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www.cdc.gov/nccdphp/dnpa/AnemIron.htm

The World Health Organization
20 Avenue Appia
CH-1211 Geneva 27
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phone: 41-22-791-2111
www.who.int/nut/ida.htm
Also, consult WHO regional and country offices.

Project IDEA - Iron Deficiency Elimination Action
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Iron and Early Childhood

Unlock Every Child's Potential

Iron is necessary for

- Intellectual development and learning
- Good health and physical growth
- Complete child development—emotion, growth, and learning

Everyone, in every country, town, or family can recognize a healthy child. A healthy child is active, playful, happy, curious, and has a good appetite. Exploring and learning, a healthy child interacts with his/her environment. The early months and the early childhood years are critical in the formation and development of intelligence, personality, and social behavior. The peak prevalence of iron deficiency among children occurs in these years and can have devastating effects.

One vital ingredient for healthy development in children has yet to be added to the early child development (ECD) agenda...Fighting Iron Deficiency.

Why Add Iron to Early Childhood Development Programs?

Iron deficiency anemia is a problem of great magnitude affecting 48% of young children worldwide. In the past, the problem has been ignored because the focus of assistance to children around the world was to ensure their survival in the face of severe illness and disease. Great success has been achieved in saving lives, and with more surviving children, communities rightly have turned their efforts to ensuring that their children develop fully and achieve their potential.

The evidence of iron's beneficial impact on children is mounting and it is clear that the inclusion of iron in early child development programs is both urgent and cost-effective since it helps programs reach their goals.

Until recently, most programs focused on treating severely anemic children. Now attention needs to shift to prevention as well as treatment of iron deficiency and its most severe form, anemia. There are effective strategies that can be put in place.

"The costs of iron deficiency anemia are high: children who are slow to learn may limit the ability of the teachers to fulfill their tasks and hold back their classmates, they may need special schools, and they may have increased infection rates and therefore increase the load on the health system."

Consultative Meeting on Child Development and Iron Deficiency, Oxford University, 1997

Iron affects

- cognitive development
- concentration
- attention span
- memory
- learning
- physical growth
- manual dexterity
- muscle function
- immunity to disease and illness
- social interaction
- behavior

What Does Iron Do?

Iron is a vital ingredient in blood cells, essential in carrying oxygen to all parts of the body. When there is not enough iron in the body, not enough oxygen is carried to the brain and muscles. This reduces brain development, available energy, and proper muscle function.

Developmental test scores of children with anemia show a deficit greater than that observed for mild lead poisoning.

Iron Deficiency: contemporary Scientific Issues and International Programmatic Approaches by Ray Yip, J. Nutrition 124, 1994

Growing Strong & Healthy

From the very beginning of life, iron deficiency and anemia cause problems for children. More than half of all pregnant women are anemic and they give birth to underweight babies who face a higher risk of dying in infancy and childhood.

When infants are exclusively breastfed, they obtain enough iron from breast milk for the first six months of life. However, if they are not breastfed, they almost certainly become iron deficient. Breastfeeding and child feeding practices are not ideal in most countries, preventing children from getting the iron they need.

Even with a good diet, from 6 to 24 months, infants need additional iron, either from syrups, tablets, or iron-fortified foods, to meet the demands of their rapid growth and development. Children who do not receive adequate iron develop anemia. They are smaller, weaker, and develop skills more slowly.

Diarrhea, respiratory illnesses, and other infections common in childhood are more frequent and severe in children with iron deficiency and anemia. Sufficient iron provides resistance to illness and diseases in early childhood.

Developing Skills & Curiosity

Development of motor skills takes shape during the first 24 months of life. Studies show that children of this age with iron deficiency anemia have delayed psychomotor development. 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 lethargic and often hesitant. This results in less exploration from which children learn and develop. With adequate iron, children explore and play more; they develop intellectually and socially, become curious and confident, expanding their experiences and strengthening their motor skills.

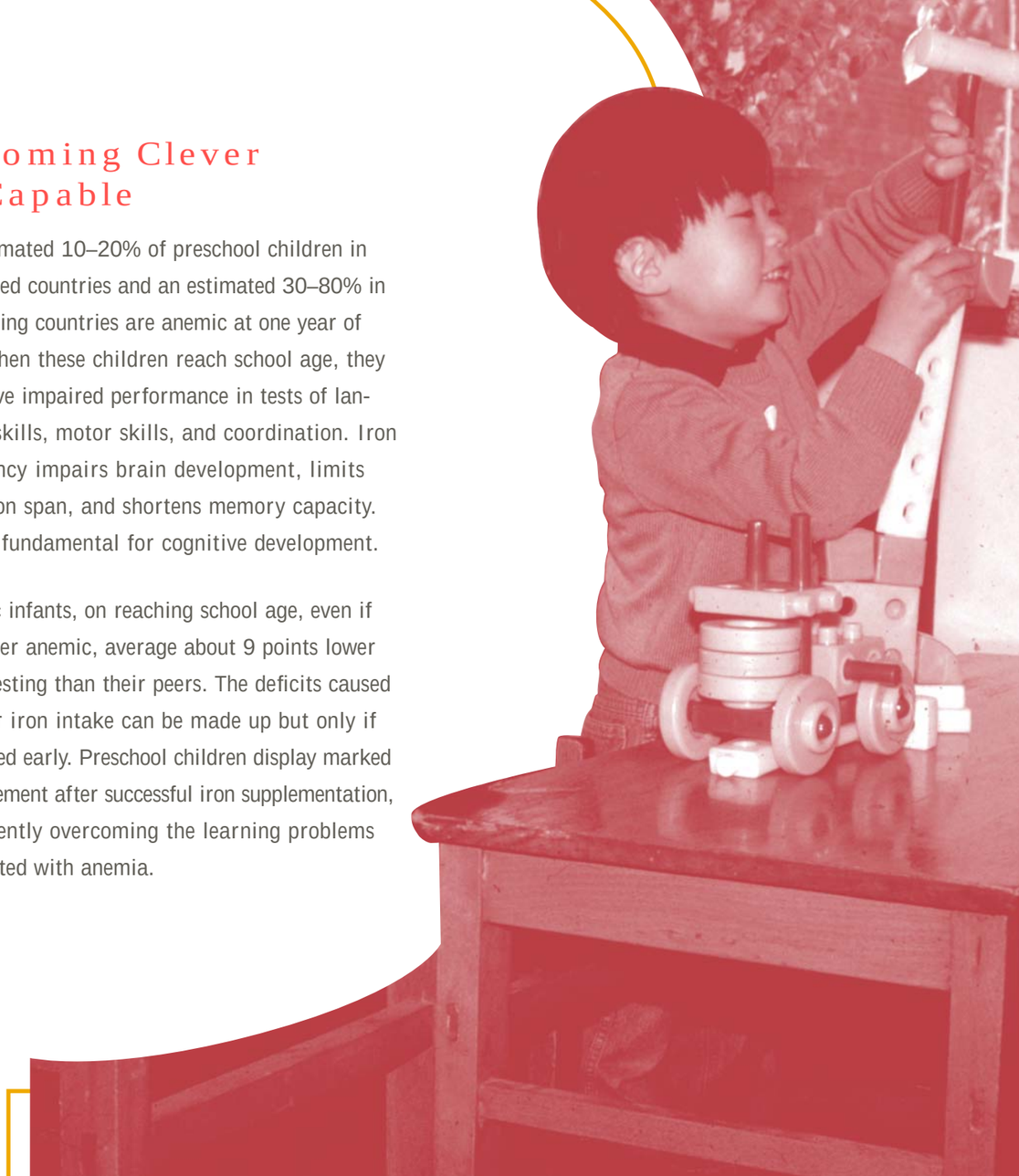
"Children whose earliest years are blighted by hunger or disease or whose minds are not stimulated by appropriate interaction with adults and their environment pay for these early deficits throughout their lives—and so does society."

ECD: Investing in the Future by Mary Young, World Bank 1999

Becoming Clever & Capable

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. When these children reach school age, they will have impaired performance in tests of language skills, motor skills, and coordination. Iron deficiency impairs brain development, limits attention span, and shortens memory capacity. Iron is fundamental for cognitive development.

Anemic infants, on reaching school age, even if no longer anemic, average about 9 points lower in IQ testing than their peers. The deficits caused by poor iron intake can be made up but only if corrected early. Preschool children display marked improvement after successful iron supplementation, consistently overcoming the learning problems associated with anemia.



The Iron Opportunity

Solutions are available and cost-effective

Preventing and treating iron deficiency and anemia are among the most cost-effective health actions available that can provide a key support to full child development. Fortification of foods can cost as little as $.10 per person per year, and supplements for children, such as sprinkles added daily to their food, can cost as little as $5 per year per child.

There are multiple actions for defeating iron deficiency and anemia. Many countries have already begun programs to reduce iron deficiency (such as fortification of staple foods), but few have targeted young children, despite the fact that they are among the most at-risk for becoming anemic.

Early childhood programs can efficiently integrate actions to reduce iron deficiency into their work, directly benefiting the children and the effectiveness of the 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.

Supplementation involves giving children iron in tablets, syrups, or other preparations. Supplementation is the method of choice when iron deficiency is severe or when access to regular dietary intake of iron is limited.

Increasing the consumption of iron-rich foods in the daily diet aims to ensure that people have knowledge of and access to foods rich in iron, such as meats, beans, certain dried fruits, vegetables, and fruits rich in vitamin C (which helps absorption of iron).

Fortification is the addition of iron to foods that are regularly consumed and can be fortified. Basic ingredients, such as wheat and maize flour and some condiments, such as soy sauce, can be fortified. Staple foods, such as bread, cereal, noodles, and weaning foods can also have iron added to them.

Education about increasing the consumption of iron-rich foods, fortified foods, and supplements will help parents and caregivers to appropriately and effectively use what is available to them.

Strengthening other public health measures such as deworming, malaria prevention and treatment, and diarrhea prevention will help decrease iron deficiency and anemia. These conditions cause iron deficiency through loss of blood or destruction of red blood cells.

What Can My Early Childhood Program Do Today?

Provide iron supplements to children. Iron supplementation, in the form of syrup 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 them to give more attention to iron deficiency.

Provide meals and/or snacks that are iron-rich. ECD programs that provide food to children in their care should choose foods that are high in iron and/or fortified with iron. These include: meat, beans, and dried fruit. Each region has local foods rich in iron. Foods fortified with iron will vary or may not be available. Some typical fortified foods are: bread, noodles, cereal, soy sauce, flour, and maize meal.

Foods that enhance the absorption of iron should be encouraged. These include fruits and vegetables rich in vitamin C. Drinks such as coffee and tea block the absorption of iron so these should not be given to children.

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.

Reducing iron deficiency and anemia can help ECD programs be more successful.

ECD Program Examples

Some governments are already making progress in defeating iron deficiency. While public health programs in most countries are working to provide iron supplements for pregnant women, some countries, such as Nicaragua, are now placing emphasis on supplements for young children. In Nicaragua, iron syrup is being provided to children through growth monitoring and promotion programs.

The National ECD Program in the Philippines is working to provide iron-fortified snacks to their children.

The Integrated ECD Project of Eritrea is encouraging flour fortification, improving dietary intake of iron through educating children's caregivers/parents about iron-rich diets, and reducing malaria and worm infections.

Some countries, such as Thailand and Indonesia have mounted large-scale public education programs that have achieved success in improving dietary iron consumption by children.

The US Women, Infants, and Children Program has provided fortified foods to children and reduced childhood anemia by 16%, resulting in higher scores on tests of memory for those children.

Iron deficiency and anemia affect people of all ages and successful work is being implemented for other groups.

Other Examples

School systems in Egypt are providing iron supplements and nutrition education to students. Supplementation, combined with nutrition education, has proved to be successful and sustainable in addressing iron deficiency in student groups.

Flour fortification has been the key to success in many countries such as the United States and the United Kingdom. Flour fortification is currently being implemented or considered by many other countries—Sri Lanka, Mexico, Venezuela, Egypt, Morocco, Philippines, and South Africa.

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Sources:
Major Issues in the Control of Iron Deficiency, The Micronutrient Initiative and UNICEF, 1998.
Iron Deficiency Anemia Assessment, Prevention, and Control, WHO, UNICEF, UNU, 2001.
Child Development and Iron Deficiency, The Oxford Brief, ILSI/INACG, 1997.

Photography:
PAHO: cover
Photodisc: pages 2, 14
Prasanta Biswas, Still Pictures: page 5
Liz Bumgarner: pages 8, 9, 12(boy)
Ron Giling, Still Pictures: pages 6, 10
USDA: pages 7, 12(girl), insert "How can ECD"
Jareunsri, Still Pictures: page 12
Mohsen Allam: insert "Impact"

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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.

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.