



Anemia Prevention and Control: **WHAT WORKS**

Part II Tools and Resources



Anemia Prevention
and Control:
WHAT WORKS

Part II

Tools and Resources

The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of USAID.

The findings, interpretations, and conclusions expressed here are those of the author(s) and do not necessarily reflect the views of the Board of Executive Directors of the World Bank or the governments they represent. The World Bank cannot guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply on the part of the World Bank any judgment of the legal status of any territory or the endorsement or acceptance of such boundaries.

The views expressed in this publication are those of the author(s) and do not necessarily reflect the views of UNICEF. Any map in this work does not reflect a position by UNICEF on the legal status of any country or territory or the delimitation of any frontiers.

This document does not necessarily represent the views or opinions of the Pan American Health Organization (PAHO).

The views expressed in this publication are those of the author(s) and do not necessarily reflect the views of the Food and Agriculture Organization (FAO) of the United Nations. The designations employed and the presentation of material do not imply the expression of any opinion whatsoever on the part of FAO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The designations “developed” and “developing” economies are intended for statistical convenience and do not necessarily express a judgement about the stage reached by a particular country or area in the development process.

The views in this document do not necessarily reflect the views expressed or promoted by the Micronutrient Initiative.

Cover photo credits: P. Bennett/IDRC (top), D. Sing/IDRC (middle), D. Marchand/IDRC (bottom)

The Monitoring, Evaluation, and Design Support (MEDS) project coordinated the development and production of this document. MEDS is funded by USAID under contract no. HRN-I-02-99-0002-00, task order no. 02. LTG Associates, Inc., and TvT Global Health and Development Strategies™, a division of Social & Scientific Systems, Inc., implement the project.

The Population, Health and Nutrition Information (PHNI) Project produced this document. PHNI is funded by USAID under contract no. HRN-C-00-00-00004-00. The Project is managed by Jorge Scientific Corporation with The Futures Group International and John Snow, Inc.

ISBN

June 2003

Anemia Prevention and Control: What Works

Contents

Part II: Tools and Resources

Abbreviations and Acronyms/Units of Measure	5
Introduction	7
Statistics/Technical Data	
Hemoglobin and Hematocrit Values Defining Anemia at Sea Level ...	9
Shifting the Hemoglobin Distribution: Hemoglobin Distribution in Palestinian vs American Children and Women	10
Anemia Prevalence Rates in Vulnerable Populations, Selected Countries	11
Anemia Prevalence by Rural/Urban Residence, Selected Countries ..	19
Substances That Inhibit and Enhance Absorption of Iron	19
Demands for Iron in Pregnancy	20
Proportion of Women Utilizing Antenatal Care (ANC) Services and Receiving/Taking Iron or Iron-Folic Acid (IFA) Supplements, Selected Countries	21
Program Development	
Raising Awareness/Program Advocacy: Sample Fact Sheets	23
Early Childhood Development	
Iron Overload	
Selected Monitoring and Evaluation Indicators for Anemia Prevention and Control Programs	26
A Tool for Reviewing Micronutrient Programs	27
Qualitative Research Instrument on Perceptions of Anemia and Use of Iron Supplements – The Indramayu Project, Indonesia	42
The Plan	
The Interview Instruments	
Trials of Improved Practices (TIPS)	
Recommended Intermittent Presumptive Treatment (IPT) or Treatment Regimens for Malaria, Hookworm, and Schistosomiasis ..	56

Iron Supplementation/Food Fortification	
Iron Doses and Three-Month Hemoglobin Increase in Women	59
Iron and Folic Acid Doses for Universal Supplementation in Vulnerable Groups	60
Iron and Folic Acid Doses for Treating Severe Anemia in Vulnerable Groups	61
United States Dietary Reference Intakes for Anemia-Related Micronutrients (Other Than Iron and Folic Acid) for Vulnerable Groups	62
Counseling Pregnant Women and Mothers About Iron Supplements	63
Counseling Points	
Sample Counseling Cards From Indonesia	
Negotiating With Women to Follow Advice	67
Food Fortification: Seven Steps for Quality Control	68
Information Sources for Anemia Prevention and Control . . .	69
References (to Parts I and II)	72

Abbreviations and Acronyms

ACC/SCN	Administrative Committee on Coordination, Sub-Committee on Nutrition (United Nations)
AED	Academy for Educational Development
AIDS	acquired immunodeficiency syndrome
ANC	antenatal care
BASICS	Basic Support for Institutionalizing Child Survival (Project)
BF	breastfeeding
CARE	Cooperative for Assistance and Relief Everywhere
CDC	Centers for Disease Control and Prevention (United States)
CF	complementary foods
CIDA	Canadian International Development Authority
DHS	Demographic and Health Survey
ECD	early childhood development
EDTA	ethylene diamine tetra-acetate
FANTA	Food and Nutrition Technical Assistance (Project)
FAO	Food and Agriculture Organization (United Nations)
FGD	focus group discussion
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation)
Hb	hemoglobin
hct	hematocrit
HIV	human immunodeficiency virus
IASG	Interagency Anemia Steering Group
IDRC	International Development Research Centre
IEC	information, education, and communication
IFA	iron-folic acid
ILSI	International Life Sciences Institute
IMCI	Integrated Management of Childhood Illness
INACG	International Nutritional Anemia Consultative Group
IPT	intermittent presumptive treatment (malaria)
IUD	intrauterine device

IVIC	Instituto Venezolana de Investigaciones Cientificas
LAM	Lactional Amenorrhea Method
MEDS	Monitoring, Evaluation and Design Support (Project)
MI	Micronutrient Initiative
MOH	ministry of health
MOST	Micronutrient Operational Strategies and Technologies (Project)
NGO	nongovernmental organization
NHHS	National Household Survey (Indonesia)
NID	national immunization day
OMNI	Opportunities for Micronutrient Interventions (Project)
PAHO	Pan American Health Organization
PATH	Program for Appropriate Technology in Health
PHNI	Population, Health and Nutrition Information (Project)
SCN	Standing Committee on Nutrition (United Nations)
TBA	traditional birth attendant
TIPS	Trials of Improved Practices
TT	tetanus toxoid
USAID	United States Agency for International Development
UNICEF	United Nations Children's Fund
UNDP	United Nations Development Programme
UNU	United Nations University
VAD	vitamin A deficiency
WHO	World Health Organization

Units of Measure

dL	deciliter
g	gram
kg	kilogram
L	liter
mcg	microgram
mg	milligram
mL	milliliter

Introduction

Anemia is defined as a low level of hemoglobin in the blood, as evidenced by a reduced quality or quantity of red blood cells. It has serious negative consequences, including increased mortality in women and children, decreased capacity to learn, and decreased productivity in all individuals. Its devastating effects on health and physical and mental productivity affect quality of life and translate into significant economic losses for individuals and for countries with high anemia prevalence.

Anemia is one of the world's most widespread health problems. It affects more than 2 billion people worldwide – one-third of the world's population – and is a significant public health problem throughout the developing world. In almost all developing countries, between one-third and one-half of the female and child populations are anemic. Prevalence among pregnant women and children under 2 years of age (the groups at highest risk) is typically more than 50 percent. The World Health Organization lists iron deficiency, a major cause of anemia, as one of the 10 top risk factors in developing countries for “lost years of healthy life.”¹

Anemia has multiple causes. Its direct causes can be broadly categorized as poor, insufficient, or abnormal red blood cell production; excessive red blood cell destruction; and excessive red blood cell loss. Contributing causes include poor nutrition related to dietary intake, dietary quality, sanitation, and health behaviors; adverse environmental conditions; lack of access to health services; and poverty. The relative importance of these causes varies by region.

Iron deficiency causes 50 percent of all anemia worldwide. Supplementing dietary iron with iron tablets, syrups, drops, or elixirs, and fortifying processed foods and condiments with iron are the best offense and defense against this cause of anemia. Where fortification has been evaluated in specific populations, it has improved iron status and reduced anemia prevalence. In most developing countries, however, food industries are not well developed. Where they are developed, most people cannot afford to buy fortified foods. Supplementing dietary iron can meet the iron needs of vulnerable groups who do not consume fortified foods. Iron supplementation also has the advantage of meeting the needs of vulnerable groups such as pregnant women and young children, whose high iron requirements cannot be met only with fortified staple foods. Iron supplementation targeted at vulnerable groups and iron fortification of a staple food or food condiments are the most cost-effective means of addressing iron-deficiency anemia in developing countries where the feasibility of general dietary improvement is limited.

Because anemia has many causes in addition to iron deficiency, many types of programs in the health sector and other social sectors have the potential to contribute to anemia prevention and control. An anemia component can and should be part of programs or activities in:

- Nutrition
- Infectious and parasitic diseases
- Antenatal care and safe motherhood
- Family planning and reproductive health

¹ The 2002 *World Health Report* of the World Health Organization uses this concept to measure the impact of a number of health problems, including anemia.

- Child health
- Schools
- HIV/AIDS prevention and treatment
- Food aid and security
- Environmental health
- Commercial sector: food and pharmaceutical manufacturers, marketers, and distributors

Sector-specific activities, when implemented as part of an overall strategy to prevent and control anemia, can significantly reduce the prevalence of anemia and its debilitating consequences in targeted populations. In most cases, it is possible to add anemia prevention or control activities to an already existing health or health-related program without large investments of time or resources.

Raising awareness of anemia prevention and control, promoting behavior change in the community, advocating for increased funding for national anemia programming, and training to build capacity among health workers are activities that can be implemented by any and all sectors, and across sectors. They are most effective when approached in a coordinated and targeted manner.

Health professionals, governments, donors, nongovernmental organizations, the commercial sector, and civil society all have roles to play in achieving worldwide anemia prevention and control. Effectively implementing interventions requires an integrated approach of financial, technical, and political commitment and support. Partnerships and collaboration among these various players should be built at the national, provincial/state, district, and local levels from the outset of anemia programming. Input from and coordination among all potential parties is most critical in the key initial phase of planning an anemia strategy.

The presentation of good anemia prevention and control practices in ***Part I: Program Guidance of Anemia Prevention and Control: What Works*** – knowing what has worked for others – facilitates taking action against anemia. Here, ***Part II: Tool and Resources*** provides background data, qualitative research instruments and methodologies, norms and protocols, and references that managers can use to design, implement, and monitor programs and share with others engaged or interested in anemia prevention and control. The materials appear in the order in which they are referred to in ***Program Guidance***.

Hemoglobin and Hematocrit ¹ Values Defining Anemia at Sea Level ²					
Age or Sex Group	Anemia Measured by Hemoglobin (g/dL)				Anemia Measured by Hematocrit (%)
	All Anemia	Mild Anemia	Moderate Anemia	Severe Anemia	All Anemia
Children 6-59 mos.	< 11.0	10-10.9	7.0-9.9	< 7.0	< 33
Children 5-11 yrs.	< 11.5	10-11.4	7.0-9.9	< 7.0	< 34
Children 12-14 yrs.	< 12.0	10-11.9	7.0-9.9	< 7.0	< 36
Nonpregnant women > 15 yrs.	< 12.0	10-11.9	7.0-9.9	< 7.0	< 36
Pregnant women	< 11.0	10-10.9	7.0-9.9	< 7.0	< 33
Men > 15 yrs.	< 13.0	12-12.9	9.0-11.9	< 9.0	< 39

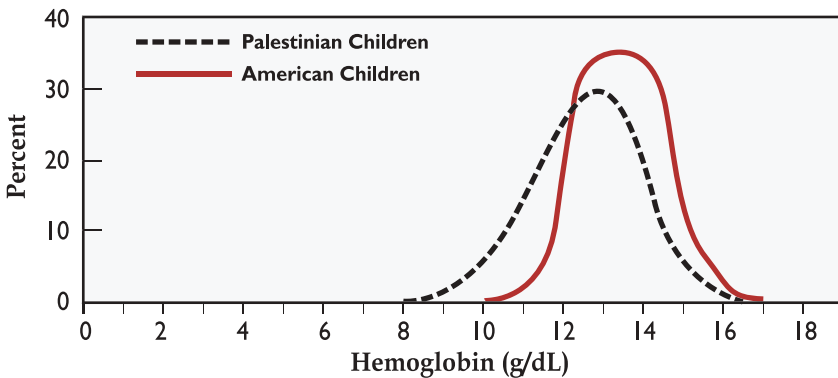
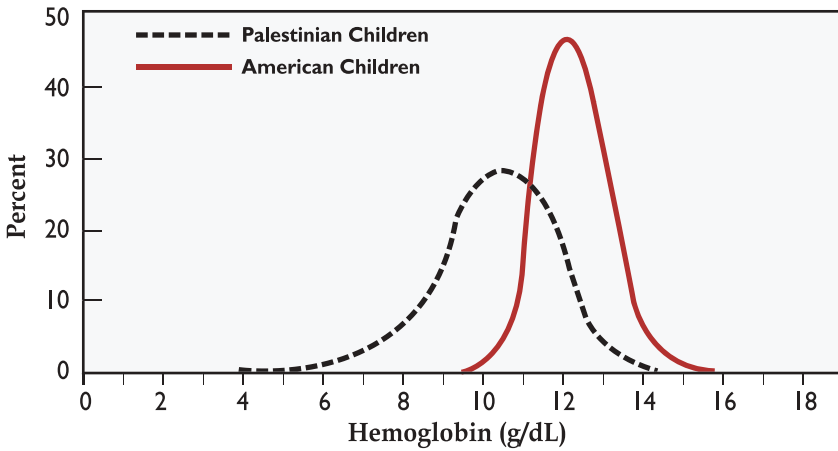
Notes:

¹ Hemoglobin is an oxygen-carrying protein in red blood cells that binds oxygen through its iron component. Hemoglobin concentration in whole blood is a common indicator for diagnosing anemia. Hematocrit is another commonly used indicator for anemia. It is the percent of whole blood made up of red blood cells. Low hematocrit is indicative of anemia.

² Hemoglobin values defining anemia change as altitude increases. Medical and/or research resources should be consulted about the most appropriate estimates of hemoglobin values defining anemia in high-altitude populations, as these may change by age group and location.

Source: WHO/UNICEF/UNU (2001); values used in Demographic and Health Surveys.

Shifting the Hemoglobin Distribution: Hemoglobin Distribution in Palestinian vs American Children and Women



Source: Yip et al. (1996).

These figures show hemoglobin distributions for Palestinian children and women compared to children and women in the United States. For anemia control, the desired approach is to prevent and treat all anemia, which will shift the entire distribution curve to the right (and make the curves above for Palestinian children and women align more closely with those for children and women in the United States, where anemia prevalence is low). Treating only severe anemia will change the configuration of the tail of the curve on the left but not shift the entire curve to the right as desired.

Anemia Prevalence Rates in Vulnerable Populations, Selected Countries (by WHO Region)

WHO Region Country (Year)	Pregnant Women	Women of Reproductive Age	Children 0-2 Years	Children 2-5 Years and/or 0-5 Years	Other
Africa					
Ghana (1999)	67%	59% (breastfeeding women)		84%	Schoolchildren: 71%
Madagascar (1997)		41.7% (0.9% severe, 10.9% moderate, 29.9% mild)	72.4% (children 6-23 mos.) (9.2% severe, 46.4% moderate, 16.8% mild)	66.8% (children 6-59 mos.) (7.2% severe, 42.1% moderate, 17.5% mild) 56.3% (children 24-59 mos.) (3.5% severe, 34% moderate, 18.8% mild)	
Mali (2001)	73.4% (5.2% severe, 43.6% moderate, 24.5% mild)	63.1% (breastfeeding women) (2.6% severe, 18.5% moderate, 41.21% mild) 59.5% (nonbreastfeeding, non-pregnant women) (2.3% severe, 16.2% moderate, 41.0% mild)	85.1% (15.4% severe, 56.0% moderate, 13.7% mild)	82.7% (children 6-59 mos.) (11.5% severe, 53.0% moderate, 18.2% mild) 56.3% (children 24-59 mos.) (9.3% severe, 51.3% moderate, 20.8% mild)	
The Gambia (1999)	73% (5% severe)	56% (breastfeeding women) (2% severe) 63% (pregnant and breastfeeding women) (3% severe)	88% (children 1-2 yrs.) (18% severe)	76% (children 1-5 yrs.) (15% severe)	
South Africa (1996)				21% (children 6-71 mos.)	
Uganda (2000/01)	41.2% (2.0% severe, 17.1% moderate, 22.1% mild)	30.3% (all women 15-49 yrs.) (0.7% severe, 7.5% moderate, 22.1% mild) 32.2% (breastfeeding women) (0.4% severe, 6.2% moderate, 25.6% mild) 26.2% (nonpregnant, nonbreastfeeding women) (0.6% severe, 5.9% moderate, 19.7% mild)	78.9% (children 6-23 mos.) (12.4% severe, 49.9% moderate, 16.6% mild)	64% (children 6-59 mos.) (6.5% severe, 37.1% moderate, 20.5% mild) 55.4% (children 24-59 mos.) (3.1% severe, 30.1% moderate, 22.8% mild)	Men 15-54 yrs.: 18.3% (1% severe, 7.4 moderate, 9.9% mild)
Zambia (1999)	46.9%	39% (1.2% severe)		65% (14.5% severe)	Men: 26%

WHO Region Country (Year)	Pregnant Women	Women of Reproductive Age	Children 0-2 Years	Children 2-5 Years and/or 0-5 Years	Other
Americas & Caribbean					
Bolivia (1997)		27.2% (0.9% severe, 5.6% moderate, 20.7% mild)	73.8% (children 6-23 mos.) (5.5% severe, 49.4% moderate, 18.9% mild)	66.7% (children 6-35 mos.) (4.5% severe, 41.8% moderate, 20.4% mild) 55% (children 24-35 mos.) (2.9% severe, 28.9% moderate, 23.2% mild)	
Haiti (2000)	63.3% (3.7% severe, 29.6% moderate, 30.0% mild)	55.1% (all women 15-49 yrs.) (3% severe, 15.8% moderate, 36.3% mild) 52.8% (breastfeeding women) (2.2% severe, 14.3% moderate, 36.3% mild) 54.9% (nonpregnant, nonbreastfeeding women) (3.2% severe, 14.7% moderate, 37% mild)	80.7% (children 6-23 mos.) (1.9% severe, 48.9% moderate, 29.9% mild)	65.3% (children 6-59 mos.) (1.6% severe, 33.8% moderate, 29.9% mild) 57.2% (children 24-59 mos.) (1.6% severe, 26.3% moderate, 29.8% mild)	
Jamaica (1992)	1982: 61.6% 1987: 53.0%				
Mexico (1999)	26.4%	20.0%	48.8% (children 6-23 mos.)	27.2% (children 6-59 mos.) 24.9% (children 24-59 mos.)	School-age boys: 19.0% School-age girls: 20.1%
Montserrat (1992)	1982: 82.3% 1985: 22.1%				

WHO Region Country (Year)	Pregnant Women	Women of Reproductive Age	Children 0-2 Years	Children 2-5 Years and/or 0-5 Years	Other
Americas & Caribbean (cont.) Peru (1996, 2000)	1996: 35.1% (0% severe, 16.1% moderate, 19.0% mild) 2000: 38.6% (2% severe, 17% moderate, 19.6% mild)	1996: 35.8% (women 15-49 yrs.) (0.5% severe, 8.1% moderate, 27.2% mild) 47.1% (breastfeeding women) (0.4% severe, 9.5% moderate, 37.2% mild) 32.8% (nonpregnant, nonbreast- feeding women) (0.5% severe, 7.2% moderate, 25.1% mild) 45.8% (women using IUD) (1.2% severe, 17.7% moderate, 26.9% mild) 2000: 31.6% (all women 15-49 yrs.) (0.3% severe, 5.9% moderate, 25.4% mild) 40.1% (breastfeeding women) (0.2% severe, 7.1% moderate, 32.8% mild) 29.6%(nonpregnant, nonbreast- feeding women) (0.2% severe, 5.0% moderate, 24.4% mild)	1996: 76.6 % (children 6-23 mos.) (3.8% severe, 46% mod- erate, 26.8% mild) 2000: 68.8% (children 6-23 mos.) (2.8% severe, 40.6% mod- erate, 25.4% mild)	1996: 56.7% (children 6-59 mos.) (1.5% severe, 29.7% moderate, 25.5% mild) 46.8% (children 24-59 mos.) (0.4% severe, 21.5% moder- ate, 24.9% mild) 2000: 49.6% (children 6-59 mos.) (1.3% severe, 24.9% moderate, 23.4% mild) 40.9% (children 24-59 mos.) (0.5% severe, 17.9% moder- ate, 22.5% mild)	
St. Vincent & the Grenadines (1992)	1985: 25% (Hb < 10 g/dL) 1990: 14.5% (Hb < 10 g/dL)				
United States (1993)	33% (low- income women in last trimester)				

WHO Region Country (Year)	Pregnant Women	Women of Reproductive Age	Children 0-2 Years	Children 2-5 Years and/or 0-5 Years	Other
South East Asia					
India (1998/99)	49.7% (2.5% severe, 25.4% moderate, 21.8% mild)	51.8% (ever-married women 15-49 yrs.) (1.9% severe, 14.8% moderate, 35% mild) 56.4% (breastfeeding women 15-49 yrs.) (1.6% severe, 15.8% moderate, 35.1% mild) 50.4% (nonpregnant, nonbreastfeeding women 15-49 yrs.) (1.9% severe, 13.4% moderate, 35.1% mild)	77% (children 12-23 mos.) (6.3% severe, 49.4% moderate, 22% mild)	74.3 % (children 6-35 mos.) (5.4% severe, 45.9% moderate, 22.9% mild)	
Nepal (1997/98)	74.6% (5.7% severe, 68.9% moderate/mild)	66.7% (nonpregnant women) (1.7% severe, 65% moderate/mild)	88% (children 6-23 mos.) (4.5% severe, 83.5% moderate/mild)	78% (children 6-59 mos.) (3.1% severe, 74.9% mod- erate/mild) 70% (children 24-59 mos.) (1.9% severe, 67.8% mod- erate/mild)	
Sri Lanka (1994)	39% (maternal anemia)	45% (nonpregnant women)	55% (children 3-24 mos.)	30% (children 36-59 mos.)	Children 5-10 yrs.: 58% Adolescents: 36%
Europe/Central Asia					
Armenia (2000)	12% (0% severe, 4.6% moderate, 7.4% mild)	12.4% (all women 15-49 yrs.) (0.3% severe, 2% moderate, 10.2% mild) 12.9% (breastfeeding women) (0.4% severe, 1.8% moderate, 10.7% mild) 12.4% (nonpregnant, nonbreastfeeding women) (0.2% severe, 1.9% moderate, 10.3% mild) 15.5% (women currently using an IUD) (0% severe, 1.3% moderate, 14.2% mild) 12.2% (women not currently using an IUD) (0.3% severe, 2% moderate, 9.9% mild)	42.3% (children 6-23 mos.) (0.9% severe, 18.9% moderate, 22.5% mild)	23.9% (children 6-59 mos.) (0.4% severe, 9.6% moderate, 14% mild) 15.6% (children 24-59 mos.) (.13% severe, 5.3% moder- ate, 10.1% mild)	

WHO Region Country (Year)	Pregnant Women	Women of Reproductive Age	Children 0-2 Years	Children 2-5 Years and/or 0-5 Years	Other
Europe/Central Asia (cont.) Kazakhstan (1995, 1999)	1995: 28.3% (moderate anemia)	1995: 48.8% (women 15-49 yrs.) (1.1% severe, 10.6% moderate, 37.1% mild) Women using IUDs: 2.0% severe, 13.2% moderate Women not using IUDs: 0.8% severe, 9.6% moderate Breastfeeding women: 14.4% mod- erate Nonpregnant, nonbreastfeeding women: 9.5% moderate 1999: 35.5% (all women 15-49 yrs.) (1.2% severe, 7.7% moderate, 26.6% mild) 45.9% (women 15-49 yrs. using an IUD) (2.5% severe, 12% moderate, 31.4% mild) 31.4% (women not using an IUD) (0.7% severe, 5.9% moderate, 24.8% mild)	1995: 73.7% (children 0-23 mos.) (4.9% severe, 36.2% moderate, 32.6% mild)	1995: 69.2% (children < 3 yrs.) (5.5% severe, 33.6% moderate, 30.1% mild) 1999: 36.3% (children < 5 yrs.) (1.4% severe, 17% moderate, 17.9% mild)	
Kyrgyz Republic (1997)	17% (moderate ane- mia)	38% (all women 15-49 yrs.) (1.4% severe, 9.1% moderate, 27.5% mild) Breastfeeding women: 9% moder- ate Nonpregnant, nonlactating women: 7.8% moderate IUD users: 2% severe, 11% moder- ate Non-IUD users: 1.3% severe, 8.2% moderate	49.8% (children < 3 yrs.) (1.4% severe, 24% mod- erate, 24.4% mild)		

WHO Region Country (Year)	Pregnant Women	Women of Reproductive Age	Children 0-2 Years	Children 2-5 Years and/or 0-5 Years	Other
Europe/Central Asia (cont.)					
Turkmenistan (2000)		<p>47.3% (women 15-49 yrs.) (1.1% severe, 8.4% moderate, 37.8% mild)</p> <p>55.5% (women currently using an IUD) (1.7% severe, 9.8% moderate, 44% mild)</p> <p>44.7% (women not currently using an IUD) (0.9% severe, 7.9% moderate, 35.9% mild)</p>	<p>37.8% (children 0-24 mos.) (0.5% severe, 18% moderate, 19.3% mild)</p>	<p>35.8% (children < 5 yrs.) (0.6% severe, 15.9% moderate, 19.3% mild)</p> <p>35.2% (children 24-59 mos.) (0.6% severe, 15.4% moderate, 19.2% mild)</p>	
Uzbekistan (1996)	26.9% (moderate anemia)	<p>60.4% (all women 15-49 yrs.) (0.9% severe, 14.2% moderate, 45.3% mild)</p> <p>12.8% (Nonpregnant, nonbreast-feeding women)</p> <p>Breastfeeding women: 14.9% moderate</p> <p>IUD users: 1.5% severe, 16.8% moderate</p> <p>Non-IUD users: 0.6% severe, 12.9% moderate</p>		60.8% (children < 3 yrs.) (1.2% severe, 25.6% moderate, 34% mild)	

WHO Region Country (Year)	Pregnant Women	Women of Reproductive Age	Children 0-2 Years	Children 2-5 Years and/or 0-5 Years	Other
E. Mediterranean					
Egypt (2000)	45.4% (0.6% severe, 9.7% moderate, 35.1% mild)	29.2% (women 15-49 yrs.) (0.3% severe, 4.6% moderate, 24.3% mild) 31.9% (breastfeeding women) (0.2% severe, 4.3% moderate, 27.4% mild) 26.3% (nonpregnant, nonbreastfeeding women) (0.3% severe, 4% moderate, 22% mild) 30.2% (IUD users) (0.1% severe, 4.4% moderate, 25.7% mild) 28.6% (non-IUD users) (0.4% severe, 4.6% moderate, 23.6% mild)	40.8% (children 6-23 mos.) (0.4% severe, 17.9% moderate, 22.5% mild)	29.9% (children 6-59 mos.) (0.2% severe, 11.2% moder- ate, 18.5% mild) 24.3% (children 24-59 mos.) (0.1% severe, 7.7% moderate, 16.5% mild)	11- to 19-yr.-olds: 29.7% (0.1% severe, 1.7% moderate, 27.9% mild) 11- to 19-yr.-old girls: 29% (0.1% severe, 2.8% moderate, 26.1% mild) 11- to 19-yr.-old boys: 30.3% (0.1% severe, 0.7% moderate, 29.5% mild)
Gaza (1998)	53.9% (third trimester)		67.7% (6-11 mos.) 58.9% (12-23 mos.)	38.4% (24-35 mos.)	
United Arab Emirates (1996)					children 6 mos-6.9 yrs: 31%

WHO Region Country (Year)	Pregnant Women	Women of Reproductive Age	Children 0-2 Years	Children 2-5 Years and/or 0-5 Years	Other
Western Pacific					
Cambodia (2000)	66.4% (4.3% severe, 35.2% moderate, 26.9% mild)	57.8% (women 15-49 yrs.) (1.3% severe, 12.7% moderate, 43.8% mild) 66.1% (breastfeeding women) (2.6% severe, 16.8% moderate, 46.7% mild) 55.1% (nonpregnant, nonbreast-feeding women) (0.7% severe, 9.9% moderate, 44.5% mild)	81.7% (children 6-23 mos.) (3.6% severe, 49.2% moderate, 28.9% mild)	63.4% (children 6-59 mos.) (2% severe, 30.6% moderate, 30.8% mild) 55.4% (children 24-59 mos.) (1.3% severe, 22.5% moderate, 31.6% mild)	
Indonesia (1995)	50.9%	39.5% (women 15-44 yrs.)		40.5% (children 0-5 yrs.)	Girls 10-14 yrs.: 57.3% Schoolchildren 5-11 yrs.: 47.2%
Philippines (2000)	50.3%	45.7% (lactating women)	56.6% (infants)		
Thailand (1996/7)	15% urban 20% rural			25%	Men: 13%
Vietnam (1996)	52.5%	42.8% (nonpregnant women)	61% (children 0-5 mos.) 59.5% (children 6-11 mos.)	46.3% (children 6 mos-5 yrs.) 28.2% (children 24-60 mos.)	Schoolboys 8-14 yrs.: 23.7% Schoolgirls 8-14 yrs.: 19.3% Schoolboys 8-14 yrs. (urban): 15.4% Schoolgirls 8-14 yrs. (urban): 11.0%

Anemia Prevalence by Rural/Urban Residence, Selected Countries				
Country, Year	Preschool Children (%)		Women of Reproductive Age (%)	
	Rural	Urban	Rural	Urban
Armenia, 2000	32.8	15.6	16.5	9.9
Bolivia, 1998	74.9	61.1	35.1	24.0
Cambodia, 2000	64.4	57.3	59.1	51.2
Egypt, 2000	34.0	23.6	30.7	27.3
Haiti, 2000	65.9	63.9	54.4	56.0
India, 1998/9	75.3	70.8	53.9	45.7
Kazakhstan, 1999	40.3	30.1	37.4	34.0
Kyrgyz Rep., 1997	53.1	38.5	41.1	31.9
Madagascar, 1997	66.9	66.7	43.5	34.6
Peru, 2000	53.5	46.7	37.1	29.2
Turkmenistan, 2000	32.6	40.9	48.7	45.4
Uganda, 2000/01	66.6	51.2	32.0	21.2
Uzbekistan, 1996	62.1	57.5	61.2	59.2

Source: Macro International Demographic and Health Surveys.

Substances That Inhibit and Enhance Absorption of Iron	
Inhibitors	Enhancers
<p>Phytates <i>Food sources:</i> Whole grains (maize, millet, rice, wheat sorghum), cereal bran, grains, flour made from whole grains, legumes (soybeans), nuts, seeds</p> <p>Polyphenols (e.g., tannins) <i>Food sources:</i> Legumes (green and brown lentils), tea, coffee, cocoa, eggplant, green leafy vegetables (spinach, beetroot greens)</p> <p>Calcium salts <i>Food sources:</i> Milk products, tortillas prepared with calcium oxide</p> <p>Oxalates <i>Food sources:</i> Green leafy vegetables (spinach, beetroot greens)</p> <p>Plant protein <i>Food sources:</i> Legumes (soybeans), nuts</p>	<p>Vitamin C (ascorbic acid) <i>Food sources:</i> Fruits and vegetables</p> <p>Animal blood, organ, and muscle products <i>Food sources:</i> Meat, poultry, fish and other seafood</p> <p>Food processing <i>Food sources:</i> Some fermented and germinated foods (soy sauce, miso, leavened bread)</p> <p>Citric and other organic acids</p>
<p><i>Sources:</i> Allen & Ahluwalia (1997); WHO/UNICEF/UNU (2001).</p>	

Demands for Iron in Pregnancy*	
Iron Losses	Amount (mg)
Fetus	270
Umbilical cord and placenta	90
Maternal blood loss	150
Obligatory losses from the gut, etc.	230
Expansion of maternal red cell mass	450
Subtotal	1,190
Iron Gains	Amount (mg)
Contraction of red cell mass after delivery	450
Absence of menstruation in pregnancy	160
Subtotal	610
Net Losses (1,190 - 610)	580
* estimated demands for a 55-kg iron-replete woman <i>Source:</i> Bothwell (2000).	

Proportion of Women Utilizing Antenatal Care (ANC) Services And Receiving/Taking Iron or Iron-Folic Acid (IFA) Supplements, Selected Countries				
Country, Year(s)	% Women Receiving ANC From Trained Provider	% Women With 4+ANC Visits	% Women With First ANC Visit at < 4-6 Mos. Pregnant	% Women Receiving/Taking Iron or IFA Supplements ¹
Armenia, '00	92.6	64.7	74.6 (< 4 mos.) 86.3 (< 6 mos.)	1.4 for 90+ days
Bangladesh, '99-00	33.7	10.5	23.3 (< 6 mos.)	36.4
Cambodia, '00	37.7	8.9	23.3 (< 6 mos.)	20.7 (90+ tablets = 2.4%)
Colombia, '00	90.8	81.0	85.5 (< 5 mos.)	76.8
Egypt, '00	52.9	36.7	48.6 (< 6 mos.)	28
Eritrea, '95	49.2	26.6	NA	29.5
Gabon, '00	91.6	63.3	85.4 (< 6 mos.)	59.7
Ghana, '98	89.0	62.3	74.8	77
Haiti, '00	78.8	44.2	66.5	46.8 (90+ tablets = 10.8%)
India, '92/3	61.9	26.9	51.0	50.5
India, '98/9	65.1	29.5	58.2	58 (3-mo. supply = 47.9%)
Indonesia, '94	82.3	63.1	75.3 (< 5 mos.)	67.1 (90+ tablets = 14%)
Indonesia, '97	89.4	70.4	82.6 (< 5 mos.)	74.3 (90+ tablets = 24%)
Kazakhstan, '99	94.4	70.0	92.2 (< 5 mos.)	48.1 (taking iron in current or last pregnancy for 29 days)
Kuwait, '96	98.5	76.5 (5+ visits)	NA	51
Malawi, '00	91.4	56.0	49.1 (< 5 mos.)	69.7 (90+ tablets during pregnancy =12%)
Mali, '01	NA	NA	NA	64.0 took iron (90+ tablets = 6%)
Mongolia, '98	96.2	NA	83.4 (< 5 mos.)	42.5 (90+ tablets = 6.9%)
Niger, '98	< 40.0	11.0	29.9	10.8
Oman, '95	99.0	57.9	NA	63.0
Peru, '00	84.0	69.0	74.0 (< 6 mos.)	60 (took 90+ days = 17%)
Philippines, '98	85.7	77.0 (3+ visits)	85.0	74.6
Qatar, '98	100.0	52.6 (5+ visits)	NA	65.0
Rwanda, '00	92.3	10 (4+ visits)	NA	20.0 (took 90+ days = 0.3%)
Tanzania, '99	92.5	69.9	61.4	44
Turkmenistan, '00	98.1	82.8	93.0 (< 5 mos.)	32 (avg. no. tablets = 14)
Uganda, '00/01	92.4	41.9	49.3	47.7 (90+ tablets = 1.7%)
Yemen, '97	34.3	11.4	23.1	20.7
Zimbabwe, '99	93.1	64.3	67.4 (< 6 mos.)	59.7 (90+ tablets during pregnancy = 5.7%)

¹Women in last three to five years unless otherwise stated.

Source: Demographic and Health Surveys.

Raising Awareness/Program Advocacy: Sample Fact Sheets

Early Childhood Development



HOW CAN EARLY CHILDHOOD DEVELOPMENT (ECD) PROGRAMS BEAT IRON DEFICIENCY?

Basic actions achieve results

Preventing and treating iron deficiency and anemia are among the most cost-effective health actions available that can provide a key element necessary for full child development. ECD programs can efficiently integrate actions to defeat iron deficiency into their work, directly benefiting the children and the effectiveness of the ECD program itself.

There is extensive experience with the following basic actions and agreement that they should be used in a combination appropriate to the children and program.

Provide iron supplements to children. Iron supplementation, in the form of syrup, sprinkles, or pills, is available today and can be distributed within ECD programs. ECD programs that interact with health programs providing immunizations, vitamin A capsules, or basic treatment and prevention services can persuade that more attention be given to iron deficiency.

Provide appropriate meals and/or snacks. ECD programs that provide food to children in their care should choose foods that are high in iron and/or fortified with iron. Foods high in iron include: meat, beans, dried fruit. Foods that enhance the absorption of iron should be eaten during the meal. These include fruits and vegetables rich in vitamin C. Drinks such as coffee and tea block the absorption of iron and these should not be given to children.

ECD programs that provide food to the children in their care should choose foods that are fortified with iron if available. Fortification is not done everywhere so items may not be available. You can talk to officials about which foods are fortified and encourage food fortification. Some typical items that are fortified are: bread, noodles, cereals, soy sauce, flour, and maize meal.

Provide information to parents and caregivers about the effects of iron deficiency and anemia, dietary sources of iron (iron-rich foods and fortified foods), and iron supplements. Such information will encourage everyone to take action to improve children's intake of iron.

Support iron fortification if it is not available in your community when talking to community, government, and business officials.

Encourage public health treatment and prevention programs if hookworm, malaria, or diarrhea is prevalent in your program area. These conditions cause iron deficiency through loss of blood or destruction of red blood cells.

Defeating iron deficiency and anemia can help early childhood programs be more successful.

Source: The Manoff Group (prepared for the Micronutrient Initiative).

Raising Awareness/Program Advocacy: Sample Fact Sheets

Early Childhood Development



THE IMPACT OF PREVENTING AND TREATING IRON DEFICIENCY ANEMIA

Help your children grow stronger and smarter

Iron deficiency and resulting anemia is a problem of great magnitude for young children. The evidence of iron's beneficial impact on children is mounting and it now is clear that the inclusion of iron in early child development programs is both urgent and cost-effective. An estimated 10–20% of preschool children in developed countries and an estimated 30–80% in developing countries are anemic at one year of age.

Good health and physical growth

From 6–24 months of age, infants need additional iron, either from syrups, tablets, or iron-fortified foods, to meet the demands of rapid growth and development. Children who do not receive adequate iron and develop anemia are smaller, weaker, and develop skills more slowly. Diarrhea, respiratory illnesses, and other infections are more frequent and severe in children with iron deficiency and anemia. Iron improves resistance to illness and diseases in early childhood.

Intellectual development and learning capacity

Iron deficiency and anemia impairs brain development, limits attention span, and shortens memory. When anemic children reach school age they will have impaired performance in tests of language skills, motor skills, and coordination. Iron is fundamental for cognitive development. Anemia can cause a loss of 9 points in IQ testing. Preschool children display

marked improvement after successful iron supplementation, consistently overcoming the learning problems associated with anemia.

Developing motor skills and social behavior

Children with iron deficiency anemia have delayed psychomotor development and their manual dexterity is permanently reduced. This has many effects on a child's life, setting him/her behind in learning and physical ability.

The behavior of young children is also affected by iron deficiency. An iron deficient child is often lethargic and hesitant. This results in reduced social interaction from which children learn and develop. With adequate iron, children explore and play more. They develop intellectually and socially because they are curious and confident, expanding their experiences and strengthening their motor skills.

Defeating iron deficiency and anemia can help early childhood programs be more successful.

Source: The Manoff Group (prepared for the Micronutrient Initiative).

Raising Awareness/Program Advocacy: Sample Fact Sheets

Iron Overload

Risk of Iron Overload From Iron-Fortified Foods

- In the United States and Europe, only 0.1 to 0.5 percent of the populations of Northern European ancestry are at risk of getting too much iron. Men are most at risk. Women of reproductive age are protected by their monthly blood loss and higher iron requirements.
- There is little risk of iron overload in Africa or Asia, except in areas where thalassemia major occurs. Thalassemia prevalence is low in most places.
- Iron fortification does not increase the risk of iron overload, even in countries with large populations of Northern European ancestry, and avoiding iron-fortified foods is not recommended for people at risk of iron overload because of hemochromatosis. It is recommended, however, that these people avoid vitamin-mineral supplements containing iron or more than 500 mg of vitamin C, which increases iron absorption.
- There is no evidence that increased iron intake from iron-fortified foods results in higher rates of heart disease, cancer, or infections.

Source: UNICEF (1996); CDC (2002).

Selected Monitoring and Evaluation Indicators for Anemia Prevention and Control Programs

Process Indicators

Number of health workers trained and supervised in anemia prevention and control measures

Types of foods available in the marketplace

Percentage or number of food companies fortifying staples or processed foods with iron

Outcome Indicators

Percentage of *target group* who

- Have adequate knowledge of anemia and anemia prevention and control measures (e.g., why, how, and when to take iron-folic acid (IFA) supplements; how to manage side effects; the need for presumptive treatment for parasitic infections; etc.)
- Are receiving the recommended number of IFA tablets
- Are taking the recommended number of IFA tablets
- Are not taking IFA tablets daily due to side effects, forgetfulness, feelings of good health, fear of medication, fear of having a big baby, or other reasons
- Are receiving treatment or presumptive treatment for hookworm infections
- Are receiving treatment or presumptive treatment for malaria
- Consume adequate amounts of iron-rich food, including fortified foods
- Have been told about indigenous foods that can mitigate anemia

Percentage of *health workers* who

- Have adequate knowledge of anemia and its prevention and control measures, including counseling messages
- Can counsel adequately on anemia-related issues
- Can use counseling materials correctly

Percentage of pharmacies or small shops that market and sell IFA tablets

Percentage of food companies that produce iron-fortified products with adequate levels of fortificant

Percentage of food available at consumer retail level that is adequately fortified with iron

Impact Indicators

Percentage of target group that has anemia, disaggregated by mild, moderate, and severe anemia

Shift in population's hemoglobin curve

A Tool for Reviewing Micronutrient Programs

Introduction and background

This Nutrition Program Review includes suggestions for questions about micronutrient programs including anemia control based on an instrument developed for a study by the World Bank in Bolivia and The BASICS Project's Nutrition Essentials.

Areas of study were chosen based on a set of criteria, possibly selecting areas with higher socioeconomic indicators and those with lower socioeconomic indicators. Smaller organizational units should be chosen based on giving a representative sample by income level and distance (either near or far) from provincial or state capitals, where there is active or significant nutrition program activity (e.g., government, donors). Similar criteria should be developed for health clinic, dispensary, and community selection.

At the province or state level

Review nutritional status data available in the province or state and coverage of existing nutrition programs related to:

- Infant feeding (breastfeeding and complementary feeding)
- Iron-folate supplementation for pregnant women
- Vitamin A supplementation for children 6 to 59 months and postpartum women
- Availability and consumption of iodized salt
- Deworming for schoolchildren and other nutrition programs in schools
- Others

Interview selected representatives from sectors related to nutrition (e.g., health, agriculture, education, or officials of the committee on food and nutrition, if it exists) and NGOs to determine their interest in nutrition and awareness of the problem of malnutrition and its effects. Discuss current programs in the province or state addressing malnutrition and how well they are working (i.e., problems, barriers, constraints, and solutions). This is to be done as a first step to facilitate an informed interaction at the subsequent levels of the data collection at lower organizational units.

At lower organizational units such as districts, communities

Review nutritional status data available and coverage of existing nutrition programs related to:

- Infant feeding (breastfeeding and complementary feeding)
- Iron-folate supplementation for pregnant women
- Vitamin A supplementation for children 6 to 59 months and postpartum women
- Availability and consumption of iodized salt
- Deworming for schoolchildren and other nutrition programs in schools
- Others

Interview selected representatives from sectors related to nutrition (e.g., health, agriculture, education, or officials of the committee on food and nutrition) and NGOs to:

- Determine their interest in nutrition
- Awareness of the problem of malnutrition and its effects
- Discuss current programs addressing malnutrition and how well they are working (problems, constraints, barriers, and solutions)
- Verify the coherence/accuracy of the submission at the provincial or state level

Health clinic (public and private)

Discussions with head of the clinic

- 1) How many staff?
- 2) What are their qualifications?
- 3) What are their responsibilities?
- 4) Do you have any staffing shortages?
- 5) What are the nutrition problems that you see in your clinic?
- 6) What are the nutrition services provided at your clinic?
- 7) What protocols do you have for delivering nutrition services? (Have staff show you the protocols.)
- 8) What nutrition training have you and your staff had? In-service? Pre-service? When was the last time you had training on nutrition? What type of training was it? Have you had Integrated Management of Childhood Illness (IMCI) training? If yes, ask staff to show you the Food Box and explain how they use it. (Where IMCI training has taken place, observations should make note of whether or not the IMCI Food Box is used when counseling the client - mothers of children < 5 years.)
- 9) What type of nutrition training do you need?
- 10) What nutrition education materials do you have to use in counseling or in your clinic? (Have staff show you the education materials used.)

Observations of staff with clients

- 1) Observe counseling session of health worker with a woman coming in for ANC
- 2) Observe counseling session of health worker with a mother of a sick child < 5 years
- 3) Observe counseling session of health worker with a mother of a well child < 5 years

Compare information given with protocols and norms for the services being given. For example, in this counseling session with a woman coming in for antenatal care, the following should be noted (similar questions should be developed for a well and sick child visit):

- | | | |
|--|-----|----|
| 1) Is this pregnant woman given iron-folate (IFA) supplements? | yes | no |
| 2) How many IFA supplements was she given? | — | |
| 3) Was she given IFA supplements at the last ANC visit? | yes | no |
| 4) Was she told how many IFA supplements to take/day? | yes | no |

5) Was she told how many IFA supplements to take during pregnancy?	yes	no
6) Was she told why to take IFA supplements?		
–Health of mother	yes	no
–Health of baby	yes	no
–Prevent or cure anemia	yes	no
7) Was she told about side effects?	yes	no
8) Was she told what the symptoms of side effects are?	yes	no
–Black stools	yes	no
–Gastric problems (diarrhea, constipation)	yes	no
9) Was she told how to manage side effects?	yes	no
–Take with food	yes	no
–Take before going to bed	yes	no
10) Was the woman weighed?	yes	no
11) Did the health worker discuss her weight with her?	yes	no
12) Is she advised that she should be gaining 1 kg/month?	yes	no
13) Is she asked about what she is eating and given suggestions on how to improve her diet?	yes	no
–Improve the amount	yes	no
–Improve the quality	yes	no
–Asked if she is using iodized salt in cooking?	yes	no
14) Is she counseled about exclusive breastfeeding?	yes	no
–What it is (only breastmilk no other fluids including water)	yes	no
–Immediately feed after delivery	yes	no
–Use colostrum	yes	no
–Why it is important (prevent infections)	yes	no
15) What other ANC services were given to the woman?		
16) Was the health worker kind and reassuring to the woman?	good/needs improving	
17) Made the woman feel comfortable?	good/needs improving	
18) Announces the subject?	good/needs improving	
19) Assures it is a subject of interest?	good/needs improving	
20) Asks open-ended questions?	good/needs improving	
21) Repeats/reflects back what the client says?	good/needs improving	

22) Doesn't challenge client's feelings?	good/needs improving
23) Avoids words that sound like the client is being judged?	good/needs improving
24) Uses simple language?	good/needs improving
25) Makes suggestions, not commands?	good/needs improving
26) Gives only simple information and advice that can be easily remembered?	good/needs improving
27) Recognizes and praises what the client is doing correctly before suggesting changes?	good/needs improving
28) Checks what is practical and possible for the client to do?	good/needs improving
29) Verifies client's understanding of advice and intention to try it?	good/needs improving
30) Sets a date for the next appointment/follow up	good/needs improving

Interviews with clinic staff (some questions for the head, some for the actual implementers)

- 1) What are the nutrition problems you see in your clinic?
- 2) What is working well for nutrition interventions and what is not working well?
- 3) How would you improve nutrition interventions in your clinic/area?
- 4) When a sick child comes in what nutrition counseling do you give the mother? (Check the advice with the standard developed from the IMCI protocol/Food Box or other counseling standards - continued breastfeeding, feeding, recuperative feeding after illness ends)
- 5) When a well child comes in what nutrition counseling do you give the mother? Check the advice against the standard developed - exclusive breastfeeding (BF) for children 0-6 months (e.g., encourage longer duration of BF and more frequent feeds - a newborn should be fed 10-12 times in 24 hours for 15-20 minutes on each breast), introduction of complementary foods (CF) with continued BF at six months, CF 5 times/day, enrichment of porridge, pap, active feeding of children 6-24 months, etc., encourage use of iodized salt in cooking.
- 6) Do you think mothers follow the advice you give? How do you know? What advice are women able to follow about feeding their children?
- 7) When you give pregnant women iron-folate supplements, how many do you give them each visit? What do you tell them when you give women IFA supplements?
- 8) Do you think women follow advice about taking IFA supplements? Do you think women take IFA supplements? How do you know?
- 9) Do you think it is important for women to take IFA supplements in pregnancy? Why?
- 10) Do you check for pallor? If you think women have pallor, what action do you take?
- 11) Do you advise pregnant women to have an anemia test? Is the test done here? If not, do you receive the results of tests? When is anemia considered serious and what action do you take if it is?

- 12) What other ANC services are given to women?
- 13) What other types of nutrition interventions are given to women in ANC? Do you weigh pregnant women routinely? Do you know how much weight women should be gaining in pregnancy? What advice do you give women about eating in pregnancy? Do you think women have trouble eating or eating more in pregnancy? Why or why not?
- 14) Do you talk to pregnant women about breastfeeding? What do you tell them? Are they interested in following this advice after they deliver?
- 15) If a woman says she doesn't have enough breastmilk, what advice do you give her? (increase breastfeeding, feed food to the infant, feed other milk to the infant, increase the food the woman is eating, other) (Circle all mentioned)
- 16) Do you check for pallor in children < 5 years of age? What body part do you use? If you think the child has pallor, what action do you take?
- 17) When do you give vitamin A capsules? Who receives vitamin A capsules and what is the dose?
- 18) What do you tell mothers of children who receive vitamin A capsules?
- 19) What do you tell postpartum women when they receive a vitamin A capsule?
- 20) What other postpartum services/interventions do women receive? How do women who deliver in the community receive this information or these services?
- 21) What other nutrition services/interventions are given to postpartum women? What advice do you give on eating/diet? Do you think women follow your advice? Why or why not?
- 22) Do you give postpartum women assistance with breastfeeding? If you don't who does?
- 23) Who supervises you and how often do you see your supervisor? What does your supervisor do when he/she visits you? Does he/she talk with you about nutrition? On every visit? How often does she/he visit?
- 24) What reporting forms do you fill out every day or month? Do you supply any nutrition information on this form? If yes, what type?
- 25) What type of outreach does your clinic do and how often? How often are you able to visit each community/year?
- 26) Do you supervise community activities in health? Are communities conducting any nutrition interventions? What are these interventions and what kind of help do you give to these activities?

Interviews with clinic clients

Mother of a sick child

- 1) Did the health worker give you counseling about how well your baby is eating? yes no
- 2) What advice did the health worker give you?
 –continued or frequent breastfeeding during illness? yes no

-continued feeding of solid foods for children 6 months & older?	yes	no
-recuperative feeding after illness ends?	yes	no
-stop breastfeeding or feeding?	yes	no
3) Did the health worker give your child a vitamin A capsule?		
-if your child has persistent diarrhea?	yes	no
-is underweight?	yes	no
-has measles?	yes	no
-has a respiratory infection?	ye	no
4) Did the health worker check your child's palm or eyelids?	yes	no
5) Did the health worker talk with you about anemia in your child?	yes	no
6) What other counseling advice did the health worker give you or action did the health worker take?		
-ask you to buy iron tablets and give them to your child?	yes	no
-give anti-malarials if your child was anemic?	yes	no
-discuss how to feed your child when he/she is no longer ill?	yes	no
-suggested you feed your child > 6 mos. at least 5 times/day?	yes	no
-suggested you enrich the porridge you feed your child > 6 mos.	yes	no
-suggested you give green and/or yellow & orange vegetables and fruits daily to your child?	yes	no
-suggested you use iodized salt in cooking?	yes	no
-suggested you feed your child using a separate plate so you know how much your child is eating?	yes	no
-suggested exclusive breastfeeding for your child 0-6 mos.?	yes	no
-weighed your child?	yes	no
-discussed his/her weight with you?	yes	no
-told you about vitamin A and when and where to obtain it?	yes	no

Mother of a well child

1) Did the health worker weigh your child?	yes	no
2) Did the health worker discuss your child's weight with you?	yes	no
3) What did the health worker tell you about your child's weight?		
-weight gain was adequate	yes	no
-weight gain was not adequate	yes	no
-how much weight your child should be gaining?	yes	no

-other	yes	no
4) Did the health worker give you advice on what to feed your child?	yes	no
5) What advice on feeding your child were you given?		
-to feed more?	yes	no
-to feed at least five times a day?	yes	no
-to enrich porridge/pap?	yes	no
-to actively feed so you know how much your child has eaten?	yes	no
-to give the child its own plate so you know how much your child has eaten?	yes	no
-to give certain types of food?	yes	no
-other advice?	yes	no
6) Did the health worker talk with you about vitamin A?	yes	no
7) Did the health worker tell you when your child should receive vitamin A?	yes	no
8) Did the health worker tell you why getting vitamin A is important for your child?	yes	no
9) What did the health worker tell you about vitamin A?		
-keeps the child from getting sick?	yes	no
-good for the child?	yes	no
-decreases risk of dying?	yes	no
-other?	yes	no
10) Did the health worker check your child's palm or eyelids or tongue?	yes	no
11) Did the health worker talk with you about anemia?	yes	no
12) If the health worker thought your child had anemia, what advice did the health worker give you?		
-buy iron and give it to the child?	yes	no
-improve the child's diet?	yes	no
-other?	yes	no
Woman attending antenatal care		
1) Did the health worker give you an anemia test?	yes	no
2) If the test was done here, did the health worker discuss the results with you?	yes	no
3) Did the health worker give you iron supplements?	yes	no

4) How many were given to you?		
-0-10 supplements	yes	no
-11-20 supplements	yes	no
-21-30 supplements	yes	no
- > 30 supplements	yes	no
5) Did the health worker tell you how many iron supplements to take/day?	yes	no
6) Did the health worker tell you how many iron supplements you should take in your pregnancy?	yes	no
7) How many supplements were you told to take in pregnancy?		
- < 30 supplements	yes	no
-30-89 supplements	yes	no
-90 supplements	yes	no
- > 90 supplements	yes	no
8) Were you told why it is important to take iron in pregnancy?		
-healthy baby	yes	no
-healthy pregnancy/mother	yes	no
-healthy delivery	yes	no
-bigger baby	yes	no
-other	yes	no
9) Did the health worker warn you that side effects might occur when taking iron?	yes	no
10) Were you told how to manage side effects?	yes	no
11) What were you told on how to manage side effects?		
-take iron at night	yes	no
-take iron with meals	yes	no
-split the tablet and take one-half in the morning & other half at night	yes	no
12) Were you weighed in this visit?	yes	no
13) Did the health worker discuss your weight with you?	yes	no
14) Did the health worker tell you how much weight you should be gaining in pregnancy?	yes	no
15) Did the health worker ask you what you were eating and discuss what to eat in pregnancy?	yes	no
16) Did the health worker tell you to buy & use iodize salt in cooking?	yes	no

17) Did the health worker discuss how to breastfeed your child when you deliver?	yes	no
18) What did the health worker discuss?		
–exclusive breastfeeding to 6 months	yes	no
–immediate breastfeeding	yes	no
–using colostrum	yes	no
–other	yes	no
19) What other ANC services are given to women?		
–checking blood pressure	yes	no
–measuring fundal height	yes	no
–physical exam	yes	no
–anti-malarials	yes	no
–deworming medicine	yes	no
–other	yes	no
Postpartum woman		
1) Were you given a vitamin A capsule?	yes	no
2) Were you given any advice on eating/diet?	yes	no
3) What advice were you given?		
–to eat more	yes	no
–to eat better quality foods	yes	no
–to improve your diet to produce enough breastmilk	yes	no
–to use iodized salt in cooking	yes	no
–other	yes	no
4) Were you given advice on breastfeeding?	yes	no
5) What advice were you given?		
–exclusive breastfeeding	yes	no
–use of colostrum	yes	no
–immediate breastfeeding	yes	no
–proper attachment	yes	no
–managing any problems with breastfeeding	yes	no
–how to increase milk production	yes	no
–other	yes	no

6) If you don't have enough breastmilk what should you do?

-increase breastfeeding	yes	no
-feed food to the infant	yes	no
-feed other milk to the infant	yes	no
-increase the food I am eating	yes	no
-other	yes	no

Inspecting supplies

1) Are there enough iron-folate tablets ordered in one year for the number of pregnant women in the catchment area (to estimate, take the total population x estimated number of pregnant women [about 4% of the total population or .04] x 90 supplements/pregnancy = total number of supplements needed)?	yes	no
2) How many days in the year are there "stock-outs" of iron-folate supplements?	_____	
3) Are there enough supplies of vitamin A capsules to give to sick children (measles, diarrhea) and postpartum women?	yes	no
4) How many days in the year are there "stock outs" of vitamin A capsules?	_____	
5) Are there other medications to support nutrition programs such as mebendazole for deworming, anti-malarials?	yes	no
6) How many days in the year are there "stock outs" of these medications?	_____	
7) Are other essential drugs available?	yes	no
8) How many days in the year are there "stock outs" of these medications?	_____	
9) Is there equipment for measuring anemia?	yes	no
10) Scales to measure the weight of children and women?	yes	no
11) Are there growth charts for recording weights of children?	yes	no

Dispensaries

- observations of staff with clients
- interviews with clinic staff
- interviews with clinic clients

Draft Grid for Data Presentation for Interviews With Staff-in-Charge

	Clinics (about 20% per province or state)	Dispensaries (about 20% per province or state)
Staffing		
% with doctors		
% with nurses		
% with lab technicians		
Supplies		
% with laboratories and equipment		
% with others (power supply, water, etc.)		
Training		
% with pre-service training in nutrition		
% with in-service training in nutrition		
% reporting a need for nutrition or other public health training in: breastfeeding anemia control infant feeding helminth control malaria control family planning		
Organisation		
% that have delegated nutrition responsibilities to staff		
% with a unit devoted to nutrition		
% reporting staff shortages		

	Clinics (about 20% per province or state)	Dispensaries (about 20% per province or state)
Prevalence of cases of malnutrition % reporting seeing nutrition problems at their facility % seeing undernutrition (poor growth) % seeing severe malnutrition % seeing anemia in women % seeing anemia in children % seeing VAD (xerophthalmia) % seeing iodine deficiency (goiter) % seeing other nutrition problems		
Provision of nutrition and other services % providing growth monitoring on a monthly basis % providing iron tablets for pregnant women % providing vitamin A for well children % providing vitamin A for sick children % testing for anemia % giving counseling on a better diet to mothers of children (including use of fortified foods) % giving counseling on a better diet to women (including use of fortified foods). % weighing pregnant women in ANC % giving counseling on breastfeeding in ANC % giving counseling on breastfeeding other times % looking at pallor as a sign of anemia % giving counseling on taking anti-malarials % giving counseling on taking antehelmitics % giving counseling on family planning		
% with nutrition education materials on hand % with other public health materials on hand		
% reporting that they had nutrition protocols for giving micronutrients and counseling on nutrition		

Draft Grid for Data of Observations With Clinics

	Clinics	Dispensaries
% of pregnant women receiving IFA		
% of pregnant women receiving at least 30 IFA at this visit		
% of pregnant women receiving IFA at last session		
% of women told how many tablets to take/day		
% of women told how many tablets to take in pregnancy		
% of women told why to take IFA		
% of women told how to manage side effects if they occur		
% of women weighed during the session		
% of women advised to gain 1 kg/month in pregnancy		
% of women counseled about eating/diet in session		
% of women counseled about exclusive breastfeeding		
% of women with blood pressure taken		
% of women with physical exam		
% of women checked for pallor		
% of women given a TT injection		
% with other		

Community: Community-based focus group discussions (FGDs)

Target communities and groups

The FGDs will be conducted in 6 communities distributed as follows:

- 2 communities where appraised clinics are located
- 2 communities where appraised dispensaries are located
- 2 communities with neither clinics nor dispensaries.

At each of these locations, the FGDs will be held with three groups (men, women, and community leaders).

Discussion guide

The discussions will be separately guided by the two members of the state data collection team. Preferably a man should conduct the men's discussion while a woman conducts the women's discussion. It is proposed that the following areas be covered:

- Existing nutrition programs
- Awareness about nutrition
- Relationship with health services
- Intervention opportunities

In discussing each of the areas, the guides should endeavour to look out for the following facts under the respective sub-headings:

Draft discussion's data sheet

a) Existing programs

Existing programs: Yes [] No []

If yes: Implementor

Focus/activities

Beneficiaries

Impact: High [] Medium [] Low/None []

Comment/Quotes if any

b) Awareness about nutrition

-What is the main nutrition problem in your community?

-Appreciation of the role of food habits and well-being:

High [] Medium [] Low/None []

-Appreciation of good hygiene practices and sanitation in relation to health

High [] Medium [] Low/None []

-Knowledge of specific food items of particular benefit to mothers and children*

Food item	Benefit

* To be completed during the discussion based on the output from the discussants.

-Awareness of foods/nutrient for prevention of some important micronutrient deficiency disorders: *(List items identified against the appropriate parameter).*

- Blood formation
- Prevention of blindness
- Prevention of goiter

c) Relationship with health institutions

- Level of patronage: High [] Medium [] Low/None []
- If high, what are those things that have encouraged the patronage?
- For low and medium, what are the constraints?
- What improvements are desired?

d) Opportunities for intervention: *

- Food security
- Health care and hygiene
- Enhancement of caring capacity

**This section is to be filled based on results from the FGDs to give some ideas on future program thrusts.*

Qualitative Research Instrument on Perceptions of Anemia and Use of Iron Supplements – The Indramayu Project, Indonesia

Introduction

The following plan and research instrument was developed for the USAID-funded MotherCare/John Snow, Inc. Project by the Manoff Group. This plan and the research instrument were used in formative research for the Indramayu Project. One component of this project tested ways to improve the existing iron supplementation program for pregnant women. Social scientists from the Manoff Group gave technical assistance to this process by developing these instruments, training non-medical interviewers and analyzing the results. The results were used to develop messages for counseling women and a social marketing campaign, to train health workers and others delivering iron supplements, and to identify and develop delivery mechanisms/strategies for the improved iron supplementation program.

The Plan

Methods

Information will be collected through use of in-depth interviews. Interview guides have been prepared in draft form for pregnant and recently delivered women, traditional birth attendants (dukun bayi) and community volunteers (kaders), and midwives (bidan) and doctors in the study area. In addition, interviews will be conducted among a small number of husbands of pregnant or recently delivered women, and among older woman family members of pregnant women, who might influence compliance with iron supplements among pregnant women.

Timeframe

The draft instruments will be pretested in the study community during February 1991, and interviewers will obtain training on in-depth interview techniques. Revisions indicated by the pretest process will be completed by end of February.

Interviews will take place in March, over a three-week period. Two interviewers will have primary responsibility for the interviews of women and TBA (dukun bayi). Two additional interviewers will assist with the health staff interviews.

Sample Strategy

The project area includes approximately 10,000 households, and an estimated 1200 pregnant women according to most recent count.

A total of 30 pregnant and recently delivered women will be interviewed. Pregnant women should be in their second or third trimester of pregnancy. Current MOH policy dictates that one iron tablet/day be taken by pregnant women beginning in the sixth month of pregnancy (end of the second trimester), and continuing into the postpartum period. In the Indonesian setting, pregnant women, even in second trimester, are not necessarily eligible to receive iron through government health facilities, and therefore would not be expected to have experience with consumption/compliance of iron supplements during the current pregnancy.

Identification information collected prior to the interview will indicate parity and level of

use of antenatal care during this pregnancy. Half of interviews will be among previous users of iron, and half among non-users.

Six midwives (bidans) are currently working in the study area, and all will be included in the interview process. There are two doctors who will be interviewed.

At least 10 community volunteers (kaders) and 12 TBAs (dukun bayi) will be interviewed. Half of the dukun bayi will be trained, half untrained.

20 interviews will be conducted among people in the community who might influence women's consumption of iron supplements: 10 interviews with women with pregnant or recently delivered women in the household, and 10 interviews with husbands of pregnant or recently delivered women.

The total number of interviews is at least 78. This number might be increased slightly if patterns of information are not readily recognizable after the planned number of interviews in each category.

Overall Research Objectives, Formative Research on Iron Compliance in Pregnancy Component:

1. To identify the behavioral, attitudinal, or other factors that affect pregnant women's compliance with iron supplementation.
2. To identify sources of information/advice about pregnancy within the community and influentials who could influence compliance with iron supplementation.
3. To identify current channels or communication/media preferences for use in dissemination of iron-related IEC.
4. To identify current channels of distribution of iron supplements to pregnant women.
5. To determine the acceptability of several proposed alternative iron tablet delivery systems in the community, to both pregnant women and health providers.
6. To explore the level of awareness, use, and attitudes toward iron in pregnancy of both women and providers of maternal health care (formal and nonformal).
7. To conduct concept testing on a limited basis to get feedback from a small sample of pregnant women on iron tablet acceptability.

Formative Research Topic Areas

Pregnant Women

1. Attitude toward pregnancy in general, and this specific pregnancy
 - planned pregnancy?
 - aspiration for pregnancy outcome, both for baby and maternal
2. Ethnomedical view of pregnancy
 - awareness of relationship between blood and health
 - beliefs regarding effects of low blood
 - blood loss on health
 - awareness of anemia as an illness (symptoms, sequelae such as hemorrhage, low birthweight) etiology
 - perceived susceptibility

- severity
 - personal experience with anemia or sequelae
3. Perceived value of preventive action during pregnancy
 - self-care practices
 - use of antenatal care
 - early care for self-detected problems of pregnancy
 4. Perceived value of iron supplementation during pregnancy
 - need for and effectiveness of iron supplements
 - personal experiences with iron supplementation (use, nonuse, duration of use)
 - side effects
 - consequences of use/nonuse of iron supplements
 - other traditional or self-care for treatment of anemia in pregnancy
 - compatibility of iron supplementation with traditional ethnomedical practices during pregnancy
 5. Circumferences of iron supplementation (prior experience)
 - attitude toward pill taking -- size, color, taste, mode of delivery (tab, cap, tonic, injection)
 - dose
 - timing
 - frequency
 - duration
 - with meals
 - how iron tabs obtained
 - from whom
 - how often
 - level of health education provided with iron supplements (treatment, instructions, comprehension/recall, adherence to instructions/education)
 - opinion of source of iron supplements (dukun bayi, bidan, kader, others)
 6. Barriers to use
 - difficulties in access to antenatal care
 - cost of transport
 - distance to supplements at posyandu (health post)
 - not given supplements
 - unaware of need for supplements
 - cost of supplements
 - given but not instructed in use
 7. Source of information on iron/anemia during pregnancy
 8. Media preferences/communication channels
 9. Iron supplements distribution (concept testing)

The Interview Instruments

Draft Question Guide for In-Depth Interviews With Pregnant Women Identification

1. Name:
2. Age:
3. Current month of pregnancy (probably at least 6 months):
4. Date of Last Birth:
5. Parity: 0 1 2 3 4 or more
6. Previous Pregnancy Outcome(s):
 - normal
 - maternal problem _____
 - neonatal problem _____
7. Level of education/literacy:
8. Iron tablet use:
 - never used
 - used in previous pregnancy
 - used this pregnancy
 - # of supplements given in pregnancy or previous pregnancy
 - # of supplements taken in pregnancy or previous pregnancy
9. Antennal care use:
 - never
 - visits this pregnancy 0 1 2 3 4 5 6 or more
 - month of pregnancy at time of ANC visit _____
 - reason for visit(s)
10. Distance from:
 - Posyandu (health post)
 - Puskesmas (health center)
 - Kader (community volunteer)
 - Dukun bayi (TBA)
 - Hospital

Introduction

I. We would like to ask you some questions about your pregnancy (explain briefly)

Was this pregnancy (or most recent pregnancy) planned?

Does having a baby now cause any problems for you?

What kind?

Overall, how have you been feeling during this (or previous) pregnancy?

What thought/hopes/fears do you have about your own health during pregnancy and delivery?

For the family during this pregnancy?

Do you notice any changes in your health during this pregnancy? What changes?

Have you had to change your daily activities in any way because of your health during this pregnancy? How?

Are you doing anything different since you became pregnant? What?

Any traditional ceremonies?

Are you taking any medicines (obat), jamu, traditional remedies, or other things especially for your pregnancy? What? Why?

What about your diet? Any changes in your diet? What changes? Why?

II. Do you know of any problems which pregnant women can have with their health?

Where do you usually go for advice about these problems?

What advice did you receive there?

Do you know of any problems in pregnancy caused by blood, low blood, bleeding?

If yes, what is this called? What are the symptoms?

If necessary, prompt tired, weak, dizzy, rapid heartbeat, headache:

- tired
- weak
- dizzy
- rapid heartbeat
- headache

Do you know of any problems a pregnant women can have if she has anemia (use local name for anemia here if women has given you one)? What?

Do you know of any problems pregnant women can have if they lose blood during childbirth? What?

Has this ever happened to you or anyone you know?

What do you think causes this to happen?

Is this a serious problem? Why or why not?

Is there anything you can do to prevent this from happening? What?

Do you know anything you can do or place to go to cure these problems?

- self-care
- dukun bayi
- household care
- posyandu

- take iron pills
- improve diet
- other

Have you ever done any of these things?

- what was the result?
- condition improved
- no change or condition worsens

III. Some pregnant women take iron supplements during their pregnancy.

Have you ever heard of pregnant women taking iron supplements?

Do you know why they take them?

Where did you hear about them?

Has anyone you know taken them?

Have you taken them?

When did you first take iron?

- this pregnancy 6 7 8 9 month
- before 6 months
- previous pregnancy
- other

When is the last time you took iron tablet?

How many did you take?

Did you stop before you took all the supplements you were given? Why?

Were there any problems which you had because of the iron supplements?

What type of problems?

If no response, prompt

- constipation
- diarrhea
- change in color/consistency of stool
- vomiting
- nausea
- abdominal pain
- dizzy
- bad taste
- heartburn

(we will also add some conditions which are not iron-related to check accuracy)

Did you take the supplements with meals?

When during the day did you take them?

How many times per day?

For how many days, weeks, months?

Why did you stop?

IV. I am going to ask you a few question about the supplements:

Is there anything about the tablet which you do not like, or which makes it difficult for you to continue taking the tablet?

Probe:

- size
- taste
- difficulty swallowing
- color

Would you find it easier to take iron in some other form?

Probe:

- jamu/tonic
- injection
- other

Did you notice any change in your health or how you were feeling after taking the iron supplements?

What?

How long were you taking the supplements before you noticed these changes?

Where did you get the iron supplements?

Who gave them to you?

How often do you have to go back and get more?

Is this difficult for you?

Do you usually return to get more supplements?

Can you remember what the person who gave you the iron supplements told you about how to use them?

Probe:

- when to take
- how long to take
- how many to take
- what to do if side effects occur
- reason for iron pills

- when to return for more supplements
- explain side effects
- other

Did you follow these instructions? Why/ Why Not?

Did any one else give you advise about iron/anemia in pregnancy? Who?

- bidan/nurse
- kader
- husband
- dukun bayi
- mother
- community leader
- mother-in-law
- female friend
- other

What did they tell you?

V. Did you ever hear about iron on the radio? TV? What did the messages say?

Have you seen posters about iron in pregnancy? At the posyandu? Where? What did the posters say?

Can you think of any other way that would be easier for you to get iron supplements than the way you are getting them now? Which way?

Do you have any problems getting to the posyandu or other source of iron tabs? What problems?

Can you think about any other problems with iron supplements other than those we have already discussed? Any other comments?

Do you have any iron supplements in the house now? Can you show them to me?

- type
- amount
- where stored

Do you have any other supplements or medicines in the house? Jamu, tonics, or other obat? Can I see them?

VI. Media Preference/Channels of Communication

Do you listen to the radio?

- how often?
- what stations?
- what times?
- what are your favorite programs?

Do you usually do other things while you are listening to radio, or only listen?

Who listens with you?

Do you have a TV? Do your neighbors have a TV? How often do you watch TV? What stations? What programs? What times? Who watches with you?

How often do you read newspapers, magazines?

Which ones?

Where would you prefer to learn more about iron supplements?

When you go out of the house each day, where do you usually go? How often do you go each week?

- market (weekly market or smaller daily market or food stalls)
- mosque
- cinema
- kader
- Other

How often do you go to the posyandu? To puskesmas? To private clinic or private doctor? To dukun bayi? Other

Is this different than before you were pregnant? How?

Trials of Improved Practices (TIPS)

Introduction

The Trials of Improved Practices (TIPs) methodology, based on product testing in marketing research, was developed by The Manoff Group in Washington, D.C. to test infant feeding recommendations and is used as the key methodology for developing the IMCI Food Box and outlined in more detail in *Designing by Dialogue*. Historically nutritionists have set recommendations on how to feed young children based on nutritional requirements of children and have rarely consulted caregivers as to whether or not can follow the recommendations. Often these recommendations are not practical for the lifestyle or culture of caregivers but with some simple modifications can be made more feasible for caregivers to use. TIPs asks the caregiver to follow recommendations and then consults with them about their ability to follow these recommendations, if they would continue new practices, how the practice could be modified to suit the caregiver's home situation and culture, etc.

The TIPs was adapted for iron pill-taking to determine what women's experiences were with taking iron (positive and negative), if they would continue to take iron for a longer period of time (i.e., throughout their pregnancy), if they would recommend iron to other women, etc. At the time of the Indramayu Project most people working in the science of anemia felt that programs were not working because women experience side effects shortly after taking iron supplements and as a result stopped taking them. The TIPs methodology was important because it showed that not all women experience side effects. Those that experienced side effects did not stop taking iron, particularly if they were counseled about how to manage them. However, there were other barriers to taking iron supplements for an extended period of time and TIPs helps identify these barriers. It also helps identify the factors that facilitate women taking iron.

Sample population for TIPS:

- 10-20 pregnant women without experience with taking iron pills
- These women should be given enough pills for a 15-20 day period and then interviewed at the end of that period

Counseling messages when women are given iron for TIPS:

- Why to take (e.g., make you and your baby healthy)
- How often to take (e.g., once per day)
- When to take (between meals or before going to bed with water or fruit juice). Note this maximizes absorption
- That side effects (give examples: black stools, gastro-intestinal problems) might occur but that they are not serious and should subside in a few days
- What to do if side effects do not subside: split the pill in half and take one half in the morning and one half in the evening
- If side effects still don't subside: take with meals

TIPS Interview after 15-20 days of taking iron

Greet the woman.

How have you been feeling since the last time I was here and left the iron supplements for you?

Did you take the iron supplements I left with you? Why did you decide to take it? Why not?

How many supplements did you take? How often? At what time of day?

Do you have any supplements remaining? Can I see them? (Count remaining supplements, and notice where she kept the supplements).

Did you take the supplements with any kind of drink or foods? Which?

Where there any things about the iron tablet which you did not like? (**Probe** size, color, swallowing, taste, smell, hates pills, other)

Did you notice any changes in how you feel while taking the supplements? What kind of changes? (**Probe** benefits, side effects, note the exact words used by women to describe)

Do you know why it is important for pregnant women to take iron supplements?

What is your opinion now that you have tried them yourself? (exact words)

Were there any things that you liked about the pills? (if not mentioned above, **probe** for specific words, concepts)

Would you be willing to continue to take iron supplements for the rest of your pregnancy? Why, why not?

Would you go to the posyandu (health post) for more iron supplements? To puskesmas (health center)? To the dukun bayi (TBA)? Some other place? Why, why not?

If iron supplements were available to buy, would you buy them? How much would you pay for them? What size package would you prefer? A package of 10 pills? A package of 30 pills? A package of all the pills you need in pregnancy?

Can you think of any difficulties you might face if you wanted to continue taking the supplements? What would make it easier for you?

Did you remember to take one tablet each day? If yes, how did you remember? If no, why not? Where did you keep your supplements?

Would you recommend these iron tables to some of your friends who are pregnant? Why or why not?

What would you tell them to convince them to take the supplements? (if any response, try to get exact words)

Did anyone in your family or any friends notice that you were taking these supplements?

Did they make any comments? What comments?

Are you/have you taken any other pills, obat, jamu, other while pregnant? Why?

You will be giving birth soon. Have you thought about your children?

Have you/will you make any plans for it? What plans?

What are you hoping most about the delivery (**Probe** safe delivery, easy delivery, short labor, strength for delivery, no problems, etc. Try to note exact words.)

Would you like me to leave some more iron supplements with you today? Why, why not?

Draft Question Guide for In-Depth Interviews for Dukun Bayi (TBA) and Kader (Community Volunteer)

How many pregnant women do you usually care for/visit each month? How many are you caring for/visiting now?

Are there many pregnant women in your area who you do not care for? How many?

Are there some common problems which pregnant women usually ask your advice about? What kind of problems?

What advice do you usually give them?

Any other things that pregnant women talk to you about?

Who else do you think pregnant women talk to about their health during pregnancy?

Have you ever heard of a problem in pregnant women called kurang darah (local term for anemia)?

Can you tell me what it is? What causes it? Is there any way to prevent it?

Do you know if a pregnant woman, or any woman, has anemia?

Do you know of any problems to health which can be caused by anemia in pregnant women? Which problems?

What do you advise a pregnant woman to do if you think she has anemia?

Do most women follow this advice?

Are there any other things you tell them to do?

Have you heard of taking iron supplements during pregnancy? (if this was not part of the answer to previous question)

Do you know why pregnant women take them?

Do you ever tell women to take iron supplements?

If so, where do you tell them to get the supplements?

Have you ever taken iron supplements yourself? When? How long?

Did you notice any change in your health (how you felt) after taking the supplements?

How do most pregnant women you know get iron supplements now?

Do they have problems getting the supplements? What problems?

Would you be willing to distribute iron supplements to pregnant women in your area?

Do you think it would be possible for pregnant women to come to your house to receive iron supplements?

What about someone delivering iron supplements to the home of each pregnant woman? Who do you think could do that? Would you be willing to deliver iron supplements to the homes of pregnant women in your area? Why? Why not?

Can you think of any other way that pregnant women could receive iron supplements?

Any other things you would like to discuss?

Draft Question Guide for In-Depth Interviews for Bidan (Midwife) and Doctor

How common is anemia in pregnant women in this area? About what percentage of all the pregnant women you care for have anemia?

How do you usually determine that a woman is anemic? Any reason why you use this method? Any problems with this method?

How serious do you think anemia is as a problem for pregnant women? Are there

other problems that you usually see in pregnant women which you think are more serious than anemia? Which?

Are there programs for prevention or treatment of anemia in this area? Can you describe them?

In your opinion, are these programs effective? Why or why not?

What could you suggest to improve the effectiveness of the current program?

When you give iron supplements to pregnant women, do you give them any advice? On how to take the supplements? On why it is necessary to take the supplements? On possible side effects? Anything else you usually tell them?

Do you think the women take the supplements you give them? Why or why not? Do women usually give you any reason why they are not taking the iron supplements? Do many women return for resupply of the iron supplements throughout the pregnancy?

Do you know of any difficulties that may prevent pregnant women from obtaining iron supplements?

Do you know of any other medicines, tonics, jamu or other traditional medicines which pregnant women commonly take? Are any of these used for anemia?

How do pregnant women receive iron supplements now? How do those women who do not attend posyandu or puskesmas obtain iron supplements?

Can you suggest any other ways or locations which might be used to distribute iron supplements to pregnant women? Who might be an appropriate person to distribute iron supplements at places other than health facilities?

Any other things which might make it easier for women to receive and take iron supplements?

Can you think of any benefits or problems that might occur if iron supplements were distributed in the community, rather than only at health facilities?

Draft Question Guide for In-Depth Interviews for Husbands or Elder Women

Introduction

Overall, how would you say your wife (daughter or daughter-in-law) has been feeling during this current pregnancy?

Is it different than her other pregnancies? (if this is not her first) How?

Does your wife (daughter or daughter-in-law) ever tell you about problems she is having during her pregnancy? What problems?

What advice do you give her?

Is there someone else you think is good for pregnant women to talk with when they have these problems? Who? Do you send your wife (daughter or daughter-in-law) there? Does she go?

Do you think pregnant women should talk to/receive care from someone even if they do not have problems? Why, why not? Who?

Do you know of any problems in pregnancy caused by blood/low blood/bleeding? How would you know if your wife (daughter or daughter-in-law) had this problem?

Have you heard of a problem called anemia? Can you tell me anything about it?

Has this happened to anyone you know? Is there anything that can be done to prevent this from happening? What can cure it?

Has your wife (daughter or daughter-in-law) or anyone you know ever done these things? What happened?

Some pregnant women take iron supplements during their pregnancy. Have you ever heard of this?

Do you know why they take iron supplements? Where did you hear about it?

Has your wife (daughter or daughter-in-law) or any woman you know taken them?

Do you know where they got the supplements?

How long did she take them? Why did she stop?

Did your wife (daughter or daughter-in-law) tell you anything about the supplements while she was taking them? What?

Did you notice any change in her health while or after she was taking the iron supplements? What changes?

Do you think it is necessary for pregnant women to take iron? Why, why not?

Do you know of any other special things your wife (daughter or daughter-in-law) or other women do or take when they are pregnant? What things? Do you think these things are necessary?

Before we started the talking did you ever hear about iron tablets for pregnant women? Where? On radio? TV? At the posyandu (health post) or puskesmas (health center)?

How often do you go to the posyandu (health post)? Why? How often do you go to the puskesmas (health center)? Why?

How often does your wife (daughter or daughter-in-law) go to posyandu? Why? Puskesmas? Why?

Is there a radio in your house?

How often do you listen? What station? What programs? What times?

Do you have a TV? Do you ever see TV? Where how often? What programs? What times?

How often do you read newspapers, magazines? Which ones?

Do you attend market? Mosque, etc.? When? How often?

Recommended Intermittent Presumptive Treatment (IPT) or Treatment Regimens
For Malaria, Hookworm, and Schistosomiasis

Treatment Group	Indication for IPT or Treatment	Dosage	Duration
Malaria (<i>Plasmodium falciparum</i>)*			
Children 2 mos. to 3 yrs.	<p><i>IPT:</i> not recommended at this time</p> <p><i>Treatment:</i> as determined by anemia using palmar pallor or fever with no cough with fast breathing</p> <p>For children 2 mos. to 3 yrs. with severe febrile disease</p>	<p>Combined 500 mg sulfadoxine, 25 mg pyrimethamine (SP) tablet: ½ tablet for children 2-12 mos. (4-< 10 kg weight) 1 tablet for children 12 mos. to 3 yrs. (10-< 14 kg)</p> <p>Intramuscular quinine injection (150 mg/ml quinine salt in ml ampoules) 2-4 months (4-< 6 kg): 0.4 ml 4-12 months (6-< 10 kg): 0.6 ml 12 months-2 years (10-< 12 kg): 0.8 ml 2 years-3 years (12-< 14 kg): 1.0 ml</p>	<p>Single dose</p> <p>Give the first dose immediately and refer child urgently to hospital. If referral is not possible, give first dose and repeat the dose 4 and 8 hours and then every 12 hours until the child is able to take oral antimalarials. Do not continue quinine injections for more than one week. If low risk for malaria, do not give quinine to a child less than 4 months of age.</p>
Children 3-5 yrs.	<p><i>IPT:</i> not recommended at this time</p> <p><i>Treatment:</i> as determined by anemia using palmar pallor or fever with no cough with fast breathing</p> <p>For children 3-5 yrs. with severe febrile disease</p>	<p>Combined 500 mg sulfadoxine, 25 mg pyrimethamine (SP) tablet: 1 SP tablet (children 14 -19 kg weight)</p> <p>Intramuscular quinine injection (150 mg/ml quinine salt in ml ampoules) 3 years up to 5 years (14-19 kg): 1.2 ml</p>	<p>Single dose</p> <p>Give the first dose immediately and refer child urgently to hospital. If referral is not possible, give first dose and repeat the dose 4 and 8 hours and then every 12 hours until the child is able to take oral antimalarials. Do not continue quinine injections for more than one week.</p>

Treatment Group	Indication for IPT or Treatment	Dosage	Duration
Pregnant women	<i>IPT</i> : recommended <i>Treatment</i>	Combined 500 mg sulfadoxine, 25 mg pyrimethamine (SP): 2 tablets 2 SP tablets or follow national protocols	IPT started in second trimester; tablets given not less than monthly
<i>Hookworm</i>			
Children 2-5 yrs.	Endemic hookworm (prevalence = 20-30%) and child has anemia as determined by palmar pal-lor**	Mebendazole, 500 mg, one dose (only children > 2 yrs.) (IMCI generic protocol)	Whenever the child presents with clinical signs for anemia and has not had a dose of mebendazole in the last six months.
Children > 5 yrs.	Endemic hookworm (prevalence = 20-30%)	Single dose of any of the following: Albendazole, 400 mg Mebendazole, 500 mg Levamisole, 2.5 mg/kg body weight Pyrantel, 10 mg/kg body weight	At least annually; optimally 2-3 times/year
Adult women, including lactating women	Endemic hookworm (prevalence = 20-30%)	Single dose of any of the following: Albendazole, 400 mg Mebendazole, 500 mg, Levamisole, 2.5 mg/kg body weight Pyrantel, 10 mg/kg body weight	At least annually; optimally 2-3 times/year

Treatment Group	Indication for IPT or Treatment	Dosage	Duration
Pregnant women	Endemic hookworm (prevalence = 20-30%)	Any of the following: Albendazole, 400 mg, single dose Mebendazole, 500 mg, single dose or 100 mg twice daily for three days Levamisole, 2.5 mg/kg body weight, single dose (but better if this dose is repeated on the next two consecutive days) Pyrantel, 10 mg/kg weight, single dose (but better if this dose is repeated on the next two consecutive days)	One treatment in second trimester If hookworm prevalence is 50%, one dose in the second trimester and one dose in the third trimester
<i>Schistosomiasis</i>			
School-age children	Schistosomiasis is endemic	Praziquantel, 40 mg/kg body weight, single dose	Annually (one dose/year)
<p>* Where malaria is endemic</p> <p>** Recent studies show it might be cost-effective to routinely deworm children < 5 years to decrease anemia and improve growth. This recommendation may thus change.</p> <p>Sources: WHO (1995) ; Stoltzfus and Dreyfuss (1998); Parise (2000).</p>			

Iron Doses and Three-Month Hemoglobin Increase in Women ¹	
Daily Dose (mg)	Increase (g/dL)
< 60	0.2
61-90	1.0
91-120	1.2
> 120	1.6
¹ Calculated from studies/programs with both supervised and unsupervised iron supplementation.	
<i>Source:</i> Sloan et al., 1992.	

**Iron and Folic Acid Doses
For Universal Supplementation in Vulnerable Groups**

Group	Iron-/Folic Acid Doses	Duration
Low-birthweight infants (< 2,500 g)	<i>Iron:</i> 2 mg/kg body weight/day <i>Folic acid:</i> 50 mcg/day	2-24 mos. of age
6- to 24-month-old children	<i>Iron:</i> 2 mg/kg body weight/day <i>Folic acid:</i> 50 mcg/day	6-12 mos. of age where anemia prevalence is < 40% 6-24 mos. of age where anemia prevalence is ≥ 40%
24- to 59-month-old children*	<i>Iron:</i> 20-30 mg iron	At least once/week for three months
School-age children (6-11 years)*	<i>Iron:</i> 30-60 mg/day	At least once/week for three months
Adolescents/women of childbearing age*	<i>Iron:</i> 60 mg/day <i>Folic acid:</i> 400 mcg/day for girls and women	At least once/week for three months
Pregnant and lactating women	<i>Iron:</i> 60 mg/day <i>Folic acid:</i> 400 mcg/day	Six months during pregnancy where anemia prevalence is < 40% Six months during pregnancy and three months postpartum where anemia prevalence is ≥ 40% If it is not possible for women to take iron and folic acid for six months in pregnancy, supplementation should continue into the postpartum period or the dose should be increased to 120 mg/day.

* The need for universal supplementation in these groups may change if there are iron-fortified foods targeted to them.

Sources: WHO/UNICEF/UNU (2001); Stoltzfus & Dreyfuss (1998). Note: Where the recommendations differ, recommendations in the Stoltzfus & Dreyfuss document were used. For example, WHO/UNICEF/UNU does not recommend folic acid for low-birthweight infants and children 6-59 months.

Iron and Folic Acid Doses For Treating Severe Anemia in Vulnerable Groups		
Group	Iron/Folic Acid Doses	Duration*
Children < 2 years old**	<i>Iron:</i> 25 mg/day <i>Folic acid:</i> 100-400 mcg/day	3 months
Children 2-12 years old	<i>Iron:</i> 60 mg/day <i>Folic acid:</i> 400 mcg/day	3 months
Adolescents and adults, including pregnant women**	<i>Iron:</i> 120 mg/day <i>Folic acid:</i> 400 mcg/day	3 months
<p><i>Indications for supplementation:</i> Presence of severe anemia as assessed by clinical signs (pallor) or hemoglobin/hematocrit tests</p> <p>* After completing three months of treatment for severe anemia, young children and pregnant women should continue on preventive supplementation regimen.</p> <p>** Children with kwashiorkor or marasmus should be assumed to be severely anemic. Oral iron supplementation should be delayed until the child starts eating again and gains weight, usually after 14 days.</p>		
<p><i>Source:</i> Stoltzfus and Dreyfuss (1998).</p>		

**United States Dietary Reference Intakes* for Anemia-Related Micronutrients
(Other Than Iron and Folic Acid) for Vulnerable Groups**

Age/Gender Group	Vitamin A (retinol activity equivalents, mcg/day)	Vitamin C (mg/day)	Riboflavin (mg/day)	Vitamin B-6 (mg/day)	Vitamin B-12 (mcg/day)	Copper (mcg/day)
0-6 mos.	400	40	0.3	0.1	0.4	200
7-12 mos.	500	50	0.4	0.3	0.5	220
1-3 yrs.	300	15	0.5	0.5	0.9	340
4-8 yrs.	400	25	0.6	0.6	1.2	440
9-13 yrs.	600	45	0.9	1.0	1.8	700
14-18 yrs.	700 females 900 males	65 females 75 males	1.0 females 1.3 males	1.2 females 1.3 males	2.4	890
Males, 19-50+ yrs.	900	90	1.3	1.3 19-50 yrs. 1.7 > 50 yrs.	2.4	900
Females, 19-50+ yrs.	700	75	1.1	1.3 19-50 yrs. 1.5 > 50 yrs.	2.4	900
Pregnant women	750 ≤ 18 yrs. 770 > 19 yrs.	80 ≤ 18 yrs. 85 > 19 yrs.	1.4	1.9	2.6	1000
Lactating women	1200 ≤ 18 yrs. 1300 > 19yrs.	115 ≤ 18 yrs. 120 > 19 yrs.	1.6	2.0	2.8	1300

*These intakes are the most recent set of dietary recommendations established by the Food and Nutrition Board of the Institute of Medicine in the United States, 1997-2001.

Source: Institute of Medicine (2001).

Counseling Pregnant Women and Mothers About Iron Supplements

Counseling Points

When and how to take supplements

- Take supplements between meals or before going to bed with a little juice or water.

How to store supplements

- Keep tablets in a cool storage place out of the reach of small children.

Where to return for more tablets

- Return for more tablets at the health center, store, or other usual supplier.

How to give supplements to children

- Crush supplements and stir into child's food (or stir sprinkles into child's food); feed the food to the child.

The importance of taking all supplements

- Take all supplements to ensure the health of the baby and the health and strength of the mother.
- Children who take all supplements will be easier to feed and take care of and will do better in school in the future.

Side effects

- They may occur as dark or black stools, gastric upset, nausea, diarrhea, or constipation.
- They are not serious and should subside in a few days.

Managing side effects

- Take supplements with meals (instead of between meals or before bed).
- Split scored tablets in half and take each half at a different time of day.

No negative effects

- Iron is not a medicine and will not harm an unborn baby if taken as directed.
- Iron does not increase the baby's birthweight (i.e., it does not cause "large babies").
- Iron does not increase the amount of blood or cause high blood pressure.

Source: Galloway et al. (2002).

Counseling Pregnant Women and Mothers About Iron Supplements

Sample Counseling Cards From Indonesia – Pregnant Women

TANDA TANDA KURANG DARAH



- Lesu, letih, lemah, cepat lelah dan lalai
- Pusing dan mata berkunang-kunang

SIGNS OF LOW BLOOD

- Pale, tired, no energy
- Lack of concentration, dizzy

MANFAAT TABLET TAMBAH DARAH



- Membuat ibu sehat dan kuat selama hamil
- Membuat bayi tumbuh sehat dan kuat
- Membuat ibu lebih bertenaga waktu melahirkan

ADVANTAGES OF IRON TABLETS

- Make you strong and healthy
- Make your baby strong and healthy
- Replace your blood used by the baby

CARA MINUM TABLET TAMBAH DARAH



- Minumlah satu tablet sehari
- Selama hamil minumlah 1 tablet perhari, paling sedikit 90 tablet selama kehamilan
- Minumlah menjelang tidur untuk mengurangi rasa mual
- Tablet tambah darah diminum bersama air putih atau buah
- Jangan minum tablet tambah darah dengan teh atau kopi karena *teh* dan *kopi* mengurangi manfaat tablet tambah darah

HOW TO TAKE IRON TABLETS

- Take a minimum of 1 tablet per day
- Take a minimum of 90 tablets during pregnancy
- Take before going to bed
- Take tablets with water or fruit
- Don't take with tea or coffee because they reduce the advantages of iron tablets

TABLET TAMBAH DARAH



- Tidak menyebabkan darah tinggi atau kebanyakan darah
- Tidak menyebabkan bayi menjadi terlalu besar

KELUHAN YANG BISA TIMBUL BILA MINUM TABLET TAMBAH DARAH



- Mual-mual
- Susah buang air besar
- Tinja berwarna hitam
- Perut terasa tidak enak setelah minum tablet tambah darah

Ini mungkin terjadi dan sama sekali tidak berbahaya, akan hilang dengan sendirinya

IBU BISA MENDAPATKAN TABLET TAMBAH DARAH



- Gratis di Puskesmas, Pustu, Posyandu
- Ibu bisa beli pada Bidan di desa atau di warung / toko obat yang bertanda khusus

IRON TABLETS

- Tablets will not cause high blood pressure
- Tablets will not cause a big baby

SIDE EFFECTS THAT SOMETIMES OCCUR WHEN TAKING IRON TABLETS

- Nausea
- Constipation
- Black stools
- Upset stomach

Don't worry about these side effects. They should disappear in a few days and they are not serious.

WHERE TO GET IRON TABLETS

- For free at health center, health post, maternal/child health care center
- For a small cost at small shop or drug store with a banner. Your village midwife can also tell you where to get them.

Counseling Pregnant Women and Mothers About Iron Supplements

Sample Counseling Cards From Indonesia – Mothers

MEGAPA IBU YANG BARU MELAHIRKAN PERLU MINUM TABLET TAMBAH DARAH?



- Tanda-tanda kurang darah tidak terasa / tidak terlihat;
- Pada waktu melahirkan ibu banyak mengeluarkan darah;
- Mengganti darah yang hilang pada waktu melahirkan;
- Tablet tambah darah tidak menyebabkan darah tinggi atau kebanyakan darah.

WHY DOES THE WOMAN WHO HAS JUST DELIVERED NEED IRON TABLETS?

- Signs of too little blood aren't felt or seen
- At the time of childbirth women can lose a lot of blood
- To replace lost blood at the time of childbirth
- Tablets don't cause high blood pressure or too much blood

CARA MINUM TABLET TAMBAH DARAH



- Minumlah satu tablet sehari
- Selama masa nifas, minumlah satu tablet, sampai selama 40 hari
- Minumlah menjelang tidur untuk mengurangi rasa mual
- Dininum bersama air putih atau buah

Jangan minum tablet tambah darah dengan teh atau kopi, karena teh dan kopi mengurangi manfaat tablet tambah darah

HOW TO TAKE IRON TABLETS

- Take a minimum of one tablet per day
 - Take tablets for 40 days
 - Take before going to bed
 - Take tablets with water or fruit
- Don't take with tea or coffee because they reduce the advantage of iron tablets

KELUHAN YANG BISA TIMBUL BILA MINUM TABLET TAMBAH DARAH?



- Mual-mual
- Susah buang air besar
- Tinja berwarna hitam
- Perut terasa tidak enak

Ibu tidak perlu khawatir, ini mungkin terjadi dan sama sekali tidak berbahaya, akan hilang dengan sendirinya.

SIDE EFFECTS THAT SOMETIMES OCCUR WHEN TAKING IRON TABLETS

- Nausea
 - Constipation
 - Black stools
 - Upset stomach
- Don't worry about these side effects – they aren't serious and should go away after a few days.*

IBU BISA MENDAPATKAN TABLET TAMBAH DARAH



- Gratis di Puskesmas, Pustu, Posyandu
- Ibu bisa beli pada Bidan di desa atau di warung / toko obat yang bertanda khusus

WHERE TO GET IRON TABLETS

- For free at health center, health post, maternal/child health care center
- For a small cost at small shop or drug store with a banner. Your village mid-wife can also tell you where to get them.

Negotiating With Women to Follow Advice

The counseling technique of "negotiating" for behavior change was developed for infant feeding, but it can also improve compliance with iron supplementation and food intake in women. Effective negotiating with a woman taking iron supplements or giving iron to her young children includes:

- Asking and discussing what she is doing now
- Asking her to try a new behavior
- Asking what practice she is able or willing to do
- Addressing initial resistance/concerns
- Agreeing on what practices she can continue
- Following up later to see if she was able to follow the new advice

The counselor and woman can then identify and discuss barriers to following the advice and consider ways to overcome them.

Source: Dickin et al. (1997).

Food Fortification: Seven Steps for Quality Control

- Decide on specifications for fortificant (particle size, color, potency, acceptable amount of fortificant) and food vehicle
- Through random testing, control fortificant, food vehicle, and fortified food for potency, particle size, color, packaging integrity, net weight, adulteration, and storage conditions, including temperature, light, moisture, and oxygen
- Identify and regulate critical control points such as shipping, industrial processing, storage, retailing, and household
- Establish a recall policy and procedure
- Audit the system periodically to ensure that manufacturers adhere to fortification standards and maintain quality
- Empower manufacturers to respond to consumer complaints
- Document all aspects of the quality assurance system and make this information available to those responsible for food fortification

Information Sources for Anemia Prevention and Control

- Academy for Educational Development (AED), 1825 Connecticut Ave., NW, Washington, DC 20009-5721, USA; Tel. 1-202-884-8000; Fax 1-202-884-8400; (<http://www.aed.org/>). PROFILES, Designing by Dialogue, and others.
- Asian Development Bank (ADB), P.O. Box 789, 0980 Manila, Philippines; Tel. 63-2-632-4444; Fax 63-2-636-2444; (<http://www.adb.org/>). Special Initiative includes Central Asia Forum on Micronutrient Malnutrition.
- Basic Support for Institutionalizing Child Survival (BASICS II), 1600 Wilson Blvd., Suite 300, Arlington, VA 22209, USA; Tel. 1-703-312-6800; Fax 1-703-312-6900; (<http://www.basics.org/>). Nutrition Essentials, Program Review of Nutrition Interventions: Checklist for District Health Services, Improving Child Health Through Nutrition: the Nutrition Minimum Package, and information on child survival including nutrition through Childline (<http://www.basics.org/new/ChildlineNew.html>).
- Centers for Disease Control and Prevention (CDC), 1600 Clifton Road, Atlanta, GA 30333, USA; Tel. (inquiries): 1-800-311-3435; (<http://www.cdc.gov/>). Overview of Iron Overload and Hemochromatosis and others on iron overload.
- Food and Agriculture Organization of the United Nations (FAO), Viale delle Terme di Caracalla 00100, Rome, Italy; Tel. 39-06-5705-1; Fax 39-06-5705-3151; (<http://www.fao.org/>). Documents on food composition including iron content of food and food based solutions to malnutrition including Preventing Micronutrient Malnutrition: A Guide to Food Based Approaches (FAO/ILSI).
- Global Alliance for Improved Nutrition (GAIN), c/o World Health Organization, Avenue Appia 20, 1211 Geneva 27, Switzerland; telephone and fax not yet available; (<http://www.gainhealth.org/>). New initiative to provide funding and other resources to reduce micronutrient malnutrition.
- The International Food Policy Research Institute (IFPRI), 2033 K Street, NW, 9th floor, Washington, D.C. 20006-1002, USA; Tel. 1-202-862-5600; Fax 1-202-467-4439; (http://www.ifpri.org). Part of the Consultative Group on International Agricultural Research (CGIAR) Centers. Special initiative on reducing micronutrient malnutrition through biofortification.
- The International Life Sciences Institute (ILSI), One Thomas Circle, N.W., 9th Floor, Washington, D.C. 20005, USA; Tel. 1-202-659-0074; Fax 1-202-659-3859; (ilsil@ilsil.org). See ILSI publications for nutrition-related publications and links to INACG and IDEA.
- International Nutrition Foundation (INF), 150 Harrison Avenue, Room 243, Boston, MA 02111, USA. Tel. 1-617-636-3771; Fax 1-617-636-3781; (<http://www.inffoundation.org/index4.html>). Closely associated with United Nations University, INF offers nutrition information including the Iron Deficiency Project Advisory Service (IDPAS) supported by the Micronutrient Initiative. For information about IDPAS and to access its database on projects and resources related to iron-deficiency anemia, contact Gary Gleason: ggleason@inffoundation.org.
- The International Nutritional Anemia Consultative Groups (INACG), INACG Secretariat, ILSI Human Nutrition Institute, One Thomas Circle, N.W., Washington, D.C. 20005-5802, USA; Tel. 1-202-659-9024; Fax 1-202-59-3617; (<http://www.ilsil.org/inacg.html>). Safety of Iron Supplementation Programs in

Malaria-Endemic Regions, Guidelines for the Use of Iron Supplements to Prevent and Treat Iron Deficiency Anemia, Iron EDTA for Food Fortification, Combating Iron Deficiency Anemia Through Food Fortification Technology: An Action Plan, Guidelines for the Use of Iron Supplements to Prevent and Treat Iron Deficiency Anemia, and others.

- Iron Deficiency Elimination Action (IDEA), ILSI Center for Health Promotion (CHP), 2295 Parklane Drive, Suite 450, Atlanta, GA 30345, USA; Tel. 1-770-934-1010; Fax 1-770-934-7126; (<http://idea.ilsi.org/>). Produces a newsletter on its activities to control iron-deficiency anemia.
- Iron Deficiency Project Advisory Service (IDPAS) – see International Nutrition Foundation (INF) entry for more information.
- John Snow, Inc. (JSI), 1616 N. Fort Myer Drive, 11th Floor, Arlington, VA 22209-3100, USA; Tel. 1-703-528-7474; Fax 1-703-528-7400; (<http://www.jsi.com/home.html>). Alleviation of Maternal Anemia in Indramayu Regency, Indonesia: Results from the MotherCare Project, Improving the Quality of Iron Supplementation Programs: The MotherCare Experience, and others.
- The Manoff Group, 2001 S Street, N.W., Suite 400, Washington, D.C. 20009, USA; Tel. 1-202-265-7469; Fax 1-202-745-1961; (<http://www.manoffgroup.com/>). Social Marketing of Micronutrients, Ten Steps to Improving Pregnant Women's Compliance With Iron Folate Tablet Supplementation, Unlock Every Child's Potential, and Iron Improves Life (advocacy documents for people working in early childhood development developed for the Micronutrient Initiative), Egypt's Adolescent Anemia Prevention Program, and others.
- The Micronutrient Initiative (MI), P.O. Box 56127, 250 Albert Street, Ottawa, Canada; Tel. 1-613-782-6800; Fax 1-613-782-6838; (<http://www.micronutrient.org/>). Preventing Iron Deficiency in Women and Children, Regulation of Fortified Foods to Address Micronutrient Malnutrition, Economic Consequences of Iron Deficiency and others.
- National Academies Press, 500 Fifth Street, N.W., Washington, D.C. 20055, USA; Tel. 1-888-624-8373; Fax 202-334-2451; (<http://www.nap.edu/books/030906029X/html/1.html>). Prevention of Micronutrient Deficiencies: Tools for Policymakers and Health Workers, Dietary Reference Intakes for Iron and Other Micronutrients, Recommended Guidelines for the Prevention, Detection and Management Among U.S. Children and Women of Childbearing Age, and others.
- Pan American Health Organization (PAHO), Regional Office of the World Health Organization, 525 Twenty-third Street, N.W., Washington, D.C. 20037, USA; Tel. 1-202-974-3000; Fax 1-202-994-3663; (<http://www.paho.org/>). Iron Fortification: Where Are We in Terms of Iron Compounds?
- Program Against Micronutrient Malnutrition (PAMM), Department of International Health, Rollins School of Public Health of Emory University, 1518 Clifton Road, N.E., Atlanta, GA 30322, USA; Fax 1-404-727-4590; (<http://www.sph.emory.edu/PAMM/oldpamm.htm>). Iron Overview and others.
- Program for Appropriate Technologies in Health (PATH), 1455 NW Leary Way, Seattle, WA 98107-5136, USA; Tel. 1-206 285-3500; Fax 1-206-285-6619; (<http://www.path.org/>). Anemia detection manual: (http://path.org/files/htup-Anemia_Detection_Methods.pdf)

- Standing Committee on Nutrition (SCN) of the United Nations, SCN Secretariat, c/o The World Health Organization, Avenue Appia 20, 1211 Geneva 27, Switzerland; Tel. 41-22-791-0456; Fax 41-22-798-8891; (<http://www.unsystem.org/scn/Default.asp>). Nutrition information including background information on iron-deficiency anemia. Working groups on nutrition including micronutrients.
- SUSTAIN (Sharing United States Technology to Aid in the Improvement of Nutrition project), 1050 Connecticut Avenue, N.W., Suite 1000, Washington, D.C. 20036, USA; Tel. 1-202-772-1030; Fax 1-202-772-3313; (<http://www.sustaintech.org/>). Research Protocol Summary: SUSTAIN Evaluation of the Bioavailability of Elemental Iron Powders Used for Food Fortification; Guidelines for Iron Fortification of Cereal Food Staples; Storage, Sensory and Bioavailability Evaluation of Iron Fortified Corn Masa Flour; and others.
- United Nations Children's Fund (UNICEF), UNICEF House, 3 United Nations Plaza, New York, NY 10017, USA; Tel. 1-212-326-7000; Fax 1-212-887-7465; (<http://www.unicef.org/uwwide/>). State of the World's Children and Multiple Indicators Cluster Surveys (MICS) with information on anemia prevalence in some countries (<http://www.unicef.org/statis/>).
- The USAID Micronutrient Program (MOST), International Science and Technology Institute, Inc., 1820 North Fort Myer Drive, Suite 600, Arlington, VA 22209, USA; Tel. 1-703-807-0236; Fax 1-703-807-0278; (<http://www.mostproject.org/>). Improving Iron Status Through Diets, Anemia Detection Methods in Low-Resource Settings, and others.
- The World Bank, Human Development Network, Nutrition Advisory Service, 1818 H Street, N.W., Washington, D.C. 20433, USA; Tel. 1-202-473-2255; Fax 1-202-522-3234; (<http://www.worldbank.org/> search "nutrition"). Enriching Lives: Overcoming Vitamin and Mineral Malnutrition in Developing Countries, At-A-Glance Series, Nutrition Toolkit, and others.
- World Health Organization (WHO), Avenue Appia 20, 1211 Geneva 27, Switzerland; Tel. 41-22-791-2111; Fax 41-22-791-3111; (<http://www.who.int/>). Integrated Management of Childhood Illness protocols containing information on treating anemia, malaria, helminth infections, and other childhood illnesses can be found at <http://www.who.int/child-adolescent-health/publications/IMCI/chartbooklet.htm> and http://www.who.int/child-adolescent-health/New_Publications/IMCI/WHO_FCH_CAH_00.40/WHO_FCH_CAH_00.40.pdf.

References

Anemia Prevention and Control: What Works

Part I, Program Guidance

Chapter I, Anemia: “Lost Years of Healthy Life”

What is Anemia?

Gillespie, S. & J. Johnston (1998). Expert consultation on anemia determinants and interventions: Proceedings of a conference held 16-17 September 1997, Ottawa. Ottawa: MI.

WHO/UNICEF/UNU (2001). Iron deficiency anaemia: Assessment, prevention and control. A guide for programme managers. Report of the WHO/UNICEF/UNU consultation, 6-10 December 1993, Geneva. Geneva: WHO.

WHO (2002). The world health report: Reducing risks, promoting healthy life. Geneva: WHO.

What Is the Impact of Anemia?

Adult Productivity

Basta, S.S., D. Soekirman, D. Karyadi & N.S. Scrimshaw (1979). Iron deficiency anemia and the productivity of adult males in Indonesia. *American Journal of Clinical Nutrition* 32:916-925.

Bates, C.J., H.J. Powers & D.I. Thurnham (1989). Vitamins, iron and physical work. *The Lancet*, 313-314, August 5.

Brooks, R.M., M.C. Latham & D.W. T. Crompton (1979). The relationship of nutrition and health to worker productivity in Kenya. *East Africa Medical Journal* 56(9):413-421.

Edgerton, V.R., G.W. Gardner, Y. Ohira, K.A. Gunawardena & B. Senewiratne (1979). Iron-deficiency anaemia and its effect on worker productivity and activity patterns. *British Medical Journal* 2:1546-1549.

Florencio, C.A. (1981). Effects of iron and ascorbic acid supplementation on hemoglobin level and work efficiency of anemic women. *Journal of Occupational Medicine* 23(10):699-704.

Gardner, G.W., V.R. Edgerton, B. Senewiratne, R.J. Barnard, & Y. Ohira (1977). Physical work capacity and metabolic stress in subjects with iron deficiency anemia. *American Journal of Clinical Nutrition* 30(6):910-917.

Gilgen, D., C.G.N. Mascie-Taylor & L. Rosetta (2001). Intestinal helminth infections, anaemia and labour productivity of female tea pluckers in Bangladesh. *Tropical Medicine & International Health* 6(6):449-457.

Haas, J.D. & T. Brownlie IV (2001). Iron deficiency and reduced work capacity: A critical review of the research to determine a causal relationship. *Journal of Nutrition* 131:676S-690S.

Horton, S. & J. Ross (1998). Economic consequences of iron deficiency. Ottawa: MI.

Levin, H. (1986). A benefit-cost analysis of nutritional interventions for anemia reduc-

tion. *World Bank Research Observer* 1(2):219-245.

Li, R., X. Chen, H. Yan, P. Deurenberg, L. Garby & J.G. Hautvast (1994). Functional consequences of iron supplementation in iron-deficient female cotton mill workers in Beijing, China. *American Journal of Clinical Nutrition* 59:909-913.

Ross, J. & S. Horton (2000). *The economic costs of iron deficiency*. Ottawa: MI.

Scholz, B.D., R. Gross, W. Schultink & S. Sastroamidjojo (1997). Anaemia is associated with reduced productivity in women even in less physically strenuous tasks. *British Journal of Nutrition* 77:47-57.

Sridharan, K., A.K. Mukherjee, S.K. Grover, M.M.L. Kumaria, B.S. Arora & R.M. Rai (1987). Assessment of nutritional status and physical work capacity of road construction workers at altitude of 2150-2750 m on two different ration scales. *Nutrition Reports International* 35(6):1269-1277.

Maternal Health

Allen, L.H. (2000). Anemia and iron deficiency: Effects on pregnancy outcome. *American Journal of Clinical Nutrition* 71: 1280S-1284S.

Brabin, B. J., M. Hakimi & D. Pelletier (2001). An analysis of anemia and pregnancy-related maternal mortality. *Journal of Nutrition* 131:604S-615S.

CDC (1998). Recommendations to prevent and control iron deficiency in the United States. *Morbidity and Mortality Weekly Report* 47(RR-3):1-36. Atlanta: CDC.

Chi, I., T. Agoestina & J. Harbin (1981). Maternal mortality at twelve teaching hospitals in Indonesia – an epidemiological analysis. *International Journal of Gynecology & Obstetrics* 19:259-266.

Dallman, P.R. (1987). Iron deficiency and the immune response. *American Journal of Clinical Nutrition* 46:329-334.

Diallo, M.S., T.S. Diallo, F.B. Diallo, Y. Diallo, A.Y. Camara, G. Onivogui, N. Keita & S.A.T Diawo (1995). Anémie et grossesse. Étude épidémiologique, clinique et pronostique à la clinique universitaire de l'hôpital Ignace Deen, Conakry (Guinée). *Rev Fr Gynécol. Obstét.* 90(3): 138-141.

Earl, R. & C.E. Woteki, Eds. (1993). *Iron deficiency anemia: Recommended guidelines for prevention, detection and management among U.S. children and women of child-bearing age*. Committee on the Prevention, Detection and Management of Iron Deficiency Anemia Among U.S. Children and Women of Child-Bearing Age, Food and Nutrition Board, Institute of Medicine. Washington, D.C.: National Academy Press.

Fleming, A. (1988). Consequences of anaemia in pregnancy on mothers. Presented at the INACG workshop "Maternal Anemia," 14-16 November, Geneva.

Gillespie, S., J. Kevany & J. Mason (1991). Controlling iron deficiency: A report based on an ACC/SCN workshop, 6-8 June 1980, Dublin. ACC/SCN State-of-the-Art Series Nutrition Policy Discussion Paper No. 9. Geneva: WHO.

Harrison, K.A. (1975). Maternal mortality in anaemia in pregnancy. *West African Medical Journal* 27:31.

Harrison, K.A. (1989). *Tropical obstetrics and gynaecology*. 2. Maternal mortality.

Transactions of the Royal Society of Tropical Medicine & Hygiene 83(suppl. 5):449-453.

INACG (1989). Guidelines for the control of maternal anemia. Washington, D.C.: ILSI/USAID.

Kolsteren, P. & S. De Souza (2000). Micronutrients and pregnancy outcome. European Commission Expert Meeting, 27-28 November 2000: 151-177.

Llewellyn-Jones, D. (1965). Severe anaemia in pregnancy (as seen in Kuala-Lumpur, Malaysia). Australian New Zealand Journal of Obstetrics and Gynaecology 5:191-197.

Mahomed, K. (2000). Iron supplementation in pregnancy (Cochrane Review). In: The Cochrane Library, Issue 3, Oxford Update Software.

Ross, J.S. & E.L. Thomas (1996). Iron deficiency anemia and maternal mortality. Profiles Working Notes Series No. 3. Washington, D.C.: AED.

Rush, D. (2000). Nutrition and maternal mortality in the developing world. American Journal of Clinical Nutrition 72(1S):212S-240S.

Sarin, A. R. (1995). Severe anemia of pregnancy, recent experience. International Journal of Gynecology and Obstetrics 50 (Suppl. 2):S45-S49.

Thonneau, P., B. Toure, P. Cantrelle, T.M. Barry, & E. Papiernik (1992). Risk factors for maternal mortality: Results of a case-control study conducted in Conakry (Guinea). International Journal of Gynaecology & Obstetrics 39:87-92.

Tsu, V.D. (1993). Postpartum haemorrhage in Zimbabwe: A risk factor analysis. British Journal of Obstetrics & Gynaecology 100:327-333.

U.S. Preventive Services Task Force (1993). Routine iron supplementation during pregnancy. Policy statement. Journal of American Medical Association 270(23):2846-2848.

WHO/UNICEF/UNU (2001). Iron deficiency anaemia: Assessment, prevention and control. A guide for programme managers. Report of the WHO/UNICEF/UNU consultation, 6-10 December 1993, Geneva. Geneva: WHO.

Zucker, J.R., E. M. Lackritz, T. K. Ruebush, A.W. Hightower, J.E. Adungosi, J.B.O. Were & C.C. Campbell (1994). Anaemia, blood transfusion practices, HIV and mortality among women of reproductive age in Western Kenya. Transactions of the Royal Society of Tropical Medicine & Hygiene 88:173-176.

Young Child Development and Learning, Adolescent Development

Bhargava, M., R. Kumar, P.U. Iyer, S. Samji, V. Kapani, & S.K. Bhargava (1989). Effect of maternal anaemia and iron depletion on foetal stores, birthweight and gestation. Acta Paediatrica Scandinavica. 78:321-322.

Brabin, B.J., M. Ginny, J. Sapau, K. Galme & J. Paino (1990). Consequences of maternal anaemia on outcome of pregnancy in a malaria endemic area of Papua New Guinea. Annals of Tropical Medicine and Parasitology 84(1):11-24.

Brabin, B.J., Z. Premji & F. Verhoeff (2001). An analysis of anemia and child mortality. Journal of Nutrition 131:636S-648S.

Cot, M., J.Y Le Hesran, P. Miaillhes, M. Esveld, D. Etya'ale & G. Breart (1995). Increase in birthweight following chloroquine chemoprophylaxis during the first pregnancy: Results of a randomized trial in Cameroon. American Journal Tropical Medicine and Hygiene.

53(6):581-585.

Garn, S.M., S.A. Ridella, A.S. Tetzold & F. Falkner (1981). Maternal hematological levels and pregnancy outcome. *Seminars in Perinatology* 5:155-162.

Grantham-McGregor, S. & C. Ani (2001). A review of studies on the effect of iron deficiency on cognitive development in children. *Journal of Nutrition* 131:649S-668S.

Halterman, J. S., J. M. Kaczorowski, C.A. Aligne, P. Auinger, & P.G. Szilagyi (2001). Iron deficiency and cognitive achievement among school-aged children and adolescents in the United States. *Pediatrics* 107(6):1381-1386.

Horton, S. & J. Ross (1998). *Economic consequences of iron deficiency*. Ottawa: MI.

Idradinata, P. & E. Pollitt (1993). A report of reversal of developmental delays in iron-deficient anaemic infants treated with iron. *The Lancet* 341:1-4.

Kim, I., D.W. Hungerford, R. Yip, S.A. Kuester, C. Zyrkowski & F.L. Trowbridge (1992). Pregnancy nutrition surveillance system – the United States 1979-1990. *Morbidity and Mortality Weekly Review* 41(No. SS-7):25-41. *CDC Surveillance Summaries*. Atlanta: CDC.

Lister, U.G., C.E. Rossiter & H. Chong (1985). II. Perinatal mortality. *British Journal of Obstetric Gynaecology* 92(suppl 5):86-99.

Lozoff, B., E. Jimenez & A.W. Wolf (1991). Long-term development outcome of infants with iron deficiency. *New England Journal of Medicine* 325:687-694.

Murphy, J.F., J. O'Riordan, R.G. Newcombe, E.C. Coles & J.F. Pearson (1986). Relation of haemoglobin levels in first and second trimesters to outcome of pregnancy. *The Lancet*: 992-994, May 3.

Nokes, C., C. van den Bosch, & D. Bundy (1998). The effects of iron deficiency and anemia on mental and motor performance, educational achievement, and behavior in children. An annotated bibliography. Washington, D.C.: INACG.

Pollitt, E., P. Hathirat, N.J. Kotchabhakdi & L. Missell (1989). Iron deficiency and educational achievement in Thailand. *American Journal of Clinical Nutrition* 50(3): 687-697.

Pollitt, E. (2000). The developmental and probabilistic nature of the functional consequences of iron-deficiency anemia in children. *Journal of Nutrition* 131:669S-675S.

Rogerson, S.J., E. Chaluluka, M. Kanjala, P. Mkundika, C. Mhango & M.E. Molyneux (2000). Intermittent sulfadoxine-pyrimethamine in pregnancy: Effectiveness against malaria morbidity in Blantyre, Malawi, in 1997-99. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 94:549-553.

Ross, J. & S. Horton (2000). *The economic costs of iron deficiency*. Ottawa: MI.

Sarici, S.U., V. Okutan, M. R. Dundaroz, A. M. Serdar, R. Akin, G. Deda & E. Gokcay (2001). The effect of iron supplementation on visual-evoked potentials in infants with iron-deficiency anemia. *Journal of Tropical Pediatrics* 47: 132-135.

Scholl, T.O., M.L. Hediger, R.L. Fischer & J.W. Shearer (1992). Anemia vs iron deficiency: Increased risk of preterm delivery in a prospective study. *American Journal of Clinical Nutrition* 55:985-988.

Stoltzfus, R.J., J.D. Kvalsvig, H.M. Chwaya, A. Montresor, M. Albonico, J.M. Tielsch, L.

Savioli & E. Pollitt (2001). Effects of iron supplementation and anthelmintic treatment on motor and language development of preschool children in Zanzibar: A double blind, placebo controlled study. *British Medical Journal* 323 (7326):1389-1393.

Stoltzfus, R.J. (undated). Iron deficiency and strategies for its control. A report prepared for the USAID Office of Nutrition.

Sturgeon, P. (1959). Studies of iron requirements in infants III. Influence of supplemental iron during normal pregnancy on mother and infant. B. The infant. *British Journal of Haematology* 5:45-55.

van Stuijvenberg, J.D. Kvalsvig, M. Faber, N. Vorster & A.J.S. Benadé (1997). Addressing micronutrient deficiencies in school children with fortified biscuits: The effect of a micronutrient fortified biscuit and cold drink on the micronutrient status and cognitive function of primary school children – a randomized controlled trial. South Africa National Research Programme for Nutritional Intervention, Medical Research Council, Child Development Programme, Human Sciences Research Council, Research and Development Department, and Sasko Milling and Baking.

Walter, T., I. De Andraca, P. Chadud & C.G. Perales (1989). Iron deficiency anemia: Adverse effects on infant psychomotor development. *Pediatrics* 84:7-17.

How Prevalent Is Anemia ?

ACC/SCN (2000). The 4th report on the world nutrition situation: Nutrition throughout the life cycle. ACC/SCN in collaboration with the International Food Policy Research Institute. Geneva: ACC/SCN.

Achadi, E. & D. M. Utari (2000). National anemia control programs: Indonesia country example. Prepared for the MI.

Asian Development Bank Regional Technical Assistance (RETA) (1998). Investment for child nutrition in Vietnam. UNICEF\Asian Development Bank.

Asian Development Bank Regional Technical Assistance (RETA) (1998). Study on reduction of child malnutrition, Sri Lanka. Final Report. Ministry of Plan Implementation\Asian Development Bank. Colombo: Marga Institute.

DHS for Bangladesh (1999/0); (Bolivia (1997); Cambodia (2000); Colombia (2000); Egypt (2000); Eritrea (1995); Ghana (1998); Haiti (2000); India (1992/3, 1998/9); Indonesia (1994, 1997); Kazakhstan (1995, 1999); Kyrgyz Republic (1997); Madagascar (1997); Malawi (2000); Mali (2001); Niger (1998); Peru (2000); Philippines (1998); Rwanda (2000); Tanzania (1999); Uganda (2000/01); Uzbekistan (1996); Yemen (1997); Zimbabwe (1999). Macro International and the governments of each country.

Earl, R. & C.E. Woteki, Eds. (1993). Iron deficiency anemia: Recommended guidelines for prevention, detection and management among U.S. children and women of child-bearing age. Committee on the Prevention, Detection and Management of Iron Deficiency Anemia Among U.S. Children and Women of Child-Bearing Age, Food and Nutrition Board, Institute of Medicine. Washington, D.C.: National Academy Press.

Helen Keller International (1999). Iron deficiency anemia throughout the lifecycle in rural Bangladesh. New York: Helen Keller International.

Helen Keller International (1999). Iron deficiency in Cambodia. *Nutrition Bulletin* Vol. 1, Issue 1.

Kim, I., D.W. Hungerford, R. Yip, S.A. Kuester, C. Zyrkowski & F.L. Trowbridge (1992). Pregnancy nutrition surveillance system – the United States 1979-1990. Morbidity and Mortality Weekly Review 41(No. SS-7):25-41. CDC Surveillance Summaries. Atlanta: CDC.

Luo, C., C.M. Mwela & J. Campbell (1999). National baseline survey on prevalence and aetiology of anaemia in Zambia: A randomized cluster community survey involving children, women and men. Lusaka: National Food and Nutrition Commission in collaboration with University Teaching Hospital, Zambia; Zambia Central Statistical Office; Zambia Nutritional Anaemia Task Force; PAMM; and HemoCue, Sweden (as reported by A. van de Wijngaart on the ngonut list serve.)

Musaiger, A.O., A. Abdulghafoor & H. Radwan (1996). Short communication: Anaemia among 6 year old children in the United Arab Emirates. European Journal of Clinical Nutrition 50:636-637.

National Nutrition Agency (NaNA) (2001). Nationwide survey on the prevalence of vitamin A and iron deficiency in women and children in the Gambia. Banjul: NaNA and the Medical Research Council.

National household survey, Indonesia (1995). As reported by Achadi & Utari, 2000.

Nepal micronutrient status survey (1998). Ministry of Health (Child Health Division), New ERA, MI, UNICEF, WHO. Kathmandu: Nepal Ministry of Health.

Nutritview (1996). Child malnutrition in South Africa. Issue No. 1. (As reported by OMNI, 1999)

OMNI (1996). Micronutrient facts. Country series. Arlington, Va.: OMNI/John Snow, Inc., project.

Secretaría de Salud (2000). Encuesta Nacional de Nutrición, 1999. Mexico. Secretaria de Salud Instituto de Salud Pública, Instituto Nacional de Estadística Geografía e Informática. Tomo 1: Niños menores de 5 años. Tomo 1I: Mujeres en edad fértil. Tomo 1II: Niños en edad escolar.

Simmons, W.K. & D. P. Sinha (1992). Reduction of anaemia in antenatals in three Caribbean countries: Possible results of different types of interventions. Caribbean Food and Nutrition Institute, Pan American Sanitary Bureau, WHO Regional Office.

Stoltzfus, R.J. (1997). Rethinking anaemia surveillance. The Lancet 349:1764-1766.

Stoltzfus, R.J. & M.L. Dreyfuss (1998). Guidelines for the use of iron supplements to prevent and treat iron deficiency anemia. Washington, D.C.: ILSI Press.

Yip, R. (1996). Final report of the 1995 Viet Nam national nutrition anemia and intestinal helminth survey: A recommended plan of action for the control of iron deficiency for Viet Nam. National Institute of Nutrition, Viet Nam/UNICEF.

What Are the Causes of Anemia?

Direct Causes: Poor, Insufficient, or Abnormal Red Blood Cell Production (Iron Deficiency, Deficiencies in Other Nutrients, HIV/AIDS, Other Infectious Diseases, Genetic Conditions)

Allen, L.H. & N. Ahluwalia (1997). Improving iron status through diet: The application of knowledge concerning dietary iron bioavailability in human populations. Arlington, Va.: OMNI/John Snow, Inc., project.

- Allen, L.H. (2000). Anemia and iron deficiency: Effects on pregnancy outcome. *American Journal of Clinical Nutrition* 71: 1280S-1284S.
- Allen, L.H., J.L. Rosado, J.E. Casterline, P. Lopez, E. Muñoz, O.P. Garcia & H. Martinez (2000). Lack of hemoglobin response to iron supplementation in anemic Mexican preschoolers with multiple micronutrient deficiencies. *American Journal of Clinical Nutrition* 71:1485-1494.
- Antelman, G., G.I. Msamanga, D. Spiegelman, E.J.N. Urassa, R. Narh, D.J. Hunter & W.W. Fawzi (2000). Nutritional factors with infectious diseases contributes to anemia among pregnant women with human immunodeficiency virus in Tanzania. *Journal of Nutrition* 130:1950-1957.
- Barrett, F. & P. Ranum (1985). Wheat and blended cereal foods. In: (F.M. Clydesdale & K.L. Wiemer, eds.), *Iron Fortification of Foods*. Orlando: Academic Press, Inc.
- Bloem, M.W., M. Wedel, E.J. van Agtmaal, A.J. Speek, S. Saowakontha & W.H.P. Schreurs (1989). Short-term effects of a single oral massive dose of vitamin A on anemia. In: (M.W. Bloem, Eds.), *Vitamin A Deficiency, Anemia and Infectious Diseases in Northeast Thailand*. Meppel, Netherlands: Krips Repro Meppel.
- Bothwell, T.H. & R.W. Charlton (1981). *Iron deficiency in women*. Washington, D.C.: INACG.
- Bothwell, T.H. (2000). Iron requirements in pregnancy and strategies to meet them. *American Journal of Clinical Nutrition* 72:257S-264S.
- Bouis, H. (1996). Enrichment of food staples through plant breeding: A strategy for fighting micronutrient malnutrition. *Nutrition Reviews* 54:31.
- CDC (1998). Recommendations to prevent and control iron deficiency in the United States. *Morbidity and Mortality Weekly Report* 47(RR-3):1-36. Atlanta: CDC.
- Charoenlarp, P., S. Dhanamitta, R. Kaewvichit, A. Silprasert, C. Suwanaradd, S. Na-Nakorn, P. Prawatmuang, S. Vatanavicharn, U. Nutcharas, P. Poortrakul, V. Tanphaichitr, O. Thanangkul, T. Vaniyapong, Thane Toe, A. Valyasevi, S. Baker, J. Cook, E.M. DeMaeyer, L. Garby & L. Hallberg (1988). A WHO collaborative study on iron supplementation in Burma and Thailand. *American Journal of Clinical Nutrition* 47:280-297.
- DeMaeyer, E.M. (1989). Preventing and controlling iron deficiency anaemia through primary health care: A guide for health administrators and programme managers. Geneva: WHO.
- Dreyfuss, M.L., R.J. Stoltzfus, J.B. Shrestha, E.K. Pradhan, S.C. LeClerq, S.K. Khatri, S.R. Shrestha, J. Katz, M. Albonico & K.P West, Jr. (2000). Hookworms, malaria, and vitamin A deficiency contribute to anemia and iron deficiency among pregnant women in the plains of Nepal. *Journal of Nutrition* 130(10):2527-2536.
- Fairweather-Tait, S.J., H.J. Powers, M.J. Minski, J. Whitehead & R. Downes (1992). Riboflavin deficiency and iron absorption in adult Gambian men. *Annals of Nutrition Metabolism* 36:34-40.
- Fleming, A. (1987). Maternal anaemia in northern Nigeria: Causes and solutions. *World Health Forum* 8(3):339-343.
- Friis, H., ed. (2002). *Micronutrients and HIV infection*. CRC Series in Modern Nutrition. Boca Raton, Fla.: CRC Press.

- Garcia-Casal, M.N., M. Layrisse, L. Solano, M.A. Baron, F. Arguello, K. Llovera, J. Ramirez, I. Leets & E. Tropper (1998). Vitamin A and β -carotene can improve non-heme iron absorption from wheat, rice, and corn by humans. *Journal of Nutrition* 128:646-650.
- Gillespie, S. & J. Johnston (1998). Expert consultation on anemia determinants and interventions. Proceedings of a conference held 16-17 September 1997, Ottawa. Ottawa: MI.
- Hallberg, L. (1988). Prevention and treatment of anemia in pregnancy. Working paper for INACG workshop "Maternal Anemia," 14-16 November, Geneva.
- Heimbach, J., S. Rieth, F. Mohamedshah, R. Slesinski, P. Samuel-Fernando, T. Sheehan, R. Dickmann, and J. Borzelleca (2000). Safety assessment of iron EDTA (Sodium iron (Fe³⁺) ethylenediaminetetraacetic acid): Summary of toxicological, fortification and exposure data. *Food and Chemical Toxicology* 38:99-111.
- Institute of Medicine Food and Nutrition Board (2000). Dietary reference intakes: Applications in dietary assessment. A report of the subcommittee on interpretation and use of dietary reference intakes and the standing committee on scientific evaluation of dietary reference intakes. Washington, D.C.: National Academy Press.
- Institute of Medicine Food and Nutrition Board (2001). Dietary reference intakes for vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium and zinc: A report of the panel on micronutrients, subcommittee on upper reference levels of nutrients and the interpretation and use of dietary reference intakes and the standing committee on scientific evaluation of dietary reference intakes. Washington, D.C.: National Academy Press.
- Murray, C., K. Styblo & A. Rouillon (1993). Tuberculosis. In: (D.T. Jamison, W.H. Mosley, A.R. Measham & J.L. Bobadilla, Eds.) *Disease Control Priorities in Developing Countries*. Oxford, U.K.: Oxford Medical Publications.
- Piwoz, E. G. & E. A. Preble (2000). HIV/AIDS and nutrition: A review of the literature and recommendations for nutritional care and support in sub-Saharan Africa. Washington, D.C.: Support for Analysis and Research in Africa/AED project.
- Rajabiun, S. (2001). HIV/AIDS: A guide for nutrition, care and support. Washington, D.C.: FANTA/AED project.
- Ruel, M.T. & C.E. Levin (2000). Assessing the potential of food-based strategies to reduce vitamin A and iron deficiencies: A review of recent evidence. Arlington, Va.: International Food Policy Research Institute and MOST/International Science and Technology Institute, Inc. project.
- Sloan, N.L., E.A. Jordan & B. Winikoff (1992). Does iron supplementation make a difference? Arlington, Va.: MotherCare/John Snow, Inc. project.
- Sommer, A. & K.P. West, Jr. with J.A. Olson & A.C. Ross (1996). *Vitamin A Deficiency: Health, Survival and Vision*. New York: Oxford University Press.
- Stoltzfus, R.J. & M.L. Dreyfuss (1998). Guidelines for the use of iron supplements to prevent and treat iron deficiency anemia. Washington, D.C.: ILSI Press..
- Suharno, D., C.E. West, Muhilal, D. Karyadi & J.G.A.J. Hautvast (1993). Supplementation with vitamin A and iron for nutritional anaemia in pregnant women in West Java, Indonesia. *The Lancet* 342:1325-8.
- SUSTAIN (1998). Proceedings from the forum on iron fortification (21 June). Chicago: Institute of Food Technologists.

Svanberg, U. & A.S. Sandberg (1987). Improved iron availability in weaning foods through the use of germination and fermentation. In: (D. Alnwick, S. Moses, O.G. Schmidt, Eds.), *Improving Young Child Feeding in Eastern and Southern Africa*. Proceedings of a meeting on household-level food technology. 10-16 October, Nairobi. Ottawa: IDRC.

Svanberg, B., B. Arvidson & A. Norby (1975). Absorption of supplemental iron during pregnancy – a longitudinal study with repeated bone-marrow studies and absorption measurements. *Acta Obstetrica Gynecologica Scandinavica* 48 (Suppl.):87-108.

West, C.E. (2000). Vitamin A and measles. *Nutrition Reviews* 58(2):S46-S54.

WHO/UNICEF/UNU (2001). Iron deficiency anaemia: Assessment, prevention and control. A guide for programme managers. Report of the WHO/UNICEF/UNU consultation, 6-10 December 1993, Geneva. Geneva: WHO.

World Bank (1994). *Enriching lives: Overcoming vitamin and mineral malnutrition in developing countries*. Washington, D.C.: World Bank.

Direct Causes: Excessive Red Blood Cell Destruction (Malaria)

Abdulla, S., J.R.M. Schellenberg, T. Marchant, R. Nathan, O. Mukasa, C. Drackeley, T. Smith, M. Tanner & C. Lengeler (2001). Impact of an insecticide-treated net programme on morbidity in Kilombero Valley, Tanzania. Abstract No. 1198 presented at the American Society of Tropical Medicine & Hygiene, November.

Bates, C.J., H. Powers, W.H. Lamb, W. Gelman & E. Webb (1987). Effect of supplementary vitamins and iron on malaria indices in rural Gambian children. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 81(2):286-291.

Bloland, P.B., E.M. Lackritz, P. Kazembe, J.B. Were, R. Steketee & C.C. Campbell (1993). Beyond chloroquine: Implications of drug resistance for evaluating malaria therapy, efficacy and treatment policy in Africa. *Journal of Infectious Diseases* 167:932-937.

Bojang, K.A., A. Palmer, M. Boele van Hensbroek, W.A.S. Banya & B.M. Greenwood (1997). Management of severe malarial anaemia in Gambian children. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 91:557-561.

Brabin, B.J., M. Ginny, J. Sapau, K. Galme & J. Paino (1990). Consequences of maternal anaemia on outcome of pregnancy in a malaria endemic area of Papua New Guinea. *Annals of Tropical Medicine and Parasitology* 84(1):11-24.

Brabin, B.J. (1992). The role of malaria in nutritional anemias. In: (S.J. Foman & S. Zlotkin, Eds.). *Nutritional Anemias*. Nestlé Nutrition Workshop Series Volume 30:65-80. New York: Nestec Ltd. Vevey/Raven Press, Ltd.

Brabin, B. J., M. Hakimi & D. Pelletier (2001). An analysis of anemia and pregnancy-related maternal mortality. *Journal of Nutrition* 131:604S-615S.

Brabin, B.J., Z. Premji & F. Verhoeff (2001). An analysis of anemia and child mortality. *Journal of Nutrition* 131:636S-648S.

Chippaux, J., D. Scheider, A. Aplogan, J. Dyck, & J. Berger (1991). Effects of iron supplementation on malaria infection. *Bulletin de la Société de Pathologie Exotique Filiales* 84(1):54-62.

Dreyfuss, M.L., R.J. Stoltzfus, J.B. Shrestha, E.K. Pradhan, S.C. LeClerq, S.K. Khatri, S.R.

Shrestha, J. Katz, M. Albonico & K.P West, Jr. (2000). Hookworms, malaria, and vitamin A deficiency contribute to anemia and iron deficiency among pregnant women in the plains of Nepal. *Journal of Nutrition* 130(10):2527-2536.

Elder, L. (2000). Issues in programming for maternal anemia. Arlington, Va.: MotherCare/John Snow, Inc. project.

Gillespie, S. & J. Johnston (1998). Expert consultation on anemia determinants and interventions. Proceedings of a conference held 16-17 September 1997, Ottawa. Ottawa: MI.

Harvey, P.W.J., P.F. Heywood, M.C. Nesheim, K. Galme, M. Zegans, J.-P. Habicht, L.S. Stephenson, K.L. Radimer, B. Brabin, K. Forsyth & M.P. Alpers (1989). The effect of iron therapy on malarial infection in Papua New Guinean school children. *American Journal of Tropical Medicine & Hygiene* 40(1):12-18.

Huddle, J.M., R.S. Gibson & T.R. Cullinan (1999). The impact of malarial infection and diet on the anaemia status of rural pregnant Malawian women. *European Journal of Clinical Nutrition* 53:792-801.

INACG (1999). Safety of iron supplementation programs in malaria-endemic regions. INACG consensus statement. Washington, D.C.: ILSI.

Malaria in the pregnant woman – state of the science and next steps (1997). Considered opinion from a symposium, Kisumu, Kenya, November 10-13, 1997 (draft).

Matteelli, A., F. Donato, A. Shein, J.A. Muchi, O. Leopardi, L. Astori & G. Carosi (1994). Malaria and anaemia in pregnant women in urban Zanzibar, Tanzania. *Annals of Tropical Medicine & Parasitology* 88(5):475-483.

Mendendez, C., E. Kahigwa, R. Hirt, P. Vounatsou, J.J. Aponte, F. Font, C. J. Acosta, D.M. Schellenberg, C.M. Galindo, J. Kimario, H. Urassa, B. Brabin, T.A. Smith, A.Y. Kitua, M. Tanner & P.L. Alonso (1997). Randomised placebo-controlled trial of iron supplementation and malaria chemoprophylaxis for prevention of severe anaemia and malaria in Tanzanian infants. *The Lancet* 350:844-850.

Oppenheimer, S.J., S.B.J. Macfarlane, J.B. Moody & C. Harrison (1986). Total dose iron infusion, malaria, and pregnancy in Papua New Guinea. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 80:818-822.

Oppenheimer, S.J., F.D. Gibson, S.B. Macfarlane, J.B. Moody, C.A. Harrison, A. Spencer & O. Bunari (1986). Iron supplementation increases prevalence and effects of malaria: Report on clinical studies in Papua New Guinea. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 80(4):603-612.

Oppenheimer, S.J. (1989). Iron and infection: The clinical evidence. *Acta Paediatr Scandnavia (Suppl)* 361:53-62.

Parise, M. (2000). Personal communication with CDC, Atlanta, Ga., on malaria control measures in pregnancy.

Schellenberg, D., C. Menendez, E. Kahigwa, J. Aponte, J. Vidal, M. Tanner, H. Mshinda & P. Alonso (2001). Intermittent treatment for malaria and anaemia control at time of routine vaccinations in Tanzanian infants: A randomized, placebo-controlled trial. *The Lancet* 357 (9267):1471-1477.

Shankar, A.H., S. Fishman, S. Goodman & R.J. Stoltzfus (under review). Iron supplementation and morbidity due to *Plasmodium falciparum*: A meta-analysis of randomized controlled clinical trials. *The Lancet*.

Shulman, C.E., E.K. Dorman, F. Cutts, K. Kawuondo, J. N. Bulmer, N. Peshu & K. Marsh (1999). Intermittent sulphadoxine-pyrimethamine to prevent severe anaemia secondary to malaria in pregnancy: A randomized placebo-controlled trial. *The Lancet* 353:632-636.

Stoltzfus, R. J., H.M. Chwaya, J.M. Tielsch, K. J. Schulze, M. Albonico & L. Savioli (1997). Epidemiology of iron deficiency anemia in Zanzibari school children. *American Journal of Clinical Nutrition* 65:153-159.

Stoltzfus, R.J., H.M. Chwaya, A. Montresor, M. Albonico, L. Savioli & J.M. Tielsch (2000). Malaria, hookworms and recent fever are related to anemia and iron status indicators in 0-5 y old Zanzibari children and these relationships change with age. *Journal of Nutrition* 130:1724-1733.

Van Hensbroek, M.B., et al. (1995). Iron, but not folic acid, combined with effective anti-malarial therapy promotes haematological recovery in African children after acute falciparum malaria. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 89(6):672-677.

Verhoeff, F.H., B. J. Brabin, L. Chimsuku, P. Kazembe, W.B. Russell & R.L. Broadhead (1998). An evaluation of the effects of intermittent sulfadoxine-pyrimethamine treatment in pregnancy on parasite clearance and risk of low birthweight in rural Malawi. *Annals of Tropical Medicine & Parasitology* 92(2):141-150.

World Bank (2001). *Malaria at a glance*. Washington, D.C.: World Bank.

Direct Causes: Excessive Red Blood Cell Loss (Helminth Infections, Bacterial and Viral Infections, Reproduction and Contraception)

Dreyfuss, M.L., R.J. Stoltzfus, J.B. Shrestha, E.K. Pradhan, S.C. LeClerq, S.K. Khatri, S.R. Shrestha, J. Katz, M. Albonico & K.P West, Jr. (2000). Hookworms, malaria, and vitamin A deficiency contribute to anemia and iron deficiency among pregnant women in the plains of Nepal. *Journal of Nutrition* 130(10):2527-2536.

Gilgen, D., C.G.N. Mascie-Taylor & L. Rosetta (2001). Intestinal helminth infections, anaemia and labour productivity of female tea pluckers in Bangladesh. *Tropical Medicine & International Health* 6(6):449-457.

Gillespie, S. & J. Johnston (1998). Expert consultation on anemia determinants and interventions. Proceedings of a conference held 16-17 September 1997, Ottawa. Ottawa: MI.

Hall, A., L. Drake & D. Bundy (2000). Public health measures to control the helminth infections that contribute to iron deficiency anaemia. In: *Nutrition Anemias*. Boca Raton, Fla.: CRC Press.

Kaptan, K., C. Beyan, A.U. Ural, T. Cetin, F. Avcu, M. Gulsen, R. Finci, & A. Yalcin (2000). *Helicobacter pylori* – is it a novel causative agent in B-12 deficiency? *Archives of Internal Medicine* 160(9):1349-1353.

Okie, S. (2000). A microbe's mystery linkage. *Washington Post*. July 17.

Olsen, A., P. Magnussen, J.H. Ouma, J. Andreassen & H. Friis (1998). The contribution of hookworm and other parasitic infections to haemoglobin and iron status among children and adults in western Kenya. *Transactions of the Royal Society of Tropical Medicine & Hygiene* 92:643-649.

Piwoz, E. G. & E. A. Preble (2000). HIV/AIDS and nutrition: A review of the literature and recommendations for nutritional care and support in sub-Saharan Africa.

Washington, D.C.: Support for Analysis and Research in Africa/AED project.

Stoltzfus, R.J., H.M. Chwaya, J.M. Tielsch, K. J. Schulze, M. Albonico & L. Savioli (1997), Epidemiology of iron deficiency anemia in Zanzibari school children. *American Journal of Clinical Nutrition* 65:153-159.

Stoltzfus, R.J., H.M. Chwaya, A. Montresor, M. Albonico, L. Savioli & J.M. Tielsch (2000). Malaria, hookworms and recent fever are related to anemia and iron status indicators in 0-5 y old Zanzibari children and these relationships change with age. *Journal of Nutrition* 130:1724-1733.

WHO (1995). Report of the WHO informal consultation on hookworm infection and anaemia in girls and women, 5-7 December 1994, Geneva. Geneva: WHO.

Contributing Causes (Poor Knowledge and Behavior, Environmental Causes, Lack of Access to Health Services, Poor Sanitation, Poverty)

DeMaeyer, E.M. (1989). Preventing and controlling iron deficiency anaemia through primary health care: A guide for health administrators and programme managers. Geneva: WHO.

DeRose, L.F., M. Das & S.R. Millman (2000). Does female disadvantage mean lower access to food? *Population and Development Review Abstracts* 26(3):517-547.

DHS for Bangladesh (1996/7); Bolivia (1997); Eritrea (1995); Ghana (1998); Guinea (1999); India (1992/3, 1998/9); Indonesia (1994, 1997); Kazakstan (1995); Kyrgyz Republic (1997); Madagascar (1997); Malawi (1992); Niger (1998); Peru (1996); Philippines (1998); Turkey (1998); Uzbekistan (1996); Yemen (1997); Zambia (1996). Macro International and the governments of each country.

Diallo, D. A. (1997). Supplementation en fer – Mali. Final technical report. IDRC project no. 93-0228. Ottawa: IDRC.

Gillespie, S. & J. Johnston (1998). Expert consultation on anemia determinants and interventions. Proceedings of a conference held 16-17 September 1997, Ottawa. Ottawa: MI.

Karp, R. (1999). Malnutrition among children in the United States: The impact of poverty. In: (M.E. Shils, J.A. Olson, M. Shike & A.C. Ross), *Modern Nutrition in Health and Disease*. Ninth edition. Baltimore: Williams and Wilkins.

Rao, K. (2001). Analysis of the anemia module for the Family Health Survey for Andhra Pradesh, India. Washington, D.C.: World Bank.

WHO/UNICEF/UNU (2001). Iron deficiency anaemia: Assessment, prevention and control. A guide for programme managers. Report of the WHO/UNICEF/UNU consultation, 6-10 December 1993, Geneva. Geneva: WHO.

World Bank (1994). *Enriching lives: Overcoming vitamin and mineral malnutrition in developing countries*. Washington, D.C.: World Bank.

Chapter II, Taking Action: Developing a Strategy for Anemia Prevention and Control

Achadi, E. & D. M. Utari (2000). National anemia control programs: Indonesia country example. Prepared for the MI.

Allen, L.H. & N. Ahluwalia (1997). Improving iron status through diet: The application

of knowledge concerning dietary iron bioavailability in human populations. Arlington, Va.: OMNI/John Snow, Inc., project.

BASICS project (1999). Nutrition essentials: A guide for health managers. Arlington, Va.: BASICS/AED/John Snow Inc./Management Sciences for Health project.

CDC (2002). Iron overload and hemochromatosis. U.S. Department of Health and Human Services, CDC National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition and Physical Activity. Atlanta: CDC.

Elder, L. (2000). Issues in programming for maternal anemia. Arlington, Va.: MotherCare/John Snow, Inc. project.

Gotink, M. (2000). Anemia control program in Kenya. Personal communication with UNICEF chief of health and nutrition.

Grajeda, R., R. Perez-Escamilla & K.G. Dewey (1997). Delayed clamping of the umbilical cord improves hematologic status of Guatemalan infants at 2 months of age. *American Journal of Clinical Nutrition* 65:425-31.

Horton, S. & J. Ross (1998). Economic consequences of iron deficiency. Ottawa: MI.

Indian Council of Medical Research (ICMR) (1989). Evaluation of the national nutritional anaemia prophylaxis programme. New Delhi: ICMR.

Kavishe, F., with contributions by S.S. Mushi (1993). Nutrition-relevant actions in Tanzania: An ACC/SCN country case study. Dar es Salaam: Tanzania Food and Nutrition Centre.

Lopez, E. & J. Molina (2000). Study on the implementation of the micronutrient supplementation program, Bolivia. Report to the World Bank and MI.

Murray, C.J.L. & A.D. Lopez (1994). Global comparative assessments in the health sector. Geneva: WHO.

PATH (1997). Anemia detection methods in low-resource settings: A manual for health workers. Arlington, Va.: OMNI/John Snow, Inc. project.

Rogerson, S.J., E. Chaluluka, M. Kanjala, P. Mkundika, C. Mhango & M.E. Molyneux (2000). Intermittent sulfadoxine-pyrimethamine in pregnancy: Effectiveness against malaria morbidity in Blantyre, Malawi, in 1997-99. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 94:549-533.

Ross, J. & S. Horton (2000). The economic costs of iron deficiency. Ottawa: MI.

Stoltzfus, R.J., M.L. Dreyfuss, H.M. Chwaya & M. Albonico (1997). Hookworm control as a strategy to prevent iron deficiency. *Nutrition Reviews* 55(6): 223-232.

UNICEF (1996). Statement on the significance of iron overload for iron deficiency control programmes. UNICEF.

UNICEF/UNU/WHO/MI (1999). Preventing iron deficiency in women and children: Background and consensus on key technical issues and resources for advocacy, planning and implementing national programmes. UNICEF, UNU, WHO, MI technical workshop, 7-9 October, New York.

WHO (1995). Integrated management of childhood illness protocols. Geneva: WHO Division of Child Health and Development.

Winichagoon, P. (2000). Anemia control program in Thailand: A case study. Paper written for the MI.

World Bank (1994). *Enriching lives: Overcoming vitamin and mineral malnutrition in developing countries*. Washington, D.C.: World Bank.

Chapter III, Providing Iron Supplements to Combat Anemia

Abel, R., J. Rajaratnam & V. Sampthkumar (2000). Anemia in pregnancy: Impact of iron supplementation, deworming and IEC. Report on projects for the reduction of maternal anemia. Arlington, Va.: MotherCare/John Snow, Inc. project.

Achadi, E. & D. M. Utari (2000). National anemia control programs: Indonesia country example. Prepared for the MI.

Baker, S. (2000). Personal communication with the Helen Keller International Africa regional bout anemia control programs in West Africa.

Beaton, G. H. & G. P. McCabe (with technical advice of R. Yip and S. Zlotkin and the collaboration of the primary investigators) (1999). Efficacy of intermittent iron supplementation in the control of iron deficiency anaemia in developing countries: An analysis of experience to date. Toronto: MI and CIDA.

Burnham, G. (1992). Treatment of malaria in pregnancy. *PVO Child Survival Technical Report 3(1): 9-11*. Washington, D.C.: USAID.

Charoenlarp, P., S. Dhanamitta, R. Kaewvichit, A. Silprasert, C. Suwanaradd, S. Na-Nakorn, P. Prawatmuang, S. Vatanavicharn, U. Nutcharas, P. Poortrakul, V. Tanphaichitr, O. Thanangkul, T. Vaniyapong, Thane Toe, A. Valyasevi, S. Baker, J. Cook, E.M. DeMaeyer, L. Garby & L. Hallberg (1988). A WHO collaborative study on iron supplementation in Burma and Thailand. *American Journal of Clinical Nutrition 47:280-297*.

Cook, J.D. (1996). Weekly compared with daily iron supplementation. *Letters to the Editor. American Journal of Clinical Nutrition 63:610-614*.

Cook, J.D., C.H. Flowers & B.S. Skikne (1998). An assessment of dried blood-spot technology for identifying iron deficiency. *Blood 92(5):1807-1813*.

Creed, H.K., T. Uribe, R. Bartolini, N. Zavaleta, M. Fukumoto & M. Bentley (2000). An intervention to improve dietary iron intake among women and adolescents through community kitchens in Lima, Peru. Report on projects for the reduction of maternal anemia. Arlington, Va.: MotherCare/John Snow, Inc. project.

DeMaeyer, E.M. (1989). Preventing and controlling iron deficiency anaemia through primary health care: A guide for health administrators and programme managers. Geneva: WHO.

DHS (1996). Malawi DHS. Government of Malawi/Macro International.

DHS (1998). Bolivia DHS. Government of Bolivia/Macro International.

Dickin, K., M. Griffiths, & E. Piwoz (1997). Designing by dialogue: A program planner's guide to consultative research for improving young child feeding. Prepared for the Health and Human Resources Analysis/AED project.

Dusch, E., R. Galloway, E. Achadi, I. Jus'at, C. Sibale, C. Franco, S. Cousens & L. Morison (1999). Clinical screening may be a cost-effective way to screen for severe anaemia. *Food and Nutrition Bulletin 20(4):409-416*.

Earl, R. & C.E. Woteki, Eds. (1993). Iron deficiency anemia: Recommended guidelines for prevention, detection and management among U.S. children and women of child-bearing age. Committee on the Prevention, Detection and Management of Iron Deficiency Anemia Among U.S. Children and Women of Child-Bearing Age, Food and Nutrition Board, Institute of Medicine. Washington, D.C.: National Academy Press.

Elder, L. (2000). Issues in programming for maternal anemia. Arlington, Va.: MotherCare/John Snow, Inc. project.

Family Health Survey (FHS) (1998/9). India FHS. Government of India/Macro International.

Galloway, R. & J. McGuire (1994). Determinants of compliance with iron supplementation: Supplies, side effects or psychology? *Social Science and Medicine* 39(3): 381-390.

Galloway, R., E. Dusch, L. Elder, E. Achadi, R. Grajeda, E. Hurtado, M. Favín, S. Kanani, J. Marsaban, N. Meda, K.M. Moore, L. Morison, N. Raina, J. Rajaratnam, J. Rodriguez & C. Stephen (2002). Women's perceptions of iron deficiency and anemia prevention and control in eight developing countries. *Social Science and Medicine* 55: 529-544.

Gillespie, S., J. Kevany & J. Mason (1991). Controlling iron deficiency: A report based on an ACC/SCN workshop. , 6-8 June 1980, Dublin. ACC/SCN State-of-the-Art Series Nutrition Policy Discussion Paper No. 9. Geneva: WHO.

Hallberg, L. (1988). Prevention and treatment of anemia in pregnancy. Working paper for INACG workshop "Maternal Nutritional Anemia," 14-16 November, Geneva.

Hermann, C. (2000). Personal communication on the iron component of the Government of Cambodia/USAID RACHA project.

INACG (1989). Guidelines for the control of maternal nutritional anemia. Washington, D.C.: ILSI/Nutrition Foundation.

Jus'at, I., E. Achadi, R. Galloway, A. Dyanto, A. Zazri, G. Supratikto, L. Zizic & L. Elder (2000). Reaching young Indonesian women through marriage registries: An innovative approach to anemia control. *Journal of Nutrition* 130:456S-458S.

Kanani S., J. Ghanekar & S. Maniar (2000). Vadodara, India: Health systems research for anemia control and pregnancy. Report on projects for the reduction of maternal anemia. Arlington, Va.: MotherCare/John Snow, Inc. project.

Lanerolle, P. , S. Atukorala, G. de Silva, S. Samarasinghe & L. Dharmawardena (2000). Evaluation of nutrition education for improving iron status in combination with daily iron supplementation. *Food and Nutrition Bulletin* 21(3):259-269.

Lopez, E. & J. Molina (2000). Study on the implementation of the micronutrient supplementation program, Bolivia. Report to the World Bank and MI.

Moore, M., P. Riono, S. Pariani (1991). A qualitative investigation of factors influencing use of iron folate supplements by pregnant women in West Java: A summary of findings. Arlington, Va.: MotherCare/John Snow, Inc. project.

MotherCare (1993). The alleviation of maternal anemia in Indramayu regency, Indonesia: Results from the MotherCare project. Working Paper 23. Arlington, Va.: MotherCare/John Snow, Inc., project.

MotherCare (2000). Malawi maternal anemia program 1995-1998. Technical Working Paper #10. Arlington, Va.: MotherCare/John Snow, Inc., project.

Muro, G.S., U. Gross, R. Gross & L. Wahyuniar (1999). Increase in compliance with weekly iron supplementation of adolescent girls by an accompanying communication programme in secondary school in Dar-es-Salaam, Tanzania. *Food and Nutrition Bulletin* 20(4):435-444.

National Research Council (1980). *Recommended Dietary Allowances*. 9th edition. Washington, D.C.: National Academy of Sciences.

National Research Council, Food and Nutrition Board, Commission on Life Sciences (1989). *Recommended Dietary Allowances*. 10th edition. Washington, D.C.: National Academy of Sciences.

Porter, A.M. (1969). Drug defaulting in the general practices. *British Medical Journal* 1:218.

Reichman, L.B (1987). Compliance in developed nations. *Supplement to Tubercle* 68:25-29.

Schultink, W., R. Gross, M. Gliwitzki, D. Karyadi & P. Matulesi (1995). Effect of daily vs twice weekly iron supplements in Indonesian preschool children with low iron status. *American Journal of Clinical Nutrition* 61:111-115.

Seshadri, S., A.E. Raj, B. Thakore, K. Sharma & F. Saiyed (1993). *Anemia in pregnant women: Strategies to improve compliance with iron supplementation*. Baroda, India: WHO Collaborating Centre in Weaning Technology and Anemia Control.

Sloan, N.L., E.A. Jordan & B. Winikoff (1992). *Does iron supplementation make a difference?* Arlington, Va.: MotherCare/John Snow, Inc., project.

Slovell, L. (1970). Oral iron therapy – side effects. In: (L. Hallberg, H.G. Harwerth & A. Vannotti, Eds.), *Iron Deficiency: Pathogenesis, Clinical Aspects, and Therapy*. London: Academic Press.

Snow, R.W., S.W. Lindsay, R.J. Haves & B.M. Greenwood (1988). Permethrin-treated bednets (mosquito nets) prevent malaria in Gambian children. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 82:838-842.

Stephen, C. (2000). *Reducing maternal anemia through community participation*. Report on projects for the reduction of maternal anemia. Arlington, Va.: MotherCare/John Snow, Inc. project.

Stoltzfus, R.J. & M.L. Dreyfuss (1998). *Guidelines for the use of iron supplements to prevent and treat iron deficiency anemia*. Washington, D.C.: ILSI Press..

Stoltzfus, R.J., A. Edward-Raj, M.L. Dreyfuss, M. Albonico, A. Montesor, M. D. Thapa & K.P. West, Jr. (1999). Clinical pallor is useful to detect severe anemia in populations where anemia is prevalent and severe. *Journal of Nutrition* 129(9):1675-1681.

UNICEF/UNU/WHO/MI (1999). *Preventing iron deficiency in women and children: Background and consensus on key technical issues and resources for advocacy, planning and implementing national programmes*. UNICEF, UNU, WHO, MI technical workshop, 7-9 October, New York.

Valyasevi, A. (1988). *Delivery system for iron supplements in pregnant women – Thailand experience*. Presented at the INACG workshop “Maternal Anemia,” 14-16 November, Geneva.

Viteri, F. (1994). The consequences of iron deficiency and anaemia in pregnancy on maternal health, the foetus, and the infant. *SCN News* 11:14-18.

Winichagoon, P. (2000). Anemia control program in Thailand: A case study. Paper written for the MI.

World Bank (1994). Hidden hunger III: Winning one battle against anemia. Human Resources Development and Operations Policy Dissemination Note 25. Washington, D.C.: World Bank.

Yip, R. (1996). Iron supplementation during pregnancy: Is it effective? Editorial. *American Journal of Clinical Nutrition* 63:853-855.

Chapter IV, Improving Dietary Iron Intake to Combat Anemia

Achadi, E. & D. M. Utari (2000). National anemia control programs: Indonesia country example. Prepared for the MI.

Barrett, F. & P. Ranum (1985). Wheat and blended cereal foods. In: (F.M. Clydesdale & K.L. Wiemer, Eds.), *Iron Fortification of Foods*. Orlando, Fla.: Academic Press, Inc.

Beard, J. (1996). Iron fortification in Venezuela. *American Journal of Clinical Nutrition* 64:972-973.

Bressani, R., L.W. Rooney & S.O. Serna Saldivar (1997). Fortification of corn masa flour with iron and/or other nutrients: A literature and industry experience review. Washington, D.C.: SUSTAIN project.

Cook, J.D. & M. E. Reusser (1983). Iron fortification: An update. *American Journal of Clinical Nutrition* 38:648-559.

el Guindi, M., S.R. Lynch & J.D. Cook (1988). Iron absorption from fortified flat breads. *British Journal of Nutrition*. 59:205-231.

Freire, W.B. (1997). Strategies of the Pan American Health Organization/World Health Organization for the control of iron deficiency in Latin America. *Nutrition Reviews* 55(6): 183-188.

Gerasimov, G. (1999). Micronutrient situation in Kyrgyz Republic: Opportunities and challenges for food fortification (salt iodization and flour fortification with iron). Trip report for the MI, 14-17 December.

Hurrell, R.F. (1997). Preventing iron deficiency through food fortification. *Nutrition Reviews* 55(6): 210-222.

Hurrell, R. (1999). Iron. In: (R. Hurrell, Ed.), *The Mineral Fortification of Foods*. Leatherhead, Surrey, U.K.: Leatherhead Food International.

INACG (1990). Combating iron deficiency anemia through food fortification technology. Summary XII INACG meeting, 5-7 December, Washington, D.C.

INACG (1993). Iron EDTA for food fortification: Washington, D.C.: ILSI.

Institute of Nutrition and Food Hygiene, Chinese Academy of Preventive Medicine. (1998). Iron fortification in soy sauce. Washington, D.C.: ILSI.

Layrisse, M., J.F. Chaves, H. Mendez-Castellano, V. Bosch, E. Tropper, B. Bastardo & E. González (1996). Early response to the effect of iron fortification in the Venezuelan population. *American Journal of Clinical Nutrition* 64:903-907.

Lerner, P., A. Milbert, A. Beloian & D.G. Hattan (1986). A review of the current position of the U.S. Food and Drug Administration on EDTA compounds, including sodium iron EDTA. Washington, D.C.: Food and Drug Administration Center for Food Safety and Applied Nutrition.

Lofti, M., M.G.V. Mannar, R.J.H.M. Merx, & P. Naber-van de Hauvel (1996). Micronutrient fortification of foods: Current practices, research and opportunities. Ottawa: MI.

Maberly, G., J. Bagriansky & L. Mkondya (2000). Examining the issues: Public and private sector collaboration to support the elimination of micronutrient malnutrition. Prepared by PAMM for MI. Atlanta: Emory University Rollins School of Public Health.

Mannar, V. (2000). Personal communication with MI director regarding work in the Middle East and North Africa region.

Mock, C.A. (1979). Case Study: Tunisia. In: (J.E. Austin, Ed.), *Global Malnutrition and Cereal Fortification*. Cambridge, Mass.: Ballinger Publishing Company.

Nestle, P. (1993). Food fortification in developing countries. Vitamin A Field Support project.

Rajagopalan, S. & M. Vinodkumar (2000). Effects of salt fortified with iron and iodine on the haemoglobin levels and productivity of tea pickers. *Food and Nutrition Bulletin* 21(3):323-329.

Rao, B.S. Narasinga (1984). Development of salt fortification program to prevent iron deficiency anemia in India. In: (V. Tanphaichitr, W. Dahlan, V. Suphakarn, A. Valyasevi, Eds.), *Human Nutrition: Better Nutrition, Better Life*. Proceedings of the Fourth Asian Congress of Nutrition held in Bangkok, Thailand, 1-4 November 1983.

Roe, M.A. & S.J. Fairweather-Tait (1999). High bioavailability of reduced iron added to UK flour. *The Lancet* 353:1938-1939.

Stekel, A., F. Monckeberg & V. Beyda (1986). Combating iron deficiency in Chile: A case study. Washington, D.C.: INACG.

SUSTAIN (1998). Proceedings from the forum on iron fortification (21 June). Chicago: Institute of Food Technologists.

SUSTAIN (1999). Final report of the micronutrient assessment project. Submitted to USAID.

Urrutia, J. J., C. Teller, V.M. Pivaral, B. Garcia, M. Flores, E. Kennedy, C. Sequiere & J.E. Austin (1979). Case study: Guatemala. In: (J.E. Austin, Ed.), *Global Malnutrition and Cereal Fortification*. Cambridge, Mass.: Ballinger Publishing Company.

Verster, A., Ed. (1998). Fortification of flour with iron in countries of the Eastern Mediterranean, Middle East and North Africa. Document based on deliberations of the Joint WHO/UNICEF/MI strategic development workshop on food fortification with special reference to iron fortification of flour, October 26-30, Muscat, Oman. WHO Regional Office for the Eastern Mediterranean.

Walter, T., M. Olivares, E. & Hertrampf (1990). Field trials of food fortification with iron: The experience in Chile. In: (B. Lonnerdal, ed.), *Iron Metabolism in Infants*. Boca Raton, Fla.: CRC Press.

Welsch, D., S. Tongpan, C. Mock, E. Kennedy & J. Austin (1979). Case study: Thailand.

In: (J.E. Austin, Ed.), *Global Malnutrition and Cereal Fortification*. Cambridge, Mass.: Ballinger Publishing Company.

WHO (2000). *Complementary feeding: Family foods for breastfed children*. Geneva: WHO Department of Nutrition for Health and Development.

WHO/UNICEF/MI (1999). *Fortification of flour to control micronutrient deficiencies in countries of the Eastern Mediterranean, Middle East and North Africa*. Report of a joint WHO/UNICEF/MI workshop, 13-16 June 1998.

Winichagoon, P. (2000). *Anemia control program in Thailand: A case study*. Paper written for the MI.

Working Group on Fortification of Salt with Iron (1982). *Use of common salt fortified with iron in the control and prevention of anemia – a collaborative study*. *American Journal of Clinical Nutrition* 35:1442-1451.

World Bank (1994). *Enriching lives: Overcoming vitamin and mineral malnutrition in developing countries*. Washington, D.C.: World Bank.

Yip, R., K.M. Walsh, M.G. Goldfarb & N.J. Binkin (1987). *Declining prevalence of anemia in childhood in a middle-class setting: A pediatric success story*. *Pediatrics* 80:330-334.

Zavaleta, N.P., G.R. Torres, T. Garcia, M.E. Escudero & S. C. Caballero (2000). *Anemia and iron deficiency in adolescent students in Lima, Peru: Causes, consequences and prevention*. Report on projects for the reduction of maternal anemia. Arlington, Va.: MotherCare/John Snow, Inc. project.

References

Anemia Prevention and Control: What Works

Part II, Tools and Resources

ACC/SCN (2000). The 4th report on the world nutrition situation: Nutrition throughout the life cycle. ACC/SCN in collaboration with the International Food Policy Research Institute. Geneva: ACC/SCN.

Achadi, E. & D. M. Utari (2000). National anemia control programs: Indonesia country example. Prepared for the MI.

Allen, L.H. & N. Ahluwalia (1997). Improving iron status through diet: The application of knowledge concerning dietary iron bioavailability in human populations. Arlington, Va.: OMNI/John Snow, Inc., project.

Asian Development Bank Regional Technical Assistance (RETA) (1998). Investment for child nutrition in Vietnam. UNICEF\Asian Development Bank.

Asian Development Bank Regional Technical Assistance (RETA) (1998). Study on reduction of child malnutrition, Sri Lanka. Ministry of Plan Implementation\Asian Development Bank. Colombo: Marga Institute.

Bothwell, T.H. (2000). Iron requirements in pregnancy and strategies to meet them. *American Journal of Clinical Nutrition* 72:257S-264S.

CDC (2002). Iron overload and hemochromatosis. U.S. Department of Health and Human Services, CDC National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition and Physical Activity. Atlanta: CDC.

DHS for Bangladesh (1999/0); (Bolivia (1997); Cambodia (2000); Colombia (2000); Egypt (2000); Eritrea (1995); Ghana (1998); Haiti (2000); India (1992/3, 1998/9); Indonesia (1994, 1997); Kazakhstan (1995, 1999); Kyrgyz Republic (1997); Madagascar (1997); Malawi (2000); Mali (2001); Niger (1998); Peru (2000); Philippines (1998); Rwanda (2000); Tanzania (1999); Uganda (2000/01); Uzbekistan (1996); Yemen (1997); Zimbabwe (1999). Macro International and the governments of each country.

Dickin, K., M. Griffiths, & E. Piwoz (1997). Designing by dialogue: A program planner's guide to consultative research for improving young child feeding. Prepared for the AED/USAID Health and Human Resources Analysis project.

Earl, R. & C.E. Woteki, Eds. (1993). Iron deficiency anemia: Recommended guidelines for prevention, detection and management among U.S. children and women of child-bearing age. Committee on the Prevention, Detection and Management of Iron Deficiency Anemia Among U.S. Children and Women of Child-Bearing Age, Food and Nutrition Board, Institute of Medicine. Washington, D.C.: National Academy Press.

Galloway, R., E. Dusch, L. Elder, E. Achadi, R. Grajeda, E. Hurtado, M. Favin, S. Kanani, J. Marsaban, N. Meda, K.M. Moore, L. Morison, N. Raina, J. Rajaratnam, J. Rodriguez & C. Stephen (2002). Women's perceptions of iron deficiency and anemia prevention and control in eight developing countries. *Social Science and Medicine* 55: 529-544.

Helen Keller International (1999). Iron deficiency anemia throughout the lifecycle in rural Bangladesh. New York: Helen Keller International.

Helen Keller International (1999). Iron deficiency in Cambodia. *Nutrition Bulletin* Vol. 1, Issue 1.

Institute of Medicine Food and Nutrition Board (2000). Dietary reference intakes: Applications in dietary assessment. A report of the subcommittee on interpretation and uses of dietary reference intakes and the standing committee on the scientific evaluation of dietary reference intakes. Washington, D.C.: National Academy Press.

Kim, I., D.W. Hungerford, R. Yip, S.A. Kuester, C. Zyrkowski & F.L. Trowbridge (1992). Pregnancy nutrition surveillance system – the United States 1979-1990. Morbidity and Mortality Weekly Review 41(No. SS-7):25-41. CDC Surveillance Summaries. Atlanta: CDC.

Luo, C., C.M. Mwela & J. Campbell (1999). National baseline survey on prevalence and aetiology of anaemia in Zambia: A randomized cluster community survey involving children, women and men. Lusaka: National Food and Nutrition Commission in collaboration with University Teaching Hospital, Zambia; Zambia Central Statistical Office; Zambia Nutritional Anaemia Task Force; PAMM; and HemoCue, Sweden (as reported by A. van de Wijngaart on the ngonut list serve.)

Manoff Group (nd.). How can early childhood development (ECD) programs beat iron deficiency? Fact sheet developed for the MI.

Manoff Group (nd.) The impact of preventing and treating iron deficiency anemia. Fact sheet developed for the MI.

Manoff Group (1991). Qualitative research instrument on perceptions of anemia and use of iron supplements – the Indramayu project, Indonesia. Developed for the MotherCare/John Snow, Inc., project.

Musaiger, A.O., A. Abdulghafoor & H. Radwan (1996). Short communication: Anaemia among 6 year old children in the United Arab Emirates. European Journal of Clinical Nutrition 50:636-637.

National Nutrition Agency (NaNA) (2001). Nationwide survey on the prevalence of vitamin A and iron deficiency in women and children in the Gambia. Banjul: NaNA and the Medical Research Council.

National household survey, Indonesia (1995). As reported by Achadi & Utari, 2000.

Nepal micronutrient status survey (1998). Ministry of Health (Child Health Division), New ERA, MI, UNICEF, WHO. Kathmandu: Nepal Ministry of Health.

Nutritview (1996). Child malnutrition in South Africa. Issue No. 1. (As reported by OMNI, 1999)

OMNI (1996). Micronutrient facts. Country series. Arlington, Va.: OMNI/John Snow, Inc., project.

Parise, M. (2000). Personal communication with CDC, Atlanta, Ga., on malaria control measures in pregnancy.

Secretaría de Salud (2000). Encuesta Nacional de Nutrición, 1999. Mexico. Secretaría de Salud Instituto de Salud Pública, Instituto Nacional de Estadística Geografía e Informática. Tomo 1: Niños menores de 5 años. Tomo 1I: Mujeres en edad fértil. Tomo 1II: Niños en edad escolar.

Simmons, W.K. & D. P. Sinha (1992). Reduction of anaemia in antenatals in three Caribbean countries: Possible results of different types of interventions. Caribbean Food and Nutrition Institute, Pan American Sanitary Bureau, WHO Regional Office.

- Sloan, N.L., E.A. Jordan & B. Winikoff (1992). Does iron supplementation make a difference? Working Paper No. 15. Arlington, Va.: MotherCare/John Snow, Inc., project.
- Stoltzfus, R.J. (1997). Rethinking anaemia surveillance. *The Lancet* 349:1764-1766.
- Stoltzfus, R.J. & M.L. Dreyfuss (1998). Guidelines for the use of iron supplements to prevent and treat iron deficiency anemia. Washington, D.C.: ILSI Press..
- UNICEF (1996). Statement on the significance of iron overload for iron deficiency control programmes. UNICEF.
- WHO (1995). Integrated management of childhood illness protocols. Geneva: WHO Division of Child Health and Development.
- WHO/UNICEF/UNU (2001). Iron deficiency anaemia: Assessment, prevention and control. A guide for programme managers. Report of the WHO/UNICEF/UNU consultation, 6-10 December 1993, Geneva. Geneva: WHO.
- World Bank (2000). A tool for reviewing micronutrient programs. Developed by the World Bank for MI.
- Yip, R., K.M. Walsh, M.G. Goldfarb & N.J. Binkin (1987). Declining prevalence of anemia in childhood in a middle-class setting: A pediatric success story. *Pediatrics* 80:330-334.
- Yip, R. (1996). Final report of the 1995 Viet Nam national nutrition anemia and intestinal helminth survey: A recommended plan of action for the control of iron deficiency for Viet Nam. National Institute of Nutrition, Viet Nam/UNICEF.
- Yip, R., R.J. Stoltzfus & W.K. Simmons (1996). Assessment of the prevalence and the nature of iron deficiency for populations: The utility of comparing haemoglobin distributions. In (L. Hallberg & N.G. Asp, Eds.), *Iron Nutrition in Health and Disease*. London: John Libbey & Co.

