



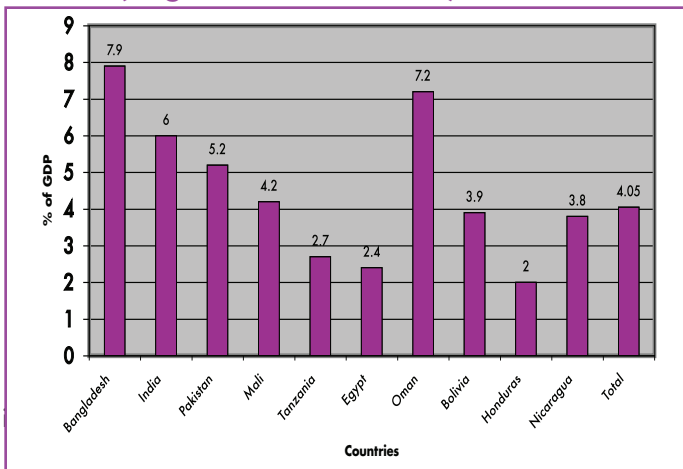
Anemia

at a glance

Why tackle anemia?

Anemia is ignored in most developing countries even though it is one of the most prevalent public health problems and has serious consequences for national development. Iron deficiency causes at least 50% of all anemia, and almost a million deaths a year; three-quarters of the deaths occur in Africa and South-East Asia. Iron deficiency anemia (IDA) is in the “top ten” risk factors contributing to the global burden of disease. One study estimates the economic costs of IDA at 4.05% of gross domestic product (GDP)—US\$2.32 per capita in lost productivity and US\$14.46 per capita in lost cognitive function (IDA reduces IQ by half a standard deviation). Worldwide, \$50 billion in GDP is lost annually in low-

Estimates of Economic Losses from Iron Deficiency Anemia (Cognitive & Productive) as % of GDP



Source: Horton and Ross 2003

What causes anemia?

Anemia is defined as a low level of hemoglobin in red blood cells. Iron in the hemoglobin molecule fixes oxygen in the lungs and releases it in the tissues where oxygen generates energy for the body. The major clinical symptom of anemia and iron deficiency is pallor and its physical symptom is fatigue resulting in reduced capacity to work.

There are three major causes of anemia:

1) insufficient red blood cell production due to inadequate intake or poor utilization of dietary iron (due to poor diet and helminth infections);

2) excessive red blood cell destruction due to malaria which displaces hemoglobin and prevents the transport of oxygen to the tissues;

3) excessive red blood cell loss due to helminth infections (mainly hookworm and schistosomiasis and in some cases trichuriasis) leading to iron deficiency, and blood loss in women during their reproductive years.

Other significant causes of anemia include nutritional deficiencies other than iron deficiency (i.e. folic acid, vitamins A and B-12), genetic conditions (e.g. thalassemia in parts of the Mediterranean, sickle cell in Africa), factors related to reproduction (e.g. high fertility, obstetric complications, contraceptives or practices that increase blood loss such as not breastfeeding), and infections (e.g.

Anemia Prevalence	Public Health Significance
≥ 40%	Severe
20-39%	Moderate
5-19%	Mild
0-4.9%	Normal

HIV/AIDS, tuberculosis, diarrhea) that increase requirements for iron and other micronutrients. Energy, vitamin A and zinc deficiencies can increase the severity of malaria infection, which may cause or exacerbate anemia. The relative importance of different causes varies by region. Malaria is a major cause of anemia in Sub-Saharan Africa. Iron deficiency is a major cause of anemia in all developing countries, including Africa, where consumption of iron is limited because dietary sources of iron are not affordable by most families.

Anemia prevalence

National anemia surveys have been conducted in only 25 developing countries, but WHO estimates that more than 2 billion people worldwide are anemic. A severe public health problem exists when anemia prevalence is ≥40% in any group.

Children <2 years and pregnant women are most at risk for anemia because their requirements for iron are higher than any other group and they are most susceptible to malaria. For pregnant women, anemia prevalence is highest in Nepal (75%) and is ≥40% in 16 of 19 countries with data. For children <2, anemia prevalence is highest in Benin, the

Gambia and Nepal (88%) and $\geq 40\%$ in 19 of 20 countries with data. School children, adolescents, the elderly and reproductive-age women also suffer from anemia. Anemia can be a problem in men with helminth infections that cause blood loss or who engage in heavy labor. Anemia affects productivity and incomes, but is usually life threatening only in pregnant or newly delivered women and young children.

Severe anemia (hemoglobin < 7 g/dL) is a public health problem if prevalence exceeds 2%. Where severe anemia prevalence has been investigated, it is a problem in most countries in Africa and South Asia and some countries in East Asia and the Pacific (e.g., Cambodia). (For country data, see DHS and Galloway, 2003 in **Resources and References**).

The main ways to combat anemia

The three major causes of anemia (iron deficiency, malaria and helminth infections) can be addressed during contacts with vulnerable groups using a combination of key interventions, as needed.

Five Key Interventions

- Iron supplements targeted to at-risk groups
- Fortification of staple foods with iron and other micronutrients that cause anemia for the general population and iron-fortified foods targeted to at-risk groups
- Prevent and treat malaria
- Use of insecticide-treated materials and bednets, particularly by at-risk groups, to prevent anemia
- Deworming (anthelmintics) in at-risk groups

Other important interventions to decrease anemia:

- Increase production and consumption of foods with iron and all micronutrients (folic acid, vitamins A, C, B-12 and zinc) that contribute to anemia and increase the severity of illness
- Supplementation with other micronutrients needed to prevent anemia, including "multi-micronutrients" as consensus develops on appropriate use, and if affordable
- Fully immunize children
- Prevent and treat communicable diseases
- Manage obstetric complications, particularly excessive bleeding
- Promote birth spacing through use of modern contraceptives and exclusive breastfeeding
- Promote use of contraceptives that decrease blood loss
- Improve water and sanitation facilities/practices

Where to combat anemia

Anemia should be addressed through **health facilities** (to reach young children and their mothers); **schools** (to reach children and their parents); and **existing programs**

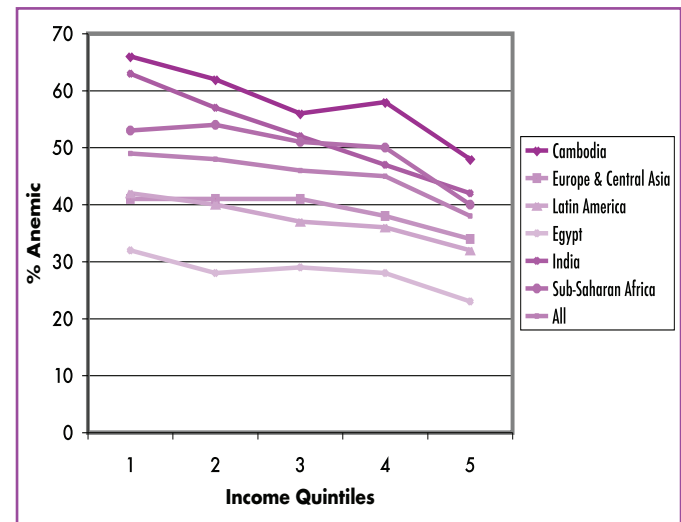
that work directly with communities and community workers, such as water and sanitation/environmental health/ hygiene and infectious disease control programs.

Agriculture extension/food security programs can help increase production and consumption of foods rich in iron and other micronutrients. The private sector can also help, especially food and pharmaceutical manufacturers, marketers and distributors. Specific interventions for each point of contact are in the **Core Anemia Control Interventions Table**.

Reaching the poor and most vulnerable

The poorest women, particularly when pregnant, and children < 5 years are the most anemic and have least access to services and interventions to mitigate anemia. In women, anemia prevalence decreases with income in every region/country. Prevalence in the poorest compared to the richest quintile is 2 times higher in India and 1.4 times higher in Egypt, Cambodia, LAC and ECA. But anemia is high even in the richest groups, so programs should not be narrowly targeted. A similar scenario exists for anemia prevalence by income group in children, with the greatest poor/rich differences in Egypt and LAC.

Anemia Prevalence in Women (15-49 years) by Income Quintile



Source: World Bank Poverty Group

Unlike vitamin A which can be delivered as a massive dose every six months, iron supplements need to be consumed daily by the most vulnerable groups, making it more difficult to provide a constant supply. Poor women are less likely to receive iron supplements than rich women with 2-5 times as many of the richest group receiving iron than the poorest group. Little is known about the actual number of iron supplements women receive and how many women, rich or poor, receive the recommended number of iron supplements during pregnancy.

Poor/rich differences in women receiving prophylactic anti-malarials are small; 1.2 higher for the richest than the poorest women. Only 0.9% of households in Africa own an insecticide treated bednet (ITB), and most ownership is in richest households where ownership is seven-fold higher than in the poorest households.

Solutions for increasing iron use where health services utilization is low include moving distribution points for iron

supplements from health facilities to communities. Traditional birth attendants, community workers and women's groups have been used successfully to distribute iron supplements and can also promote use of ITB. In some countries, private sector community shops sell iron tablets and ITB, but this requires public sector input to ensure that counseling, educational and advertising messages are consistent and to monitor changes in anemia prevalence. To effectively reduce anemia, coverage of women and children receiving the recommended number of iron supplements and being dewormed may need to be greater than 80-90% and at least 60% of women and children need to sleep under ITB. There are few success stories for anemia reduction. Thailand decreased anemia in pregnant women from 40% to 20% from 1986 to 1996/7 using 500,000 trained community volunteers to identify women early in their pregnancies and encourage them to use antenatal care services where they were given ample iron supplements and counseling on how and why to take them and treated for helminth and malaria as needed.

Program Manager's anemia interventions checklist

Know the problem: situation analysis

- Determine the public health significance and prevalence of anemia; identify priority target groups, areas of greatest anemia prevalence and its causes
- Determine what people know about anemia and their experience with anemia prevention and control programs

Raise awareness and develop partnerships

- Raise awareness across sectors: advocate and educate to prevent and control anemia
- Build partnerships in health, agriculture, food and pharmaceutical sectors, among government ministries and agencies, NGOs, donors, industry, and commerce

Develop interventions and implement plans

- Identify priorities, responsibilities, and time frames
- Identify specific objectives
- Identify collaborating groups (universities, government agencies, NGOs, civil groups, commercial entities)
- Review existing programs and determine and develop anemia prevention and control activities
- Determine and secure staffing, funding and other resources to implement activities
- Develop a monitoring and evaluation plan and indicators, using reduction of anemia as a benchmark for program success in IDA, malaria and helminth control programs

For more information:

Nutrition Advisory Service: email nutrition@worldbank.org

Resources and References

FRESH (Focusing Resources on Effective School Health) World Bank, 2001.

<http://www.freshschools.org/whatisFRESH.htm>

DHS (Demographic and Health Surveys).

<http://www.measuredhs.com/>

Galloway, R, 2003. Anemia prevention and control - What works? USAID, World Bank, PAHO/WHO, Micronutrient Initiative, FAO, and UNICEF.

Horton, S & J Ross, 2003. The economics of iron deficiency, Food Policy 28:51-75. Available: World Bank Library Resources, e-journals

INACG - International Nutritional Anemia Consultative Group - provides information and publications on iron and iron deficiency's contribution to anemia.

<http://inacg.ilsa.org/>

The Micronutrient Initiative provides information and publications on iron and other micronutrients.

<http://www.micronutrient.org/>

MOST provides information and publications on iron and other micronutrients. <http://www.mostproject.org/>

SCN (2004). Nutrition for improved development outcomes. 5th Report on the World Nutrition Situation. United Nations Standing Committee on Nutrition.

<http://www.unsystem.org/scn/Publications/AnnualMeeting/SCN31/SCN5Report.pdf>

Stoltzfus, R & M Dreyfuss, 1998. Guidelines for the use of iron supplements to prevent and treat iron deficiency anemia. INACG, WHO, UNICEF. <http://inacg.ilsa.org/>

WHO 2002. World Health Report, World Health Organization, Geneva.

<http://www.who.int/publications/en/> This site also includes useful publications on malaria, helminths and nutrition.

World Bank 2004. Poverty and Income. The Poverty Group. <http://devdata.worldbank.org/hnpstats/pvd.asp>

Expanded versions of the "at a glance" series, with e-linkages to resources and more information, are available on the World Bank Health-Nutrition-Population web site: www.worldbank.org/hnp

Core Anemia Interventions: Core Interventions, Beneficiaries, and Indicators

Core Interventions

Beneficiaries

Indicators

COMBAT THE THREE MAIN CAUSES OF ANEMIA

Prevent anemia in women during antenatal, delivery and postpartum care contacts

- 1) *For iron deficiency:* 60 mg of iron + 400 mcg folic acid (IFA) for pregnant women daily: where prevalence is <40%, 180 tablets (for 6 mos of supplementation); and, where prevalence is ≥40%, another 90 tablets during the postpartum period.
- 2) *For malaria* (intermittent, presumptive treatment or IPT): 500 mg sulfadoxine + 25 mg pyrimethamine (SP) or effective anti-malarials for pregnant women after the fetus has been felt to move: 3 tablets in a single dose two times during pregnancy but no more frequently than monthly.
- 3) *For helminths (worms)* that cause blood loss, any of the following are effective and safe: 400 mg albendazole as a single dose; 500 mg mebendazole as a single dose; 2.5 mg/kg body weight of levamisole as a single dose (but better if repeated on two consecutive days); and 10 mg/kg weight of pyrantel as a single dose (but better if repeated on two consecutive days)—where prevalence 20-50%, one treatment in second trimester; where prevalence is ≥50%, one dose in second trimester and one dose in third trimester.

- ✓ % pregnant women or children 2-24 mos who received and took the recommended dose and number of IFA tablets
- ✓ % women who received the recommended dose and number of IFA tablets postpartum.
- ✓ % pregnant women who received and took the recommended dose and number of tablets for IPT
- ✓ % pregnant women and children 2-5 yrs. who received and took the recommended dose and number of tablets of anthelmintic medication

Women during pregnancy, delivery and postpartum periods and their breastfed infants <6 mos.

Prevent anemia in children 0-5 years during well and sick child visits

- 1) *For iron deficiency:* 12.5 mg iron + 50 mcg folic acid (as drops/syrup/crushed tablets) for children 6-24 mos daily: where prevalence is <40%, 180 doses between 6-12 mos for normal weight infants and 660 doses between 2-24 mos for low birthweight infants (<2500 g); where prevalence is 40%, 540 doses between 6-24 mos for normal weight infants and 660 doses between 2-24 months for low birthweight infants.
20-30 mg (2 mg/kg body weight/day) of iron daily or weekly for children 2-5 years (there is no international recommendation for this age group on the duration of supplementation which should be determined locally but a minimum of 3 months for the daily dose and 6 months for the weekly dose are probably needed where prevalence is high).
- 2) *For malaria:* intermittent presumptive treatment (IPT) for malaria is not recommended for this age group, but a recent study showed promising results of giving IPT to young children and a recommendation for IPT in children <5 years may be made by 2006.
- 3) *For helminths (worms)* that cause blood loss: 500 mg. mebendazole as a single dose every six months for children 2-5 years old (IMCI generic protocol) where helminths (e.g., hookworm) are endemic (prevalence=20-30%). A recent WHO Expert Committee found no evidence to exclude children <2 years from deworming and a consultation to discuss this matter will be held in the near future.

Children 6-24 mos. (normal birthweight) or children 2-24 mos. (low birth-weight) or children 2-5 years

- ✓ % women and caregivers of children <5 yrs. following health and nutrition good practices that increase iron intake or decrease its loss; decrease malaria and helminth transmission

Behavior change communications (BCC) are needed during contacts with women and children to improve compliance in use of iron, effective anti-malarials and anthelmintics. Other messages should promote the following: women receiving a dose of vitamin A within 60 days after they deliver and children 6-59 mos. receiving vitamin A twice-yearly (see *Vitamin A at-a-glance*); good breastfeeding practices; full immunization for women and children; increased consumption of energy, iron-rich foods (meat), other micronutrients (vitamins A and B-12 and folic acid) and iron enhancers (vitamin C, germinated/fermented foods); decreased consumption of iron inhibitors (tea and coffee at meals); nightly use of ITB (bednets); modern family planning methods that reduce iron loss; good water and sanitation practices; and awareness about danger signs in pregnancy, delivery, postpartum (bleeding) and from childhood diseases and what do to about them.

¹ Note: iron supplementation, anti-malarials and deworming during pregnancy ensure that adequate energy, iron and other micronutrients are delivered to the fetus and newborns have adequate stores of iron which is their main source of iron in their first six months of life; exclusive breastfeeding in infants<6 months ensures infants receive the small but absorbable amount of iron in breastmilk.

Treat anemia in women (particularly severe anemia which can be identified using clinical signs for pallor of the palm or conjunctiva or, if available, a test for hemoglobin)

- 1) *For iron deficiency*: 120 mg iron + 400 mcg folic acid daily: 90 tablets for 3 mos.
- 2) *For malaria*: give IPT doses for effective anti-malarials, if women with severe anemia have not received the recommended doses. Rapid detection and treatment of suspected malaria.
- 3) *For helminths (worms)* that cause blood loss: give preventive doses of anthelmintics if woman with severe anemia has not received these and is in at least her second trimester.

Pregnant women

- ✓ % pregnant women and children <5 yrs appropriately treated for [particularly] severe anemia

Treat anemia in children (particularly severe anemia which can be identified using clinical signs for pallor of the palm [conjunctiva cannot be used in children] or, if available, a test for hemoglobin)

- 1) *For iron deficiency*: 25 mg of iron + 100-400 mcg folic acid (drops/syrup/crushed tablets) daily to children <2 years and 60 mg of iron daily+ 400 mcg folic acid daily to children 2-5 years: for 3 mos.
- 2) *For malaria*: nationally recommended first line and effective anti-malarial medication.
- 3) *For helminths (worms)* that cause blood loss: prevention dose of anthelmintics, when child presents with clinical signs of anemia and has not had a dose of mebendazole in the last six months and is > 2 years.

Children 0-5 yrs

Behavior change communications are needed during these contacts to ensure compliance in use of iron supplementation, anti-malarials and anthelmintics and to ensure women and children return for follow up when messages to improve health and nutrition behaviors and practices should be given (including prompt treatment of fever).

Pregnant women and caregivers of children <5 yrs

- ✓ % pregnant women and children <5 yrs following BCC messages and returning for follow-up

PREVENT ANEMIA IN THE OTHER VULNERABLE GROUPS

Primary and secondary schools

- 1) *For iron deficiency*: 30-60 mg of iron daily or weekly for children 6-11 years (there is no recommendation on number of doses for children, but 3 months of the daily dose and 6 months of the weekly dose are probably needed in areas of high prevalence of anemia). 60 mg of iron daily or weekly for adolescents (add 400 mcg of folic acid for girls).
- 2) *For malaria*: IPT is not recommended for this group, but treat for suspected malaria.
- 3) *For helminths (worms)* that cause blood loss: anthelmintics in endemic areas at least two times a year (same dose as for pregnant women) and where urinary schistosomiasis is endemic give praziquantel (40 mg/kg, single dose) annually for prevention or to children who report having blood in their urine.

Children 6-11 years attending primary school, adolescents attending secondary school

- ✓ % children 6-11 years or adolescents attending school who received the recommended dose and number of iron (or IFA) supplements. . .
- ✓ % children 6-11 years or adolescents attending school with suspected malaria who are treated.
- ✓ % children 6-11 years or adolescents attending school who received the recommended dose and number e of anthelmintics

Daycare centers and pre-schools

Follow protocols for children under five years under “prevent anemia in well child, sick child care” contact above

Children 0-5 years

See indicators under well child, sick child care

Core Interventions

Beneficiaries

Indicators

School committees and parent-teacher associations

Behavior change communications: disseminate messages through school contacts to promote the following: compliance with iron supplementation, anti-malarials and anthelmintics, as indicated; consumption and production of good sources of energy, iron and other micronutrients; use of insecticide treated materials (bednets), particularly for vulnerable groups; family planning methods that reduce iron loss; controlling infectious diseases (diarrhea, HIV/AIDS and others); good water and sanitation practices.

✓ % households following health and nutrition good practices that increase iron intake or decrease its loss; decrease malaria and helminth transmission

All members of the community but particularly vulnerable groups

OTHER ACTIVITIES TO CONTROL ANEMIA

Micronutrients

Community-based distribution (home visits, growth monitoring and promotion) of iron and other micronutrient supplements to the most vulnerable groups, particularly where health services are not well utilized, and other high-risk groups (i.e., all reproductive age women, heavy laborers, children not attending school).

Vulnerable groups

✓ % children under 2 years and % pregnant receiving iron supplements through community

Water and sanitation/hygiene

Promote good water and sanitation facilities and practices.

All households

✓ % households with adequate water and sanitation facilities
✓ % households with good water and sanitation practices (e.g., hand washing, wearing shoes)

Infectious disease control

Promote immunization.
Promote home-based care for diarrhea, respiratory infections and other communicable diseases (HIV/AIDS).
Promote use of ITB (bednets).
Behavior change communications (BCC) to prevent and treat infectious diseases including HIV/AIDS and refer serious cases.

Children 0-5 years and women

✓ % children <12 months fully immunized for DPT; measles
✓ % children <5 years appropriately treated for communicable diseases
✓ % children <5 and pregnant women who slept under an ITB the previous night (malaria risk areas)
✓ % people following BCC messages to prevent and treat infectious diseases

Family Planning

Promote breastfeeding for lactational amenorrhea method (LAM) and modern methods of contraceptives including those that reduce blood loss.

Reproductive age women

✓ % women using modern methods of contraception/ methods that reduce blood loss

Reproductive health

Promote the care of women (raising awareness about danger signs during pregnancy and postpartum periods and what to do about them; the need for antenatal and postpartum care, adequate diet for women).

Reproductive age women

✓ % women consuming adequate amounts of energy and micronutrient-rich foods including iodized salt
✓ % women who know danger signs during pregnancy and after delivery

Private sector (food and pharmaceutical manufacturers, marketers, distributors)

Promote production and sale of iron and micronutrient supplements, fortified foods, ITB (bednets) and family planning by private vendors, marketers, distributors.

Private sector vendors, marketers, distributors

✓ No. vendors, marketers & distributors selling iron, micronutrient supplements and ITB (bednets)
✓ % pregnant women buying iron, other supplements, ITB
✓ % vulnerable groups consuming fortified foods