of health care and child welfare, it believes strongly that integration of SCI activities with other local resources for the treatment and prevention of illness and disease, including malnutrition, will be required for SCI to be most effective. Thus, the committee ends Chapter 3 with suggestions toward this end. The committee's overall summary and conclusions are presented in Chapter 4.

Appendix A contains the USAID memorandum outlining the initial charge for this third CIN meeting. Appendix B offers guidance for further development of the diagnostic screens used in the SCI and comments on the nutritional diagnosis and management strategies for the three categories of children that will be identified. Appendix C lists references to articles made available to the committee members, and Appendix D provides excerpts of important components of the nutrition algorithms.

ACKNOWLEDGMENTS

The committee gives special thanks to the USAID staff from the Office of Health and Nutrition, who gave graciously of their time in providing information for the report. These included Susan Anthony, Al Bartlett, Kevin Callahan, Eunyong Chung, Cate Johnson, Caryn Miller, Samuel G. Kahn, and Andrew Siderski. The committee also thanks the following individuals for their important contributions to the evidentiary base considered in the preparation of the report: Robert E. Black, The Johns Hopkins School of Hygiene and Public Health; Caryn Bern, Centers for Disease Control and Prevention; Joanne Csete, United Nations Children's Fund (UNICEF); Katherine L. Dickin, The Manoff Group, Inc.; Mary S. Lung'aho, WellStart; and Ronald Waldman, The Basics Project. The committee would also like to express its appreciation to the IOM staff who facilitated the work of the CIN: Christopher P. Howson, study director; Jamaine L. Tinker, financial associate; Michael Edington, managing editor; Caroline McEuen, copy editor; Claudia Carl, administrative associate; and Gail Spears, administrative assistant. The committee especially thanks Susan M. Knasiak, research assistant, for her help in conducting the third meeting and for her valuable editorial advice in preparing the report draft. Finally, the committee thanks Richard G. Seifman, formerly at USAID; Polly

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Lindsay H. Allen, *Chair*
Committee on International Nutrition

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Background

THE SICK CHILD INITIATIVE

In the early 1990s, bilateral donors, especially the European contingent, reiterated the need to develop an integrated approach to the management of childhood illness. The rationale for an integrated approach included the following:

- It was recognized that children often were treated for one symptom. Because there is considerable overlap in signs and symptoms of several of the major diseases, a single diagnosis focusing on the most apparent problem may lead to an associated condition being overlooked.
- With separate disease-specific guidelines and training, the health worker was left the difficult task of integration during his or her encounter with the sick child.
- Young infants with life-threatening illnesses often presented with nonspecific clinical signs, which made a disease-specific approach difficult.
- Many national governments were moving toward policies of integrated disease management without any clear guidelines on how to achieve this.

Consequently, in 1992 the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) initiated development of an integrated approach to managing the main life-threatening diseases of childhood—pneumonia, diarrhea, malaria, measles, and malnutrition—which together cause approximately three-quarters of deaths in children under 5 years of age. The Sick Child Initiative (SCI), as this approach has come to be known, builds on

more than 16 years of experience with case management of diarrheal diseases, primarily by oral rehydration therapy, and more than 7 years of research on, and program management of, acute respiratory infections (ARI). The major purpose of the SCI is to train primary health care providers to diagnose diseases and prescribe the appropriate treatment at the health center level, or to refer cases with complications immediately to a district hospital. As such, the SCI is not intended to be the main program or substitute for existing preventive and community health and nutrition activities. Research and development activities of the SCI, coordinated at WHO by the Division of Diarrhoeal and Acute Respiratory Disease Control (CDR), are called the Integrated Management of Child Illness (IMCI). A number of other institutions and individuals—including, for example, UNICEF, USAID, and the U.S. Centers for Disease Control and Prevention (CDC)—are collaborating in these activities.

According to the SCI, the sick child is assessed initially through a limited range of questions and observation of easily recognized symptoms. The child's nutritional and immunization status are recorded, and immunization is given if needed. The child's condition is classified according to disease grouping and severity guidelines, which are used as a basis for treatment and possible referral to a hospital or other higher-level care if the illness or condition is of sufficient severity. The final step is to give the mother advice on follow-up care.

Support for an integrated approach to the management of childhood illness was given further impetus by the estimation of the *World Development Report 1993: Investing in Health* (World Bank, 1993, p. 77), that the SCI could potentially prevent up to half of deaths in low-income countries, because there is a high fatality rate from common childhood diseases among malnourished children (Pelletier et al., 1993). In addition, the *World Development Report 1993* considered integrated management of childhood illnesses to be one of the most cost-effective health interventions and recommended that SCI be given a high priority in countries with child mortality rates of more than 30 deaths per 1,000 children under the age of 5 (World Bank, 1993, p. 114).

CHARGE TO THE COMMITTEE

The charge from USAID was as follows:

Drawing on the scientific and technical knowledge of individual members, background information and other pertinent data, the Committee is requested to make recommendations as to: (1) practicality of the nutrition components of the (SCI) algorithm; (2) whether the nutrition components of the algorithm should or should not be modified, and if to be modified, how; and (3) the additional information or data required to improve the performance of the integrated management of childhood illness algorithm's nutritional effectiveness [see Appendix A].

During the committee meeting, a request was made that two additional questions be considered: (4) how can nutritional components be monitored during field testing or introductions, and (5) what should the role be for those with experience and expertise in nutrition as field testing or introduction evolves?

PROJECT SCOPE

It became evident during both the preparation for and evolution of the 2-day meeting of the CIN in January 1995 that the SCI is rapidly evolving. The specifics of the nutrition components are still under development and will benefit from the next phase of the SCI, which will include adaptation of the algorithms for use in specific locations. It was therefore inappropriate for the committee to produce a summative evaluation of the nutrition components as if the SCI were a finished product. Thus, the committee undertook this task as a formative evaluation, commenting on the nutrition components of the SCI with the knowledge that they continue to evolve.

It is also important to note that WHO had neither requested advice nor was provided with an opportunity in advance to share information on their progress and deliberations on the SCI. Because the committee did not have access to the latest drafts of WHO documents or to WHO's current thinking on the SCI, its formative evaluation could not address what WHO is doing or intends to do in the future with respect to further development of the SCI. However, because the committee believes that the SCI is one of the most important enterprises in primary health care in developing countries, it appreciated the opportunity to discuss certain principles that may offer useful guidance to those concerned with its development. As a result, rather than focusing solely on its responses to the specific questions posed by USAID, the CIN has also addressed larger contextual concerns related to the nutrition components of the SCI.

Based on the expertise and experience of individual members, the committee has provided detailed comments and suggestions about selected nutrition components, while others are discussed in a more general fashion. Because the committee did not have the background information or time to make comprehensive commentaries on all the nutrition components of the algorithms, it has chosen to present its discussion of selected, specific components as an appendix to the report.

Integrating nutrition into the treatment of the sick child is a relatively new venture, and one that deserves the strongest praise. It was apparent to the committee, however, that there has been substantial variation in efforts thus far to validate and test the components of the algorithms relating to nutrition. The long-term involvement of the team developing the SCI with the case

management of childhood diarrhea and acute respiratory infection may explain, in part, why the components of the algorithms that deal with these illnesses have received more attention and field testing than those relating to nutrition. The committee hopes that its comments will help WHO and other organizations as they move to address this imbalance in further development of the SCI.



Description of the Nutrition Algorithms of the Sick Child Initiative

The Sick Child Initiative (SCI) attempts to integrate separate case management systems into one entity. It provides an approach for the management of diarrhea, respiratory infection, malaria, measles, and malnutrition in one integrated system. A crucial goal of SCI is to identify the minimum essential elements for the diagnosis and treatment of each of these five disease components. The algorithms are intended for use in first-level health facilities that have minimal equipment, so that diagnosis depends primarily on the medical history and physical examination of the child by the health worker. The nutritional assessment uses simple techniques, and it is assumed to be possible with the level of technical expertise that reflects the current skills of clinical health workers when they are provided with some additional training.

The nutrition algorithm is divided into three broad components: assessment, classification, and treatment (see Appendix D for the algorithm). The nutrition assessment component, "Classify Nutritional Status," relies on relatively simple measurements for the identification of malnutrition and anemia. It assumes that a scale is available for weighing the child, but not a lengthboard to measure height or length or equipment for measuring hemoglobin or hematocrit. The identification of malnutrition and anemia is based on the presence or absence of following: visible severe wasting, pallor, clouding of the cornea, foamy patches on the whites of the eyes, or edema of both feet. The child is also weighed, and weight-for-age is classified as "low" or "not low." Based on these symptoms, the child (age 2 months to 5 years) is classified in one of the three groups described in the following sections.

SEVERE MALNUTRITION OR SEVERE ANEMIA

This classification is given if a child has any one of the following symptoms: visible severe wasting, severe pallor, clouding of the cornea, or edema of both feet. Such children are given vitamin A and an urgent referral to hospital.

MODERATE MALNUTRITION OR MODERATE ANEMIA

This classification is based on the presence of one of the following: low weight-for-age, foamy patches on the white of the eye, or pallor. Children in this category will have their feeding assessed, using one set of questions for infants age 1 week to 2 months, and another set for those 2 months to 5 years. For the younger groups, questions are asked about whether there is difficulty in feeding and the frequency of breastfeeding and consumption of other foods and drinks. Breastfeeding is further assessed by observing the attachment and suckling effectiveness of infants during a 4-minute period for infants who have not fed for at least an hour. For the older infants, the mother is asked questions about breastfeeding frequency and diurnal patterns; type, frequency, amounts, and providers of other foods and feeding techniques; and any changes in feeding as a result of illness. The mother's answers are compared with a set of "Feeding Recommendations during Sickness and Health" that are intended for all children up to 5 years, and referred to as the "Food Box." The "Food Box" provides basic information on how and what the child should be fed from the ages of 0–4 months, 4–6 months, 6–12 months, 12 months–2 years, and 2 years and older. The mother then is counseled as appropriate using the "Counsel the Mother" chart.

Administration of vitamin A and counseling on the use of foods rich in vitamin A are recommended for children with foamy patches on the eye. For children with pallor, medicinal iron is given for 14 days; after this period the mother is asked to return to obtain sufficient iron to last up to 2 months. (If pallor still exists at 2 months, the child is referred for assessment.) An oral antimalarial drug is advised in high malaria areas, and mebendazole, a broad-spectrum antiparasitic agent, is recommended for children older than 2 years who have not had a dose in the prior 6 months. For children with low weight-for-age or pallor, the mother is asked to return with her child in 14 days. At that time the child is reweighed, weight gain is calculated, and feeding is reassessed. If weight gain has been inadequate or the child has lost weight, or if the child has a feeding problem, the mother is counseled about problems found by the health worker, who again refers to the "Food Box" and the "Counsel the Mother" charts. The mother is asked again to return with her child in 14 days or is referred. If weight gain is good, the mother is encouraged to continue.

NO SIGNS OF MALNUTRITION OR ANEMIA

For cases of sick children who present with none of the key indicators, if the child is under 2 years of age, feeding is still assessed and mothers are advised about infant and child feeding based on information contained in the Food Box (see Appendix D). If the child is over 2 years of age, and has no signs of malnutrition or anemia, no feeding assessment or advice is proposed. Thus, the nutrition algorithms also incorporate the concept of *prevention* of malnutrition by providing feeding recommendations to sick, but well-nourished, children.

The complementary foods to be provided for those under 2 years of age are intended to be derived for each location by consultants working with national and/or local staff during a forthcoming, in-country *adaptation phase* of the algorithms. This strategy recognizes that the composition of weaning foods often varies by country, and even within countries, and that for the health worker's advice on infant feeding to be relevant to the caretaker, examples of nutritionally appropriate, locally available foods must be developed. The "Counsel the Mother" chart also provides guidance to health workers on the most common feeding problems and potentially feasible, locally adapted, solutions.

Because application of the entire set of SCI algorithms is supposed to take less than 10 minutes for each mother/child pair, the "Assessment of The Child's Feeding" and "Counseling the Mother About Feeding Problems" components must be done quite rapidly. Newly trained health workers in Ethiopia, however, took on average of 15 to 20 minutes to perform the medical consultations in a pilot study, and about half of this time was taken by the nutrition counseling (M. S. Lung'aho, WellStart International, Washington, D.C., personal communication, 1995).





Answers to the Five Questions Posed to the Committee

THE SICK CHILD INITIATIVE IN THE CONTEXT OF HEALTH CARE AND WELFARE

The major purpose of integrating the primary health care worker's management of childhood illnesses is to improve the efficacy and efficiency of management of childhood diseases, including malnutrition and other presenting complaints. This is, of course, done within a larger context of health care, including preventive health care and the curative care obtained in a manner other than face-to-face contact with the primary health care worker. This is recognized in the SCI in its referral of some children in need of curative care to more specialized levels and by incorporation of some preventive measures into the algorithms for the primary health care worker.

There is yet a larger setting to be considered in the delivery of primary health care. In many countries, the health sector, and in particular the primary health care component of that sector, is the entry point for the poor into the larger societal support structure. The SCI algorithms thus must establish and incorporate appropriate links to other health and social services programs. At present there is little discussion of this larger context in the SCI documents reviewed.

Two such links require urgent consideration: the referral of very sick and severely malnourished children who probably need hospitalization, and the referral of others to curative and preventive interventions that might be more

efficiently performed by individuals other than the health worker using the present SCI algorithms.

The diagnosis and management of sick or malnourished children by the primary health care worker require attention to the following components:

- The ability of the caretaker to identify the disease; to treat it correctly, at home when appropriate; or to seek appropriate assistance in circumstances where the SCI considers it is best provided by the local health worker.
- The ability of the health worker to diagnose the disease, to negotiate treatment with the child's caretaker, to provide the resources for treatment when appropriate, and to follow up to assure satisfactory evolution of the problem.
- The ability of the caretaker to understand and to implement the prescription, and to seek further help when appropriate.

The WHO documents submitted to the committee dealt with the second of these three components, and thus only the resources directly provided by the health worker—such as counseling and medicines—are described here. WHO recognizes that the other two components are also essential and is in the process of addressing them, but it has not yet advanced far in their documentation. The organization of referrals to other programs and the competence of these programs to deal with their responsibilities effectively is a challenge that must be met in the future for the SCI to achieve maximum effectiveness. The impact of the initiative will be greatly enhanced if the paths for integrating SCI activities with any other resources for the treatment and prevention of illness and disease, including malnutrition, are clearly identified when the algorithms are adapted for each location.

QUESTIONS 1 AND 2: Make recommendations on the practicality of the nutrition components of the (SCI) algorithm, and whether the nutrition components of the algorithm should or should not be modified, and if to be modified, how?

The committee's responses to these two charges have been combined. Because the nutrition component of the SCI is still evolving, the committee felt that broader considerations were more relevant to this report than specific recommendations.

The Diagnosis of Severe Malnutrition and Severe Anemia

The diagnostic approach to assess these conditions is similar to that used for other illnesses addressed by the SCI. Most of the clinical symptoms are

qualitatively obvious and can be standardized. The screening tools are innovative, and the tools are being tested, with very promising results. The next step will be to ascertain the relative quality of the screening tools in different environments, using data from more health workers in each location to develop Receiver Operating Characteristics (ROC) curves. In Appendix B, the committee provides several suggestions for further development of diagnostic screens and indicators that predict benefit.

Treatment of Severe Malnutrition

Severe malnutrition is to be handled by the primary health worker through an urgent referral of the child to a hospital. The practicality of this strategy depends on the accessibility of effective hospital care for severe malnutrition. This includes blood transfusion for life-threatening anemia and intensive feeding of children with marasmus and kwashiorkor, including gastric intubation and intravenous electrolyte stabilization and antibiotic treatment when necessary. Intensive feeding is always a critical component of the management of marasmus and kwashiorkor, both initially and as treatment proceeds. Few hospitals in developing countries have the resources to do this, unless assisted by family members. Thus, successful intensive feeding may require a different concept of hospital care and needs to be addressed if referral is to be a meaningful intervention in the SCI.

Diagnosis of Moderate Malnutrition or Anemia

The diagnosis of "moderate malnutrition" is based on weight-for-age. The validity of this screen is currently being tested against weight-for-height as the presumed "true" outcome of moderate malnutrition. Weight-for-height, however, is not a good measure of moderate malnutrition in many populations (Victora, 1992). Height-for-age may be a better "gold standard" for validating the weight-for-age screen, especially over the period when active stunting exists (up to about 2 years of age) and in areas where weight-for-height is relatively unaffected by moderate malnutrition despite widespread stunting (that is, in regions other than South and Southeast Asia) (Victora, 1992). The appropriate outcome for validation is likely to depend on epidemiological information collected during the in-country adaptation phase. After 18–22 months of age, low weight- or height-for-age are increasingly likely to reflect past undernutrition rather than current feeding. Consideration might be given to developing different thresholds for low weight- or height-for-age at different ages. Thus, validation of the anthropometric screen to define and measure moderate malnutrition is an area that requires further development (Appendix B).

The diagnosis of moderate anemia in the SCI depends on assessment of pallor, but the use of this indicator remains to be validated to the same degree that it has been in the detection of severe anemia. This is important given the high prevalence of moderate anemia and its well-established detrimental effects on human function.

Treatment of Moderate Malnutrition

The treatment of moderate malnutrition depends on an assessment of feeding practices and the giving of feeding advice, both of which are time-consuming. If moderate malnutrition is prevalent in the area where the clinic is located, both activities might be more efficiently and effectively performed for groups of children and their caretakers through participatory assessment strategies and "teaching by doing" approaches. The IMCI might consider how to develop or work with existing group interventions where this seems to be a more practical strategy. The face-to-face meeting of the primary health care worker with the mother or caretaker must be used to motivate the mother or caretaker to participate in these group interventions. The committee believes that these interventions are as important for the SCI as the development of appropriate referral institutions for severely ill children, and may well be more cost-effective.

In Appendix B, a number of suggestions are provided for the assessment of feeding practices and feeding recommendations. In general, the committee felt that some aspects of the assessment of breastfeeding and other feeding practices were unnecessarily complicated, while the development of locally appropriate feeding recommendations will require substantially more effort.

Nutritional Management of Sick Children Who Are Not Malnourished

The basic SCI approach of fostering and encouraging the continued feeding of the sick child, with special emphasis on continued breastfeeding during illness, is now recognized as correct and appropriate (Brown, 1994).

Prevention of Malnutrition within the Management of the Sick Child

The face-to-face meeting between the caretaker of the sick child and the primary health worker provides an opportunity to improve present and future feeding practices, with the goal of preventing malnutrition. This is especially important during breastfeeding and weaning. Again, in many situations this may

be best accomplished through referral to mothers' groups, such as those mentioned above.

QUESTION 3: What additional information or data are required to improve the performance of the integrated management of childhood illness algorithm's nutritional effectiveness?

Validating the Diagnosis

The approach of the SCI to validating diagnoses for severe malnutrition and severe anemia is logical, because it separates validating the diagnosis of severe malnutrition from that of less severe malnutrition in the same way as they are separated in their immediate management. Further data collection and the use of methodologies to analyze these data are pending. This is an area of research in which the SCI has now taken the lead.

The validation of diagnoses of moderate malnutrition is more difficult because clear-cut outcomes of functional significance, such as rapid death, are less easily used for validation. Death in the longer-term could be studied but requires more time and data collection, as well as different analytic strategies. The use of shorter-term proxies to validate the diagnosis of moderate malnutrition is a problem that requires more scientific attention, as discussed in the answer to Questions 1 and 2 and Appendix B.

Treatment

Treatment of malnutrition requires the collection of information about feeding practices, which is time-consuming and cannot be done well under the present time constraints of the SCI examinations. Treatment of moderate malnutrition and the prevention of malnutrition in populations where it is prevalent depends on significant behavior modification. Achieving such modifications is also time-consuming, and as currently practiced it may not be effective on a one-to-one basis in the context of the management of the sick child.

Both of these problems could be resolved by permitting much more time for each encounter in the SCI. Time constraints, however, are today's reality in the management of sick children. Whether or not these constraints can be overcome is thought to depend on personnel resources. More research might reveal other ways to deal with these tasks than by increasing the one-to-one encounter time. Other resources for establishing community interaction should be identified. One way that is already done in many countries is by the referral of mothers to groups for learning about nutrition and other mother-care issues—for example,

where growth monitoring and promotion programs are in place. Whether this approach might be usefully incorporated into the SCI requires more research.

The effective treatment of malnutrition also depends on the development of local feeding recommendations. This, in turn, requires information on the type and composition of foods used and appropriate for this purpose, and on whether these foods can maintain adequate nutritional status of infants and children. More effort will be needed in this area.

QUESTION 4: How can nutritional components be monitored during field testing or introductions?

The incorporation of monitoring into the SCI is important, and it is part of the philosophy of the CDR section of WHO. The development of appropriate monitoring of the nutrition components is pending, because further definition of the nutrition goals of the SCI and the means to attain them are required. The goals must be further defined to identify the intermediary and outcome variables that will be the best measures of whether the intervention has attained its goals. With this information it will be possible to define how the nutrition components can be monitored during field testing, as well as in ongoing programs. There is much work to be done in this area.

QUESTION 5: What should the role be for those with experience and expertise in nutrition as field testing or introduction evolves?

Nutrition expertise at this juncture in the development of the nutrition component of the SCI, whether at WHO or elsewhere, is needed to define the nutritional goals of the SCI and the means to attain them, validate the diagnostic screens, evaluate the nutrition assessment algorithms, develop and evaluate feeding recommendations (especially for complementary feeding), evaluate the effectiveness of the SCI advice in changing feeding behavior, design monitoring to ascertain whether the goals have been met, and to deal with the inevitable changes in knowledge as experience develops.

The task of mobilizing this expertise should not reside solely within CDR at WHO, or even solely within WHO. The SCI has a broad-based constituency that involves many organizations, with the leadership at WHO. In its management of the Diarrheal Disease Prevention Program, CDR has been a paragon of how to mobilize the research community to advance the implementation of programs that are effective in improving health. One may expect CDR to build on that experience. Equally important is that other agencies concerned with effective action in nutrition build on that experience in furthering the SCI. They should

mobilize scientists with the appropriate expertise and experience to focus attention on the many issues in the SCI that require further research and testing.

4



Summary and Conclusions

- Because an estimated 57 percent of infant and child deaths in developing countries are caused by the synergistic impact of malnutrition on common illnesses of infancy and childhood, the concept of including the assessment and management of nutrition in the integrated management of childhood illness is extremely important, and it is the basis of the international effort called the Sick Child Initiative (SCI). The World Health Organization (WHO) deserves the highest praise for its efforts to put this concept into practice through its Integrated Management of Childhood Illness (IMCI) activities. Major advances have been made in developing and testing the nutrition components of the SCI, but many problems remain unresolved.

- The use of the clinical encounter as a vehicle for identifying children with malnutrition and initiating a process of management to improve their nutritional status is a major accomplishment of the SCI. It is long overdue. Nevertheless, the present format of problem identification and counseling presents many logistic difficulties and does not provide mechanisms for adequate follow-up. These two issues will have to be resolved if the goals of the SCI are to be achieved. Without concerted attention to these problems, there is a significant danger of a backlash effect, in which the frustrations of health workers will cause programs to eliminate the nutrition components from the algorithms. This would be tragic because the strong role of malnutrition in childhood mortality and impaired development is now incontrovertible, and the IMCI presents an important opportunity to address this global problem.

- The CIN perceived that certain aspects of the nutrition components of the SCI have been more thoroughly developed than others, and that some have been tested empirically—especially those related to diarrhea—while others would benefit from the same rigorous field testing that has been conducted on assessment

and treatment of diarrheal disease. The recommendations for nutrition assessment of very malnourished children are strongly developed. In contrast, the diagnosis and treatment of less malnourished children—who will be a large proportion of those to be managed—is less well thought out. The CIN, however, strongly supports the continued inclusion of, and attention to, moderately malnourished children in the SCI.

- Another concern is the role of prevention of malnutrition in the SCI. The biggest concern is the appropriateness and feasibility of assessing child feeding practices and giving feeding advice to the mother or caretaker. Some components of the SCI feeding assessment and recommendations reviewed by the committee may be impractical and not feasible. The international community concerned with the SCI must give attention to the development of methods for identifying, facilitating, or establishing complementary community support systems and other means of supporting and achieving changes in child feeding practices. The committee recommends that these and related concerns be carefully addressed in the next phases of development of the SCI.

- The nutrition community—including WHO and USAID—should be mobilized to become more involved in the development and validation of diagnostic tools, the feeding recommendations, and the effectiveness of the SCI, using a model similar to that followed so successfully in WHO's CDR (WHO, 1995). Experience in the diarrheal disease program has shown that the development of the nutrition components of the SCI will be a multiyear endeavor. The unresolved issues require a research agenda that would benefit from collaboration with one or more organizations that are capable of mobilizing scientists and the expertise required.

In conclusion, the committee recommends to USAID that it support endeavors to focus scientific expertise on resolving the outstanding questions concerning the nutrition components of the SCI. The more rapidly these are resolved, the more rapidly the SCI can be implemented, and the more effective it will be in reducing childhood malnutrition and its synergistic impact on child illness in developing countries.

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Appendix A

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USAID's Request to the Committee

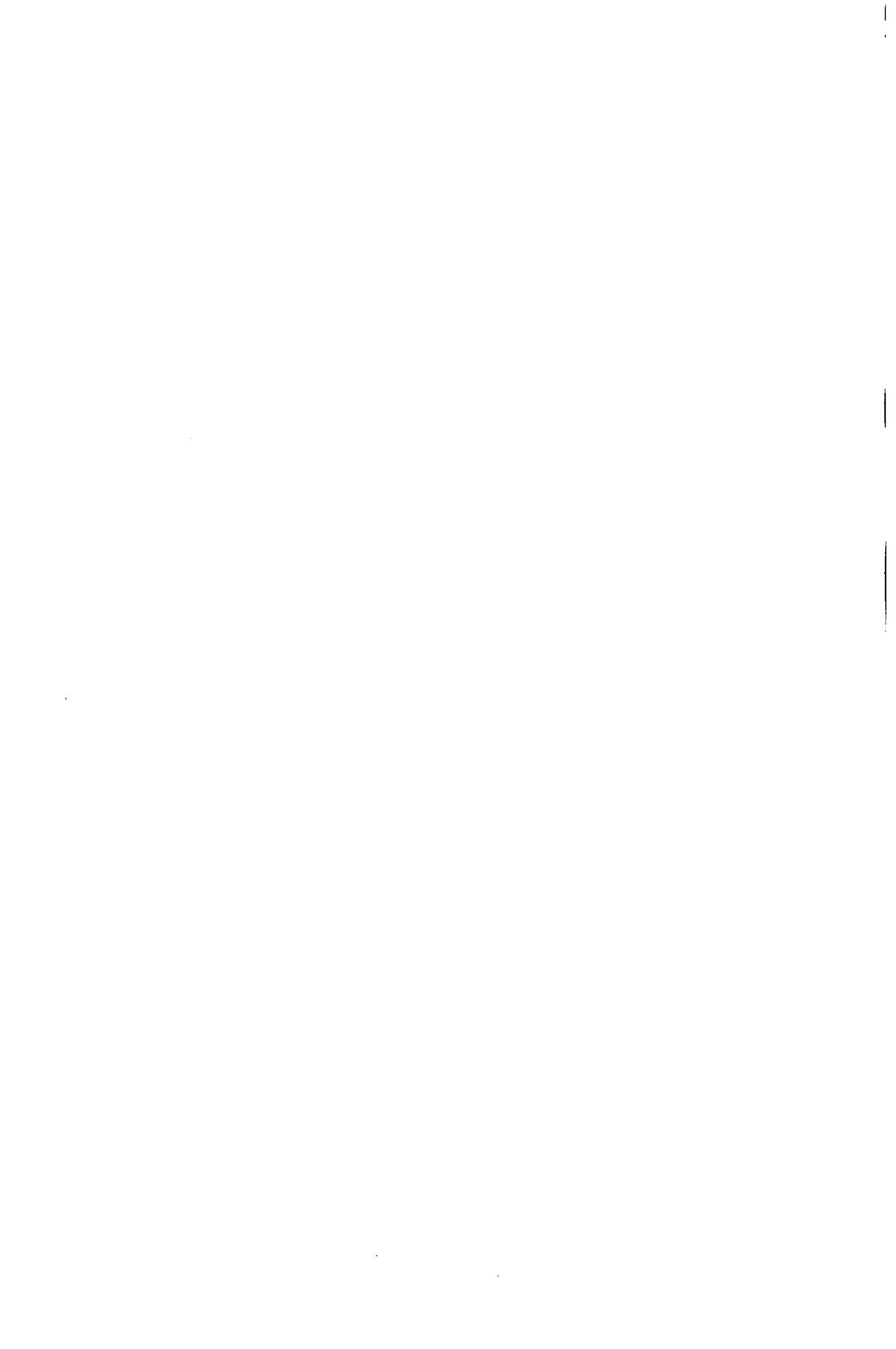
MEMORANDUM FROM SAMUEL G. KAHN DATED 8 DECEMBER 1994

TO: NAS/IOM/IH, Christopher P. Howson
FROM: USAID/G/PHN/HN, Samuel G. Kahn
SUBJECT: Committee on International Nutrition (CIN)

The third meeting of the CIN is scheduled to take place this January 19 and 20, 1995. The topic to be addressed is the nutrition components of the WHO/UNICEF "Integrated Management of Childhood Illness." This is an algorithm currently being developed for the integrated management of sick children in developing countries. Accompanying this memorandum are the algorithm, and other background documents and information which are submitted to assist the committee in its review.

Drawing on the scientific and technical knowledge of individual members, background information and other pertinent data, the committee is requested to make recommendations as to:

- practicability of the nutrition components of the algorithm;
- whether the nutrition components of the algorithm should or should not be modified, and if to be modified, how;
- what additional information or data are required to improve the performance of the integrated management of childhood illness algorithm's nutritional effectiveness.



Appendix B



Guidance on Development of the SCI Diagnostic Screens and Specific Comments on the Proposed Approaches to Diagnose and Treat Malnutrition

SUGGESTIONS FOR DEVELOPMENT OF DIAGNOSTIC SCREENS AND RELATIONSHIP TO THE IMPACT OF SCI INTERVENTIONS

The SCI algorithm is divided into three parts: assessment, classification, and treatment. Information collected in the first two parts is used as a diagnostic screen that then determines the treatment. A major innovation of the SCI is the development of an approach to create diagnostic screens across diseases, including malnutrition.

Diagnostic screens need to be evaluated in terms of their sensitivity (coverage) and efficiency. In the literature available to the CIN, preliminary analyses have been performed to evaluate some of the screens for malnutrition. Examples include the sensitivity and specificity of pallor to diagnose anemia and of low weight-for-age to diagnose malnutrition, based on the assumption that low weight-for-height (wasting) is the true indicator of the prevalence of malnutrition. In this section, comments are offered on: the need for analyses that measure the quality of the nutrition screens; a more appropriate method for comparing diagnostic screening tools according to these qualities; and the need to consider different outcomes to test the validity of these screens.

MEASUREMENT OF EFFICIENCY AND COVERAGE

Diagnostic screens are customarily described by their sensitivity and specificity. In the context of the SCI's nutrition algorithms, sensitivity is the proportion of truly malnourished individuals who are properly defined as malnourished according to the screen, and is the coverage of the screen to identify those who are truly malnourished. Specificity is the proportion of truly well-nourished individuals who are correctly defined as well-nourished according to the screen. The quality of the screen is determined by its sensitivity and specificity.

It is also useful to determine the positive predictive value (PPV) of the screens, which is the proportion of those diagnosed as malnourished who are truly malnourished. The PPV depends not only on the sensitivity and specificity of the screen, but also on the prevalence of the malnourished. It follows that $1 - \text{PPV}$ is the proportion of individuals who will be wrongly diagnosed as malnourished and wrongly treated for malnutrition. Therefore it is the positive predictive value of a screen, and not its sensitivity and specificity, that determines its efficiency. Analyses of efficiency will need to be made after the highest quality screens have been selected, and should include cost-benefit analyses that consider the prevalence of malnutrition and the resource constraints across settings.

METHODS TO COMPARE DIAGNOSTIC SCREENS

A common way to compare screens for their ability to diagnose illness is to compare the differences in prevalences of the truly ill (for example, those who will die if untreated) or by comparing the differences in the relative risks for true illness (for example, the ratio of deaths of those screening positive over those screening negative). These approaches have been used by the IMCI—to evaluate the validity of severe wasting and edema for predicting mortality, for example. Both of these avenues of comparison are directly related to the positive predictive value, however, and therefore will change across populations even when the sensitivity-specificity characteristics are constant. For this reason, the more appropriate way to compare diagnostic screening tools is the Receiver Operating Characteristics (ROC) method. ROC compares the relationship of sensitivity to specificity, which is much more constant across populations than the positive predictive value and indexes derived from it (such as, relative risks) (Green and Swets, 1966).

The ROC method was originally developed as a dichotomous screen (Green and Swets, 1966), such as the health worker's perception of wasting to pick up life-threatening marasmus. Its use requires data from many health workers in order to have a range of sensitivity and specificity. The sensitivity and

specificity for each worker's assessment of a group of individuals are plotted as Z scores. This methodology has been adapted to compare indicators of nutritional status (for example, anthropometry) and health that are continuous variables, where ROC is plotted for the sensitivity-specificity at each value of the individuals measured (Brownie et al., 1986). The resultant curves are then compared across screens to identify the best. This must be done by first examining the ROCs for parallelism between the screens to be compared in the Z score transformations, rather than plotting ROC curves in the original percentage values. Only ROC curves that do not cross can be ranked. Rankings are then compared across settings to assess their reliability. In summary, it is the committee's opinion that the development of the nutrition screens requires that data from more health workers be used to develop ROC curves to compare the screens in different settings, and that Z score transformations be used when plotting these curves.

DEFINING THE APPROPRIATE OUTCOME

Correctly defining the outcome is crucial to the validity of this approach to developing appropriate risk indicators. For this purpose, the best outcome is that which is to be prevented (for example, death). This was used in the IMCI validation to test the "severe wasting" indicator for screening. Sometimes the outcomes are too costly or time-consuming to measure, so that surrogate "gold standards" are used. Thus weight-for-height, an anthropometric proxy for wasting, has been used in the SCI as the outcome for defining the sensitivity-specificity characteristics of the weight-for-age screen to diagnose mild to moderate malnutrition. The "gold standard" proxy is only as good as its relationship to the outcome to be prevented. A potential problem noted by the CIN is that in most populations with mild to moderate malnutrition, death as the outcome to be prevented is probably better proxied by active stunting (inadequate growth in stature) than by the wasting (which is a more useful indicator of severe malnutrition) used in the SCI. This conclusion is based on the recent insight that case fatality rates for common illnesses increase with decreasing weight-for-age (Pelletier et al., 1993) in populations that do not demonstrate significant wasting (Victora, 1992). This strongly implies that present wasting may be a poor proxy for present growth stunting. If so, the validation studies that WHO's IMCI program have done on the screens for moderate malnutrition may be valid for parts of the world where low weight-for-height is prevalent, but not where stunting occurs without low weight-for-height, as is the case in most of the world. In the latter case, active stunting, rather than wasting, may need to be the "gold standard" for validating the screen.

Rather than using risk screens for a deleterious outcome such as death, the most useful screen would properly identify children who would benefit (Habicht and Pelletier, 1990) from the nutrition and other interventions proposed. The prerequisites to investigate this question are: a defined intervention and a defined response, application of the intervention, and measurement of the response. The response is the difference in outcome (in mortality, for example) between those who receive the intervention and those who do not. With this "benefit approach," it would be possible to relate the sensitivity-specificity characteristics of the diagnostic screens to the benefits (including nutritional status) of the integrated management of childhood illnesses. This should be the long-term goal of the SCI. In the meantime, WHO's IMCI program should continue with its current approach of developing screens for risk.

Research to develop indicators that predict benefit requires a research program that goes beyond the present time frame and resources of WHO's IMCI program. It is important, however, that the IMCI program and the larger SCI community mobilize the research community to address these issues in relation to the SCI diagnostic screens for malnutrition, so that they are ultimately validated relative to the SCI interventions. These interventions would also simultaneously serve to validate the SCI interventions themselves, which is an ultimate necessity.

SPECIFIC COMMENTS ON THE PROPOSED DIAGNOSIS AND TREATMENT OF MALNUTRITION IN THE NUTRITION ALGORITHMS

The SCI's management of childhood diseases, including undernutrition, can be divided conceptually into three major areas:

- The diagnosis and treatment of the sick child with severe malnutrition or severe anemia.
- The diagnosis and treatment of the sick child with moderate malnutrition or moderate anemia.
- The nutritional management of the sick child who is not malnourished.

This section of the report is structured around the nutrition components of the algorithms that are to be used for the diagnosis and treatment of children in these three categories. Responses incorporate answers to the questions that USAID asked the committee to address.

THE SICK CHILD WITH SEVERE MALNUTRITION OR SEVERE ANEMIA

Diagnosis

Children are classified as having *severe malnutrition or severe anemia* if they have any of the following symptoms: visible severe wasting, severe pallor, clouding of the cornea, or edema of both feet.

Visible Severe Wasting

The use of clinical signs of severe wasting is innovative and appropriate for detecting severely marasmic children. As discussed in the previous chapter, WHO has begun the necessary task of investigating the validity of these indicators. The results are very encouraging, although, as suggested, different methods could be used to test the specificity and sensitivity of the screens. The performance of these indicators is likely to be dependent on the expertise of the observer, so that studies at other sites will be important to confirm these results, which so far reflect the performance in the hands of only one user. In addition, training materials to systematize the recognition of visible severe wasting will need to be developed (C. Bern, CDC, Atlanta, personal communication, 1995).

Edema

There is a long history of the association between edema and risk of mortality, which has been confirmed in early tests of the validity of edema as a screen in the IMCI. Because many malnourished children present with kwashiorkor rather than, or in addition to, marasmus, inclusion of this screen is appropriate.

Severe Pallor

Severe pallor is proposed as a simple, innovative indicator of severe anemia that avoids the need for laboratory assessment. To date, testing of the anemia algorithms has focused on the sensitivity and specificity of pallor for the detection of severe anemia (J. Tulloch, CDR, WHO, Geneva, personal communication, 1995). Field performance of indicators for the clinical diagnosis of severe anemia have been fairly extensively evaluated in malarious areas, including western Kenya, The Gambia, and Uganda, where the prevalence of severe anemia (hemoglobin < 8 g/dL) reaches 50 percent (C. Bern, CDC, Atlanta, personal communication, 1995). In Siaya, Kenya, health workers assessed pallor at various anatomic sites and demonstrated that palmar pallor was 90 percent sensitive and 63 percent specific for the detection of moderate

anemia (hemoglobin < 8 g/dL), while severe palmar pallor was 60 percent sensitive and 98 percent specific to detect severe anemia (hemoglobin < 5g/dL) (C. Bern, CDC, Atlanta, personal communication, 1995). Of the anatomic sites tested, palmar pallor had the best combination of specificity and sensitivity for detecting severe and moderate anemia.

While the use of palmar pallor to detect severe anemia is innovative and should be encouraged, in the IMCI studies to determine specificity and sensitivity, only one or two clinic personnel made the evaluation (J. Tulloch, CDR, WHO, Geneva, personal communication, 1995). In future evaluations, at least ten individuals at each site should provide specificity and sensitivity estimates, so that the ROC methodology can be used appropriately.

Clouding of the Cornea

Clouding of the cornea indicates severe vitamin A deficiency and is an appropriate diagnostic tool.

Treatment

The IMCI algorithms direct the clinic health worker to give vitamin A to children in this category in areas where vitamin A deficiency is prevalent, and to refer them urgently to hospital. The recommendation to provide vitamin A in the clinic seems appropriate. The recommendation to simply refer such children elsewhere, however, assumes that primary care facilities are available, and that these facilities will have the information and resources to provide the appropriate nutritional treatment, as well as to manage the illness. Feeding assessment and the provision of appropriate nutrition advice for these children also become the responsibility of the hospitals. Thus, the feasibility of these recommendations needs to be systematically evaluated during the adaptation and early implementation phases of the SCI.

THE SICK CHILD WITH MODERATE MALNUTRITION OR MODERATE ANEMIA

Diagnosis

Although severe malnutrition is a major concern because it can be immediately life-threatening, the majority of mortality associated with malnutrition occurs among children with moderate malnutrition because of its higher prevalence (Pelletier et al., 1993). Thus, it is most important to correctly identify

and treat moderately malnourished children in order to have a significant impact on mortality rates.

Children are placed in this category if they have low weight-for-age, foamy patches on the white of the eye, or pallor.

Low Weight-for-Age to Diagnose Moderate Malnutrition

Initial visit. Diagnosis of the moderately malnourished child is more problematic than that of the severely malnourished child. Most moderately malnourished children are not wasted (Beaton et al., 1990; Victora, 1992), so that wasting is not useful in determining which of these children need nutritional management.

Anthropometric indicators for the detection of marginal malnutrition must be developed while considering the pattern and timing of growth failure in developing countries. Malnutrition during the first few (4–6) months of life generally manifests itself as an earlier and more pronounced deficit in length growth rather than in weight growth (Calloway et al., 1988; Ruel et al., 1995). This means that length-for-age may be a better outcome than weight-for-length for validating the screen to detect children who are undernourished in early infancy, and that failure in length growth is likely to reflect *current* undernutrition at this age.

Between about 4–6 and 18 months of age, children in poor regions of the world are likely to suffer both poor weight gain and poor linear growth, brought about by a combination of inadequate nutrient intake and infections (Tomkins and Watson, 1989). This will be reflected in low weight-for-age and low length-for-age, but not in low weight-for-height in most regions of the world, unless the child is severely malnourished. Because deficits in length and weight are cumulative over this period, as the child becomes older, low height-or weight-for age are progressively more likely to reflect *past* malnutrition than the current feeding situation. In nonwasted populations, after about 18–22 months of age, growth rates become more similar to those of well-nourished children, although the child usually remains lighter and shorter than the international reference values (Allen, 1993; Beaton et al., 1990).

One implication of this progression is that a different threshold for low weight- or height-for-age might be considered at different ages. Consideration should be given to developing a growth chart with a reference curve based on varying cutoffs depending on the age of the child. If the appropriateness of different cutoffs is not carefully considered and tested, this could lead to inappropriate and inefficient use of resources, given that the IMCI recommends feeding assessment, advice, and follow-up for every child whose weight falls below a given threshold. Intervention will most benefit the child who is currently growing poorly, and may not change the outcome for older children

who have low weight-for-age because of previous poor growth (stunting) (Beaton et al., 1990). The current plan is to determine actual thresholds during the in-country adaptation phase of the SCI. This is an area that needs more thought and research by the SCI community (WHO, in press).

Anthropometric Measures at Follow-up Visits

According to the nutrition algorithms, the follow-up visit for a child who meets the anthropometric criteria for poor growth on the initial visit is to be scheduled at 14 days. This is appropriate for enabling the health worker to check whether the caretaker was able to implement the recommendations, to provide support to continue correct practices, and to reorient the caretaker in cases of difficulty or failure. Fourteen days, however, is too short for growth to be determined accurately, and may lead to an incorrect assessment of improvement. In addition, since no new intervention is recommended at 14 days, there is no concrete incentive for a mother to return.

Alternative Anthropometric Indicators

Alternative indicators are to be addressed in the "Adaptation Guide," including length-for-age, weight-for-height, mid-upper-arm circumference, and growth faltering. Each of these indicators has advantages and disadvantages compared with weight-for-age.

Mid-upper-arm circumference (MUAC) is more likely to identify younger children than older children as malnourished, when used with a fixed cutoff. It identifies different children as malnourished from those identified either by weight-for-age or weight-for-height. Also, measurement errors in MUAC may be more likely to shift a child from the "not malnourished" category to the "malnourished" category (or vice versa) than for other measurements, because the margin for error is smaller.

Foamy Patches on the Whites of the Eyes to Diagnose Moderate Vitamin A Deficiency

While this indicator is appropriate for diagnosing vitamin A deficiency, the committee suggests adding "won't open eyes" and a question about nightblindness history to the classification of nutritional status. The committee also recommends that children who "won't open their eyes" or "whose eyes are pussy" be included under measles, requiring referral, in addition to clouding of the cornea. It should be made clear that the child's eyes must be forced open if necessary, because health personnel are often reluctant to do this.

Pallor to Diagnose Moderate Anemia

Further attention needs to be paid to the problem of diagnosing less severe anemia (hemoglobin 8–11 g/dL) using pallor. The IMCI has tested the sensitivity and specificity of palmar pallor for diagnosing moderate anemia in only one nonmalarious site in Bangladesh (J. Tulloch, CDR, WHO, Geneva, personal communication, 1995). Hemoglobin concentrations below 8 g/dL are relatively rare in countries where malaria is absent, whereas concentrations in the range of 8–11 g/dL are very common in most areas of the world (ACC/SCN, 1991). Concentrations in this range, however, are well-established as having detrimental consequences for the cognitive performance and other functions of the child (Scrimshaw, 1991). Whether or not clinical signs are useful to detect moderate anemia remains to be seen.

Nutritional Management

Proposed Procedures to Assess Feeding Problems and to Provide Nutritional Counseling

Assessment of feeding problems. The caretakers of all infants ages 1 week to 2 months are asked questions about whether there is any difficulty feeding; whether the child is breastfed, and if so, how many times a day; and whether the infant usually receives any other foods or drinks, and if so, how often. An assessment of breastfeeding is then recommended in the algorithm if the infant has any difficulty feeding, is feeding less than six times a day, has a low weight-for-age, or is taking any other food or drinks, but has no indications for urgent referral to hospital.

The part of the nutrition algorithm concerned with assessment of the feeding of older children contains three sections: usual breastfeeding practices, usual consumption of other foods and fluids, and any modifications of these feeding practices during the current illness. The questions on breastfeeding refer to the frequency of daytime breastfeeding and any occurrence of nighttime breastfeeding. The questions on other foods and fluids solicit information on the kinds of items, their frequency of administration, and the use of feeding bottles; for low weight-for-age children, information is also sought about the portion size, who feeds the child, and the methods of feeding.

Nutrition counseling. The feeding recommendations encompassed within the algorithm are divided into five age categories: birth to 4 months of age, 4–6 months, 6–12 months, 12–24 months, and older than 24 months. Exclusive breastfeeding at least six times daily is suggested for the youngest age group, and introduction of complementary foods is recommended for those 4 to 6 months, depending on the presence of specific indicators of apparent need.

These indicators included poor weight gain (not defined), hungry appearance after breastfeeding, and demonstration of interest in semisolid foods. During the next age period, continued breastfeeding on demand is recommended, along with at least three to five adequate servings daily, depending on breastfeeding status, of locally available foods rich in nutrients and energy. The recommendations specify the appropriate order of feeding: first, breast milk; then semisolids; and finally other fluids.

During the period from 12–24 months, continued breastfeeding is recommended, as well as five adequate servings of family foods or other recommended foods. The suggested order of serving semisolids and breastmilk is reversed from that stated for the preceding age group. For the oldest age group (>24 months), three servings daily of family foods and two nutritious snacks are recommended. A footnote providing examples of the kinds of foods that might be offered for the periods from 6 to 24 months suggests an energy-rich food (possibly a thick cereal with added oil), meat, fish, eggs or pulses, and fruits and vegetables.

Comments on Infant Feeding Assessment

It will be necessary to develop appropriate age-specific feeding recommendations (considering issues of food availability, cultural beliefs, and prevailing nutritional problems) for each country or subregion within the country before successful implementation of the nutritional treatment algorithm will be possible at new locales. The IMCI proposes to do this within the local adaptation activities. Once these recommendations are developed, the assessment of child feeding within the context of the SCI visit can be simplified to examine the extent to which the locale-specific recommendations are already being used for an individual child, and to reinforce recommended practices.

Infants found to have low weight-for-age between 1 week and 2 months of age will be targeted for a feeding assessment. Low weight-for-age during the first few weeks after birth, however, may be caused primarily by low birth weight. A substantial proportion of infants may therefore be assessed unnecessarily for breastfeeding problems, a possibility that will need to be investigated. A 1-week-old infant who weighs less than at birth may have feeding problems, whereas a small infant who has gained weight probably does not. Thus, weight in relation to birthweight may be a better indicator of feeding problems during this period; information on birth weight, however, is often unavailable.

The committee felt that more thought needs to be given to the section on “Assess Breastfeeding” of the young infant. As stated, breastfeeding will not be assessed for infants who have fed in the previous hour, regardless of identified

low weight or feeding problems. If the infant has not fed for at least an hour, there is to be 4-minute period when breastfeeding is observed. Assessment of attachment probably needs to be done within a few days after birth—if it is not adequate at this time, the infant will be at serious risk of malnutrition and dehydration. Even making the assessment at 1 week postpartum may be too late. The assessment would require careful training of personnel because it is not easy to do well. The committee also questions what will be done if poor attachment is identified and how successful any intervention is likely to be.

Comments on Assessment of Feeding in Children Age 2 Months to 2 Years

The questions about breastfeeding will, appropriately, provide information on whether the child is currently breastfed during the day and at night. It is not certain, however, whether all mothers will be able to report their frequency of nursing. Because the feeding recommendations specify that the child should be fed as often as he or she wants, it would be desirable to obtain information on the signals used to initiate a feed (mother's preference or child's demand). Finally, mothers should be asked whether they are aware of any problems with breastfeeding.

The questions on other foods may need to be reformulated in each locale. If, for example, there are common local preparations that are suitable for young children, mothers might be questioned specifically about their knowledge and use of these foods. It is not clear how information on serving size will be obtained, especially when the children do not receive their own servings and when there are multiple caregivers. Each of these questions must be developed during the locale-specific adaptation phase. Because the committee was unconvinced of the importance of the order of feeding breast milk and semisolids, the lack of questions pertaining to serving order was not viewed as problematic.

Comments on Feeding Recommendations

The committee felt that several aspects of the feeding recommendations are unnecessarily complicated. In particular, it should be possible to reduce the number of age groups presented, and it may be possible to eliminate the recommendations regarding the order of individual foods served. At the same time, much more effort should be devoted to defining what is meant by a "good daily diet" in a given setting. This will require adaptation of the algorithm in each country, and a process must be developed to prepare country-specific recommendations based on the general guidelines.

The emphasis on local adaptation of the Food Box is strongly endorsed by the CIN. In some countries, existing governmental and nongovernmental nutrition programs have already acquired valuable information on child feeding practices, feeding problems, and feasible solutions to some of these problems that could be incorporated into the modified feeding recommendations. Nevertheless, the CIN believes that the available information needed to serve as the basis for feeding recommendations will be poor in many countries and regions. It is unrealistic to expect that resources would necessarily be available to fill these information gaps. Therefore, the CIN strongly suggests that the mechanisms for generating this information, and the resources to do so, be clearly identified and developed prior to full in-country implementation of the SCI.

Little information is available on the relationships between dietary intake and functional outcomes in children beyond two years of age. A number of studies suggest, however, that the growth velocity of children of this age in developing countries approximates that of children in more affluent nations (Allen, 1993). Therefore, specific feeding recommendations may no longer be necessary for children of this age range in developing countries when local data suggest adequate growth and nutritional status. The committee agrees that the suggested provision of two nutritious snacks in addition to three meals of family foods a day seems acceptable and is unlikely to produce any harm. Only recommendations that are important for child nutrition and health should be articulated, however, to avoid any unnecessary expenditure of health worker time for counseling on nonessential matters. In addition, it may be better to give intensive age-specific advice to mothers of children in the age group when growth faltering tends to occur, rather than attempt to target those with anthropometric deficits. It will be important to be able to tap into resources for feeding advice and support already operating in a community, or to develop them. This may be especially possible in, for example, Latin America (as compared to many parts of Africa). The counseling and support provided by the IMCI algorithms should be carefully linked to that provided by other programs to ensure complementary services.

It appears that the component of the algorithm that will be most difficult to implement will be the country-specific recommendations for special foods for infants during the period from 6 to 12 months. The committee recommends that general guidelines be prepared first regarding ideal characteristics of the special foods and a process to allow translation of these guidelines into specific recommendations in a given setting. In particular, quantitative guidelines are needed on the recommended energy density, feeding frequency, and nutrient content of special foods for this age group. The committee was not provided with information on these issues and felt that a great deal of additional thought

will need to be devoted to them. The current recommendations on the kinds of foods that comprise a good daily diet are too vague to be very useful in planning adequate diets. In many instances there may be several ways to increase the quantity or quality of complementary foods that are equally adequate from a nutritional viewpoint, but not equally feasible or acceptable from the viewpoint of the family. In order to increase the likelihood that families will be able to follow the feeding recommendations given during the counseling session, it is critical that the recommendations be sound from both a biomedical and a social science perspective.

The optimal age for introduction of complementary foods is controversial. While some recent evidence suggests that these foods may not be necessary before 6 months of age (Cohen et al., 1994), more information is needed on this question, especially for populations with large numbers of low-birth-weight infants or undernourished mothers. If these recent observations are confirmed, separate feeding recommendations for infants from 4 to 6 months of age may become superfluous.

Although it is recognized that individual children may require complementary foods at different ages, the committee recommends, from an operational perspective, that the age at which additional foods should be introduced be stated. Moreover, the currently proposed indicators of apparent need for complementary foods were of great concern to the committee for two reasons. *First*, the definition of inadequate weight gain needs to be specified. This is a major challenge, especially given the current debate about the appropriate reference data to use for breastfed infants. *Second*, the appearance of hunger after breastfeeding may easily be misinterpreted. It is conceivable that infants who are uncomfortable after a feed for any of a number of possible reasons will be assumed—erroneously—to be receiving an inadequate amount of breastmilk. Thus, if advice on introduction of complementary foods is to be individualized, better indicators must be developed.

The committee was not aware of sufficiently compelling scientific evidence to warrant specification of the order of breastmilk, foods, and other liquids in the course of a single feeding episode. These recommendations, as currently stated, may be especially difficult to communicate to caregivers because of the different suggested orders of breastfeeds and semisolids before and after the age of 12 months. Unless additional evidence is forthcoming, the committee recommends that the advice be simplified to the following: other foods and liquids should be offered at least three times a day, after or between breastfeeds. The committee was uncertain about the specific age at which children could consume customary family foods in place of specially prepared infant foods. This may vary in individual countries, depending on the types of family foods available and prevailing cultural beliefs. Until further information is available, the recommended transition at 12 months seems reasonable.

Milk should be mentioned in the footnote that describes a good daily diet. The recommendation to add oil to thick cereals should be made with caution, because this practice can easily dilute the concentration of protein and micronutrients in the food, and consequently the amounts of these nutrients consumed by the infant. This is an area of current research that needs to be encouraged.

The CIN feels that it is important in both the training protocols and the adaptation manuals to explicitly recognize the role of family members other than the mother in transmitting and implementing feeding advice. It is not always the mother who brings the child into the health facility. The caretaker accompanying the child will depend on such factors as the work patterns of the mother, cultural norms concerning travel outside the village and interaction with authorities; and perceived severity of the child's condition (both at the initial visit and at follow-up visits). While it may be convenient (as is currently the case) to frame the algorithm in terms of the mother/child dyad, the CIN recommends considering substituting "mother/caretaker" for "mother" in the IMCI charts.

In addition to asking the mother/caretaker about current feeding practices and whether or not the child's feeding has changed during the illness, the committee also recommends that she be asked what *she* perceives as the main problem (if any) in feeding this child. Not only would such a question draw the attention of the health worker to constrained resources (such as time, food, and money) where they are as much or more of a barrier to optimal feeding as lack of information about correct feeding practices, but it would also convey to the mother/caretaker that her analysis of the feeding problem is considered valuable. In some cases, when the health worker understands what the mother/caretaker views as the most important feeding problem, together they can come up with a practical solution. In addition, however, a considerable body of research and programmatic experience suggests that when mothers are made to feel that their viewpoint is respected and considered valuable by health workers, they are more likely to follow the advice being given and to return for future visits to the health facility.

One component of the nutrition algorithm is to advise the mother/caretaker of infants or children diagnosed as having moderate malnutrition or feeding problems to return with the child in 14 days. A further follow-up visit after another 14 days is recommended if the child is not judged by the health worker to be doing well nutritionally at the first follow-up visit. The CIN feels that the practicality or feasibility of follow-up visits needs to be carefully assessed in terms of the distance from where families live to the primary level health facility; competing demands on the family member's time (particularly the time of the mother); and the benefits or additional services that the mother might

expect to receive on behalf of herself or the sick child at the time of the follow-up visit. The committee recognizes that the issue of the practicality of follow-up visits extends beyond the nutrition components of the algorithm, but because follow-up visits after 14 days are an important component of the nutrition advice given to the mother, the CIN wishes to raise the issue for consideration. In many settings over half of all children under 5 years of age are likely to be classified as malnourished or anemic (ACC/SCN, 1992), so it is probable that many follow-up visit recommendations will be triggered, thus making their practicality an appropriate concern.

The CIN would like to offer two suggestions concerning the issue of practicality of follow-up visits. The first is that further information should be obtained concerning the proportion of recommended follow-up visits that actually occur, as well as any factors that are strongly associated with an increased or decreased likelihood of the sick child being brought in for a follow-up visit. There are several potential sources of such information. One is systematic evaluation of the past experience of first-level health facilities with follow-up visits for sick children. Another source of information would be stand-alone research on follow-up visits. A third source would be careful evaluation of the follow-up visit element of the IMCI as it is implemented in the field to test if the health worker can go to the family rather than expecting the mother or another family member to bring the child back to the facility. In addition, where something of value to the family will be obtained at the follow-up visit (for example, the growth monitoring programs are linked to take-home food rations), the visit is more likely to occur. Anthropological research concerning child survival interventions leads to the conclusion that if the mother/caretaker expects only to receive further advice, and perhaps to be evaluated negatively on the progress that her child is making, the likelihood of a follow-up visit is significantly diminished (Coreil et al., 1994).

Treatment of Anemia

While iron deficiency is the primary cause of anemia, it is generally accepted that another important cause of anemia, especially during pregnancy, is folate deficiency. For this reason, combined iron-folate supplements are available from WHO. The IMCI recommends not using supplements containing folate in malarious areas because of competition with antimalarials. Also, the effectiveness of folate supplements for reducing anemia in adult women has been shown in several countries to be negligible. Consideration should be given to the potential benefits for children of combining other nutrients in iron supplements rather than, or in addition to, folate. For example, retinol (Mejia and Chew, 1988; Muhilal et al., 1988; Suharno et al., 1993) and riboflavin

(Powers et al., 1985) supplements have produced significant improvements in anemia compared with iron alone.

Treatment of Vitamin A Deficiency

It has long been recognized by WHO that the appearance of xerophthalmia in a population indicates a high prevalence of vitamin A deficiency, which may provoke the need to provide vitamin A to all children seen in the clinic and/or country-level programmatic interventions.

The algorithms suggest that vitamin A be given to all children with measles, with "severe malnutrition or severe anemia," or "malnutrition or anemia." The committee felt that these recommendations were appropriate.

Under the algorithms for Identifying Treatment of the child with malnutrition or anemia, the recommendation is to "Make sure child is receiving foods containing Vitamin A." This recommendation needs to be reexamined, and perhaps altered to refer more specifically to animal products high in vitamin A (retinol). Plant foods do not contain preformed vitamin A, and absorption of carotenoids (pro-vitamin A) may be poor in the many regions of the world where fat intakes are low. Increasing intake of plant sources of the pro-vitamin may therefore be less effective unless some oil is added to the local diet. The addition of oil, however, needs to be done with caution, as described under our comments on appropriate complementary foods for infants.

NUTRITIONAL MANAGEMENT OF THE SICK CHILD WHO IS NOT MALNOURISHED

In most cases, few, if any, modifications of currently recommended feeding practices for infants and young preschool children are required during illness. Thus, the major concerns of the clinic-based health worker when examining a sick child should be to assure that the child's usual feeding practices are appropriate for age, these practices are continued to the extent possible during illness, and that any necessary illness-related modifications are discussed with the child's caregiver. When these feeding practices (either before or during illness) are inappropriate, the reasons should be explored to identify and resolve any constraints to implementation of the suggested feeding recommendations.

Acute Diarrhea

No specific recommendations are provided on feeding children during acute diarrhea. As indicated above, in most cases no modifications of the usual diet will be necessary. In settings where infants less than 6 months of age are fed

exclusively with nonhuman milks, however, caution is indicated when the diarrhea is severe and dehydration is present. Mothers should be advised to observe the child closely for worsening diarrhea, which may require that a local cereal or tuber be added to the milk drink to reduce the amount of milk (lactose) that needs to be consumed. The need for micronutrient supplementation is currently under study, and additional recommendations may be forthcoming in the near future. Mothers should also be warned of the possibility of reduced child appetite during diarrhea and the possible ways to manage this problem.

Persistent Diarrhea

The recommendations for persistent diarrhea indicate that milk feeds should be modified to encourage more frequent breastfeeding of longer duration and the partial replacement of nonhuman milk consumption with fermented milk products or semisolid food. It is unlikely that women can actively increase the duration of breastfeeding unless they have been terminating feeds before the child was satisfied. It would be preferable to state that the infant should be allowed to terminate each nursing episode. The recommendation regarding nonhuman milks seems appropriate for children older than 6 months, but it may be difficult to implement for younger infants who have not had experience with nonliquid foods. Again, specific advice on micronutrient supplements may be appropriate once more information is available from ongoing clinical trials. Currently the IMCI does not recommend vitamin A supplementation in persistent diarrhea. Nevertheless, because vitamin A supplements do reduce the severity of diarrhea and diarrhea-associated mortality (Beaton et al., 1992), the rationale for this is unclear to the CIN.

Dysentery

No specific recommendations are provided on the dietary management of patients with dysentery. Some studies suggest that excessive losses of protein and other nutrients in fecal blood may necessitate supplementation with these nutrients. More research will be needed in this area before new recommendations can be implemented.

Measles

The nutritional recommendation for severe, complicated measles; complicated measles; and uncomplicated measles is to treat with vitamin A. This recommendation is based on a recent meta-analysis of community vitamin A supplementation trials, which shows that vitamin A reduced mortality and severe complications after the onset of measles (Beaton et al., 1992). Thus, the

recommendation to supplement with vitamin A is justifiable if there is a high prevalence of vitamin A deficiency or of measles fatality in the community, which must be decided prior to implementation of the SCI. Mothers of children with severe measles and uncomplicated measles are asked to return to the clinic with the child in 5 days if the child still has a fever; if there is no fever at 5 days, they are asked to return to the clinic in 14 days for a full assessment—including possible malnutrition—and for advice on how to feed her child based on the Food Box. We assume that the provision of feeding advice after a measles episode is thought to be useful here because malnutrition is a common complication of (that is, caused by) measles. The committee, however, questions whether it is *necessary* to provide the mother of a well-nourished child with information on how to feed her child after measles, especially if there are no complications.

Appendix C

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Additional Materials

Available to the Committee

The committee gathered the following additional information for consideration at the meeting:

- American Academy of Pediatrics Committee on Infectious Diseases. 1993. Vitamin A treatment of measles. *Pediatrics* 91(5): 1014–1015.
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- Brown, K. H. 1994. Dietary management of acute diarrheal disease: Contemporary scientific issues. *J. Nutr.* 124(suppl.): 1455S–1460S.
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- Brown, K. H., J. M. Peerson, and O. Fontaine. 1994. Use of nonhuman milks in the dietary management of young children with acute diarrhea: A meta-analysis of clinical trials. *Pediatrics* 93(1): 17–27.
- Brown, K. H., J. M. Peerson, G. Lopez de Romaña, H. C. de Kanashiro, and R. E. Black. 1995. Validity and epidemiology of reported poor appetite among Peruvian infants from a low-income, peri-urban community. *Am. J. Clin. Nutr.* 61(1): 26–32.
- Castillo-Duran, C., P. Vial, and R. Uauy. 1988. Trace mineral balance during acute diarrhea in infants. *J. Pediatr.* 113(3): 452–457.
- Lutter, C. K., J. O. Mora, J-P. Habicht, K. M. Rasmussen, D. S. Robson, S. G. Sellers, C. M. Super, and M. G. Herrera. 1989. Nutritional supplementation: Effects on child stunting because of diarrhea. *Am. J. Clin. Nutr.* 50: 1–8.

- Ogaro, F. O., V. A. Orinda, F. E. Onyango, and R. E. Black. 1993. Effect of vitamin A on diarrhoeal and respiratory complications of measles. *Trop. Geog. Med.* 45(6): 283–286.
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- Sachdev, H. P. S., N. K. Mittal, S. K. Mittal, and H. S. Yadav. 1988. A controlled trial on utility of oral zinc supplementation in acute dehydrating diarrhea in infants. *J. Pediatr. Gastroenterol. Nutr.* 7: 877–881.
- Zinc and copper wastage during acute diarrhea. 1990. *Nutr. Rev.* 48(1): 19–22.

Appendix D

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The Nutrition Algorithms

The following are excerpts of important nutrition components of the SCI algorithms found on pages 2, 14, 15, 30, 31, and 32 of the WHO (World Health Organization) *Management of Childhood Illness* (Developmental—Prepared for Field Testing, February 1995).

ASSESS

THEN CHECK THE CHILD FOR MALNUTRITION AND ANAEMIA.

LOOK AND FEEL:

- Look for visible severe wasting.
- Look for palmar pallor.
- Look for clouding of the cornea.
- Look for foamy patches on the white of the eye.
- Look for oedema of both feet.
- Weigh the child. Then determine weight for age.

Classify
NUTRITIONAL STATUS

CLASSIFY
THE ILLNESS USING ALL
BOXES THAT MATCH THE CHILD'S
SYMPTOMS OR PROBLEMS:

IDENTIFY TREATMENT

<ul style="list-style-type: none"> • Visible severe wasting, • Severe pallor, • Clouding of the cornea, or • Oedema of both feet. 	SEVERE MALNUTRITION OR SEVERE ANAEMIA	<ul style="list-style-type: none"> ▶ Give Vitamin A. ▶ Refer URGENTLY to hospital.
<ul style="list-style-type: none"> • Low weight for age, • Foamy patches on the white of the eye, or • Pallor. 	MALNUTRITION OR ANAEMIA	<ul style="list-style-type: none"> ▶ Assess the child's feeding and counsel the mother on feeding using the FOOD box on the COUNSEL THE MOTHER chart. ▶ If foamy patches on white of eye, <ul style="list-style-type: none"> - Give Vitamin A. - Make sure child is receiving foods containing Vitamin A. ▶ If pallor, <ul style="list-style-type: none"> - Give iron. - Give oral antimalarial if high malaria risk. - Give mebendazole if child is 2 years or older and has not had a dose in the previous 6 months. ▶ If low weight for age or pallor, advise mother to return with child in 14 days.
<ul style="list-style-type: none"> • Not low weight for age and no other signs of malnutrition. 	NO SIGNS OF MALNUTRITION OR ANAEMIA	<ul style="list-style-type: none"> ▶ If child is less than 2 years old, assess the child's feeding and counsel the mother on feeding using the FOOD box on the COUNSEL THE MOTHER chart.

MAKE SURE CHILD WITH DANGER SIGNS IS REFERRED after first dose of an appropriate antibiotic and other urgent treatments.

Exceptions: Rehydration of the child with severe dehydration may resolve danger signs so that referral is no longer needed.



COUNSEL THE MOTHER



FOOD

▶ ***Assess the Child's Feeding***

Ask questions about the child's usual feeding and feeding during illness. Compare the mother's answers to the *Feeding Recommendations* for the child's age in the box below.

ASK -

- ▶ Do you breastfeed your child?
 - How many times a day?
 - Do you also breastfeed during the night?

- ▶ Does the child take any other food or fluids?
 - What food or fluids?
 - How many times a day?
 - Does the child use a feeding bottle?
 - If low weight for age: How large are servings? Does the child receive his own serving? Who feeds the child and how?

- ▶ During this illness, has the child's feeding changed? If so, how?

► Feeding Recommendations During Sickness and Health

<p>Up to 4 Months of Age</p>  <ul style="list-style-type: none"> Breastfeed as often as the child wants, day and night – at least 6 times a day. Do not give other foods or fluids. 	<p>4 Months up to 6 Months</p>  <ul style="list-style-type: none"> Breastfeed as often as the child wants, day and night – at least 6 times a day. If the child: <ul style="list-style-type: none"> is not gaining weight adequately, appears hungry after breastfeeding, or shows interest in semisolid foods, <p>add complementary foods (listed under 6 months up to 12 months).</p> <p>Give these foods 1 or 2 times daily after breastfeeding.</p>	<p>6 Months up to 12 Months</p>  <ul style="list-style-type: none"> Breastfeed as often as the child wants. Give adequate servings of: <ul style="list-style-type: none"> _____ _____ 3 times a day if breastfed; 5 times a day if not breastfed. At each feeding, follow this order:  	<p>12 Months up to 2 Years</p>  <ul style="list-style-type: none"> Breastfeed as often as the child wants. Give adequate servings of: <ul style="list-style-type: none"> _____ _____ or family foods 5 times a day. At each feeding, follow this order:  	<p>2 Years and Older</p>  <ul style="list-style-type: none"> Give family foods at 3 meals each day. Also, twice daily, give nutritious food between meals, such as: <ul style="list-style-type: none"> _____ _____ 
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* A good daily diet should be adequate in quantity and include an energy-rich food (for example, thick cereal with added oil); meat, fish, eggs, or pulses; and fruits and vegetables.

¹ FOR CHILD WITH PERSISTENT DIARRHOEA

Modify milk feeds as follows:

- If still breastfeeding, give more frequent, longer breastfeeds, day and night.
- If taking other milk, replace with increased breastfeeding,
OR replace with fermented milk products, such as yoghurt
OR replace half the milk with nutrient-rich semisolid food.

For other foods, follow feeding advice appropriate for the age group.

COUNSEL THE MOTHER

Counsel the Mother About Feeding Problems

If the child is not being fed as described in the above recommendations, counsel the mother accordingly. In addition:



- ▶ If the mother reports difficulty with breastfeeding, assess breastfeeding. As needed, show the mother correct positioning and attachment for breastfeeding.
- ▶ If the child is less than 4 months old and is taking other milk or foods:
 - Build mother's confidence that she can produce all the breastmilk that the child needs.
 - If the child's weight is not low, reassure the mother that weight gain is adequate.
 - Suggest giving more frequent, longer breastfeeds, day and night, and gradually reducing other milk or foods.

If other milk needs to be continued, counsel the mother to:

- Breastfeed as much as possible, including at night.
- Make sure that other milk is a locally appropriate breastmilk substitute.
- Make sure other milk is correctly and hygienically prepared.
- Finish prepared milk within an hour.



- ▶ If the mother is using a bottle to feed the child:
 - Recommend substituting a cup for bottle.
 - Show the mother how to feed the child with a cup.
- ▶ If the child is not being fed actively, counsel the mother to:

- Sit with the child and encourage eating.
- Give the child an adequate serving in a separate plate or bowl.



- ▶ If the child is not feeding well during illness, counsel the mother to:
 - Breastfeed frequently or offer frequent small feedings.
 - Use soft, varied, appetizing, favourite foods to encourage the child to eat as much as possible.
 - Clear a blocked nose if it interferes with feeding.
 - Expect that appetite will improve as child gets better.

FLUIDS**Advise the Mother to Increase Fluids During Illness**

- ▶ Breastfeed frequently.
- ▶ Offer every sick child more to drink, for example, clean water, soup, rice water, or yoghurt drinks.
- ▶ Giving more fluids can be lifesaving for a child with diarrhoea. For diarrhoea, give fluids according to Plan A or B on *TREAT THE CHILD* chart.



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