

Report of the UNICEF/WHO Regional Consultation

Prevention and Control of Iron Deficiency Anaemia in Women and Children

3–5 February 1999
Geneva, Switzerland



United Nations Children's Fund



WORLD HEALTH
ORGANIZATION

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UNICEF/WHO Regional Consultation**

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Iron Deficiency Anaemia
in Women and Children**

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UNICEF Regional Office for Central and Eastern Europe,
the Commonwealth of Independence States
and the Baltic States

WHO Regional Office for Europe

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Consultation Opening Address from UNICEF

Distinguished Guests, Ladies and Gentlemen and Colleagues:

I am very pleased to welcome you to the Joint UNICEF, WHO Consultation on Iron Deficiency Anaemia, the first consultation that takes place to address the specific problems and challenges of our region.

Iron Deficiency Anaemia steals vitality from billions of men and women around the world and impairs cognitive development of young children. A WHO report states that Iron Deficiency Anaemia affects over 3.5 billions individuals in the developing world compared with 853 million for Iodine Deficiency and 300 million for Vitamin A Deficiency. Yet Iron Deficiency Anaemia is not receiving the right attention. For several years, it has been recognized that, despite stated national and international commitment, the level of national activities and international support directed towards programmes to reduce Iron Deficiency among vulnerable population groups has been out of balance with prevalence, seriousness, and consequences of this public health problem.

Nearly 25% of the world population suffer from the consequences of Iron Deficiency Anaemia. Unless population improve their dietary intake, consume iron fortified food, or take iron supplements regularly, they will be found iron deficient. Iron Deficiency has a high economic cost by adding to the burden on health system, affecting learning in school and reducing adult productivity. The WB, WHO and Harvard University lists Iron Deficiency Anaemia as having a higher overall cost than any other disease except tuberculosis. Iron Deficiency Anaemia can be prevented at low cost. Economic analysis support the political commitment made by the Heads of States at the World Summit for Children in 1990 and at the International Conference on Nutrition in Rome in 1992 in which there

was a consensus to implement national actions to reduce micronutrient deficiencies. Since then, and despite promising new interventions trials, little progress has been made towards the reduction of Iron Deficiency Anaemia. Part of the reason is that it is a hidden deficiency with few overt that are recognized. There is a lack of widespread knowledge on the serious and often permanent consequences of Iron Deficiency Anaemia on the cognitive development of young children and its negative impact on health of all people, especially children under the age of 5 and pregnant women. Advocacy and national skills programmes have also constraints by the wrong perception that effective and practical interventions are not available or are costly.

Also in CEE, CIS and the Baltics, very little data is available on the magnitude of Iron Deficiency Anaemia. It is still estimated to affect approximately 40 to 50% of pregnant women and 50% of children under the age of 5. The main suggested causes include

- Poor eating habits
- Large intake of inhibitors
- Decline in purchasing power
- Poor weaning practices
- Chronic illnesses such intestinal parasites
- Thalassemia
- Insufficient consumption of vegetables and food

Realizing that it is a growing problem, UNICEF Regional Office for CEE, CIS and the Baltics, in collaboration with WHO EURO, worked to convene this consultation among Governments representatives together with donors and international organisations, to discuss and endorse effective strategies for the region on the prevention and control of Iron Deficiency Anaemia among pregnant and lactating women and children.

Over the past years, there has been several global consultations held on Anaemia prevention and the different approaches to address Iron Deficiency Anaemia.

The findings of some these consultations will be presented to you. Also, important case studies will be shared with you, one of which is from our region, and that is the experience of CARK, and the other is from the Middle East. Both experiences will offer lessons learned and the process of their implementation.

The idea here is to learn from these models and to adopt and agree on an approach for CEE, CIS and the Baltics that can be adapted to different country situations and translated into plans of action.

A point that I would like to reiterate is that this meeting is your meeting, we are here to listen to you, “countries of the region”, and to work with you to find the best approach in addressing Iron Deficiency Anaemia that will meet the specific needs of your country. For us to act, we need an increased commitment on the part of national Governments as well as the support of international agencies, bilateral agencies and NGOs. It will also require commitments of communities, private institutions, the food industry and the mass media.

Finally, I wish this meeting every success and fruitful outcome that will bring us together to act on the prevention and reduction of Iron Deficiency Anaemia.

John J. Donohue, Regional Director, UNICEF Regional Office for CEE/CIS and the Baltic States

Consultation Opening Address from WHO

The Regional Director of the WHO Regional Office for Europe, Dr Jo Asvall, is aware of the challenge and the effort needed if the control of iron deficiency anaemia (IDA) is to be achieved in Countries of Central and Eastern Europe (CCEE) and Commonwealth of Independent States (CIS). This gathering of so many distinguished people concerned with public health, and in particular the health of women and children in CCEE and CIS is certainly a major step forward.

The time is ripe for an inter-country endeavour such as this consultation to review experiences, successes and difficulties of programmes to control iron deficiency anaemia. We should identify the main causes of iron deficiency anaemia and decide how best to design programmes that can solve the problem most cost-effectively.

One of the goals of the World Summit for Children calls for a reduction of IDA in women by the year 2000 to one-third of 1990 levels. At that time there was no call for any actions to be taken against iron deficiency anaemia in young children or adolescents. However in 1996 the UNICEF/WHO Joint Committee on Health Policy (JCHP) expanded the focus to include prevention of iron deficiency anaemia in young children, adolescents and pregnant women where IDA is a problem. To fulfil these commitments stakeholders from all sectors must take action to implement the necessary steps.

UNICEF and WHO have formulated the specific objectives of this consultation with assistance from international experts. These objectives are concerned with identifying the scale of the problem, the constraints to implementing national programmes to control iron deficiency anaemia and to discuss ways and means of overcoming these constraints and to

make concrete recommendations for the Region.

During the consultation we expect to hear about the lack of data that exists in many countries and the need to improve nutrition information systems. More information is needed in order to establish the correct policies which will reduce and eventually eliminate iron deficiency anaemia. Fortunately we do have information from some countries and one of the objectives of this consultation will be to review the data and decide which concrete recommendations could be formulated without waiting for more information.

The contribution of iron deficiency to miscarriages, perinatal and infant mortality and low birth weight in developing countries is now well recognised. Iron deficiency anaemia can increase fatigue and decrease work capacity in adults; shorten attention span, reduce resistance to infection, impair intellectual performance and cognitive development in children. Some governments have already established programmes aimed at control of iron deficiency anaemia and we are confident that this consultation will help to improve the situation. The resulting recommendations will provide concrete examples of what can be achieved by countries.

We would like to thank our colleagues from UNICEF for all the work that went into preparing the consultation and look forward to working with them in order to achieve a successful outcome. Although millions of women and children suffer from iron deficiency anaemia in Europe – recent progress and the increasing commitment of governments all point to the potential for real success. This consultation is clearly a major milestone on this pathway.

Aileen Robertson
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WHO Regional Office for Europe

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Regional Adviser for Child Health
WHO Regional Office for Europe

Executive Summary

Iron deficiency and its anaemia steal vitality from the young and old, threaten the health of pregnant women, impair the cognitive development of children and in their most severe forms can be a direct cause of death. One of the goals of the 1990 World Summit for Children, called for a reduction in iron deficiency anaemia in women to one third of the 1990 levels by the year 2000. Heads of States made political commitments to achieve this goal, yet despite this and other national and international pledges to address the problem of iron deficiency in this population group as well as in children and adolescents, the problem of iron deficiency anaemia has not received the required attention and support. As a result, very little progress has been made towards the global elimination of iron deficiency.

In the countries of Central and Eastern Europe, the Commonwealth of Independent States and the Baltic States (CEE/CIS/BS) there was, until recently, a lack of widespread knowledge about the serious and often permanent consequences of iron deficiency anaemia on the cognitive development of young children and its overall negative impact on people's health. Now, however, there is growing recognition of these problems by national health authorities and many have made clear their intention to address them. For their part, UNICEF, WHO and other international and bilateral donors are increasing their commitments to support efforts that aim at preventing and controlling iron deficiency and iron deficiency anaemia in this part of the world.

In February 1999, UNICEF and WHO held a consultation with participation of representatives from most of the 27 countries served by the UNICEF CEE/CIS/BS Regional Office.¹ Its purpose was to decide on how

to accelerate and expand efforts to prevent and control iron deficiency and iron deficiency anaemia, including how to improve complementary feeding of infants and young children.

High Anaemia Prevalence Rates in the Region

Findings from a number of research studies as well as national and subnational surveys indicate high prevalence rates for anaemia among women and young children in many of these countries. In large areas of the four Central Asian Republics and Kazakhstan, anaemia prevalence rates among these groups have been found to be higher than 50 percent. Based on dietary studies and subsample measurements of serum ferritin, it is believed that the majority of all anaemia in this region is caused by iron deficiency. It is also accepted that anaemia represents the most extreme form of iron deficiency, which is otherwise not apparent. From this, it is estimated that an equal number of people to those who have iron deficiency anaemia are probably iron deficient without anaemia, this means that virtually the whole of these population groups in the Central Asian Republics and other countries of the region, are iron deficient. While internationally available data on iron deficiency anaemia in the Region are limited, much of the information needed for rapid assessments of the prevalence of anaemia, and iron deficiency anaemia, in these countries can be obtained readily through local health records.

Health and Economic Effects of Iron Deficiency and Iron Deficiency Anaemia

The effects of anaemia in very severe cases include death. Lower work capacity and increased morbidity are among the negative functional consequences of even mild iron deficiency anaemia across all sectors of the population. For children and adolescents, the consequences of iron deficiency anaemia include poorer school performance, which is usually reversible if the iron deficiency is eliminated. For infants, permanent cog-

¹ The countries served by the UNICEF Regional Office for Central and Eastern Europe, the Commonwealth of Independent States and the Baltic Countries are: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Former Yugoslavia Republic of Macedonia, Georgia, Hungary, Kazakhstan, the Kyrgyz Republic, Latvia, Lithuania, Moldova, Poland, Romania, Russian Federation, Slovakia, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, Federal Republic of Yugoslavia. These countries fall within the European Region of WHO.

nitive deficits often result from iron deficiency anaemia. For pregnant women, iron deficiency anaemia increases the risk of preterm delivery and low birth weight infants and the poor iron status of the mother also contributes to lower iron stores in the newborn infant.

Until recently, the economic costs related to anaemia had gone practically unnoticed. The World Bank, WHO and Harvard University note that anaemia has a higher overall economic cost than any other disease except tuberculosis. However, the interventions necessary to prevent iron deficiency anaemia have high benefit/cost ratios, and are among the most cost effective in the realm of public health. This is especially important in the CEE/CIS/BS countries where economic considerations dominate decisions of many political debates. The high economic costs of anaemia and the low costs of interventions to address the problem should persuade national leaders to make the necessary policy decisions needed to fulfill these commitments.

Factors Contributing to Iron Deficiency Anaemia in the Region

The causes of the high prevalence of iron deficiency anaemia in these countries are complex, and relate to current living conditions, lifestyle practices and inappropriate infant feeding and dietary guidelines left over from the former Soviet era. Research shows that anaemia rates in many of these countries have risen during the past 15 years coinciding with the worsening of economic conditions for many families throughout the Region. Most significant are decreases in consumption of meats that are rich in highly-bioavailable haem iron. Not only is the iron in the meat itself lost to the body when less of that type of food is consumed, but the body also absorbs less of the non-haem iron found in grains and vegetables because the haem iron in meat enhances absorption of this other iron form. Brief details of the other main factors contributing to iron deficiency anaemia in the region are given below.

Inappropriate infant and young child feeding practices

A review of current infant and young child feeding practices within the countries of the Former Soviet Union including the Central Asian Republics identified a number of nutritional practices from the former Soviet era that differ from international standards and help to explain the poor iron status of infants and young children within these countries.

Factors identified in this comprehensive review include: early introduction of liquids and semi-solid foods during the period when exclusive

breastfeeding is recommended; e.g. introduction of water and herbal teas at around 1-2 months, with tea at 2-3 months and fruit juices at about 3-4 months. In addition, it was found that cow's milk, which has a low and poorly bioavailable iron content, was introduced at around 4-5 months. Tea has an inhibitory effect on iron absorption and furthermore, the too early introduction of supplementary drinks including tea, water and cow's milk, causes displacement of breast milk intake. The review, as well as other studies in former Soviet countries, have also found a common and strongly held, erroneous, belief that maternal anaemia is a contraindication to breastfeeding. Extensive educational and promotional campaigns and better services are needed to promote, protect and support breastfeeding, concentrating especially on counselling and psychological support.

Results of the review are reported in more detail in section four of this report.

Insufficient training on nutrition for health workers.

There are currently few large-scale educational efforts aimed at improving iron nutrition and dietary practices in ways that would improve iron nutrition in the region. Similarly, there are few training programmes attempting to improve nutrition-related communication by health workers. One significant exception has been several WHO/UNICEF supported workshops and courses in the Region with the goal of promoting improved breastfeeding practices. Such workshops have included training on breastfeeding consultation services and support groups. Other major exceptions include the Information/Education/Communication (IEC) components of the Anaemia Prevention and Control programmes supported by UNICEF in five countries in Central Asia.

The low level of bioavailable iron in staple foods.

A contributing factor to poor iron nutrition is likely to be the high extraction rates common in wheat flour processing in this Region. This results in flours with high levels of wheat bran that inhibits absorption of the naturally occurring iron left in the milled flour. The result is a low level of bioavailable iron in food staples (bread, pasta, noodles) in the Region. Fortification of the wheat flour with iron and other micronutrients during the milling process is a practical means of replacing the iron lost during milling. The amount added can be increased to compensate

for the lower levels of absorption related to the high wheat bran content and to provide an additional dietary source of iron, thus serving as a basic strategy to help reduce and prevent iron deficiency anaemia in these populations.

Unlike many countries of Europe, North and South America and Middle East, no country in this Region has an active policy calling for fortification of wheat flour with iron or other micronutrients at mills. Currently iron is not added to replace the iron naturally present in whole wheat which is lost during processing. Technically, widespread fortification of flour with iron and other micronutrients in this Region is a feasible and cost effective strategic element in programmes to prevent and control iron deficiency anaemia.

Inadequate distribution of iron and folate supplements to pregnant women.

Even if flour in the region is fortified with iron and other micronutrients, it is unlikely that this will be sufficient to meet the iron needs of pregnant women, or all young children. Therefore provision of additional supplement to these groups will still be required. Current national health policies of countries in the Region call for administration of iron supplements only when anaemia is clinically diagnosed in individuals, including pregnant women. In areas where anaemia prevalence rates are high, such as is the case in many areas in Central Asia and Russia, WHO and UNICEF recommend iron supplementation of all pregnant women. However, this recommendation is not being followed in most areas of these countries, despite the low cost of iron plus folate supplements.

Even where the health officials agree with these recommendations, national health services often cannot afford to provide this supplement. Except in one Oblast in each of five countries in Central Asia, there are no current major efforts to combine the use of iron supplementation with fortification of wheat flour and the promotion of improved diets to prevent iron deficiency and iron deficiency anaemia, in young children and women.

In the Anaemia Prevention and Control (APC) programmes supported by UNICEF in the Central Asia and Kazakhstan, oral iron plus folic acid supplements are being delivered to target groups that include all pregnant women, women of childbearing age and children less than two years of age. These programmes also include major dietary education and pro-

motional activities and efforts to initiate flour fortification in the countries.

The Need for New, Integrated Programmes

Until recently, advocacy and national-scale programmes to improve iron nutrition have been constrained both in this Region and in others by lack of agreement among nutrition programme specialists. Various specialists have tended to promote one or another intervention (education for dietary change, food fortification, dietary supplementation) as the core of iron nutrition programme designs. Recently however, there has been a major shift in the strategy design of these programmes. Nutrition programme specialists and their organisations are now agreeing that no single intervention can effectively control iron deficiency in a population.

There is now growing consensus that all of these interventions are needed and programmes require an overall integrated, longer-term strategy. At the Regional Consultation, participants joined the call from specialists at similar consultations in other regions and from major micronutrient specialist groups for the integration of several interventions to solve the problem of iron deficiency for populations of men, women, adolescents and children.

The UNICEF/WHO Regional Consultation recommended that an integrated strategic approach be used in CEE/CIS/BS countries. The following interventions should be included in programme designs:

- Improving complementary feeding of infants,
- Promoting positive dietary change in women,
- Widespread fortification of cereals and weaning foods with iron,
- Broadened use of oral iron supplementation,
- Better control of infections (where appropriate) and
- Ongoing programme monitoring.

There was also agreement that these interventions should be functionally linked with public health programmes such as family planning, breastfeeding promotion, improved maternal health and the programme for Integrated Management of Childhood Illness (IMCI).

Consultation participants agreed that effective programmes would require Governments of the CEE/CIS/BS countries to make firm, action-

oriented commitments to build sustainable, long term, integrated programmes to prevent iron deficiency and iron deficiency anaemia. Action plans should involve all stakeholders, e.g. relevant leaders in the food processing industry, the health sector and the education sector, as well as employers, community groups, and the mass media; with support from international and bilateral agencies, private and state research groups and other groups.

Specialised guidelines and technical documents that can support initiation of appropriate interventions as parts of this strategy are now available internationally or else are in development. The consultation recommended support for making such documents readily available and to have key documents translated into Russian and other languages for use by national programme planners in the Region.

Consultation Conclusions

Complementary feeding

The WHO Working Group on Complementary Feeding and the Control of Iron Deficiency Anaemia believes that current revision and updating of recommendations on complementary feeding within each country of the Former Soviet Union, including the Central Asian Republics, would have a significant positive impact on both the iron and general nutritional status of young children. The consultation concluded that the establishment of national guidelines for good complementary feeding practices based on the above, revised, recommendations, should be a priority within national-scale programmes in the control and prevention of iron deficiency and associated anaemia.

Education for dietary change

The countries of the Region need to develop plans and strategies to promote dietary improvement as a part of their integrated strategies to prevent iron deficiency. While nutrition educational activities alone may not affect behaviours sufficiently to solve the problem of iron deficiency, they are an essential component of any effective and sustainable programme. In order to promote better iron intake and absorption in family diets, those designing educational efforts need to learn what commonly consumed foods and meals contain iron and those foods that enhance or inhibit its absorption. Dietary guidelines can then be developed for the adult population, particularly focusing on women of childbearing age.

These new guidelines should form the basis of the health information campaigns and dietary education.

While promotion of iron nutrition through diet is inhibited by the economic constraints on meat consumption and the poor iron availability in vegetables, changing the composition of common meals and providing more meat as complementary foods to older infants, young children and pregnant women will help. Effective information/ educational/ communication (IEC) strategies are also needed to help consumers learn that some common practices among women such as drinking tea with meals and using cow's milk as a substitute for and a complement to breastmilk in infants can harm iron nutrition. Improved IEC training of health workers and promotion of the use of supplements, by those groups needing them, also should be essential goals of such programmes.

Flour fortification

The potential of fortification of wheat flour to contribute significantly in reducing iron deficiency and other micronutrient deficiencies in women and adolescents in this Region was a major topic at the consultation. Large amounts of wheat flour from centralised, large-scale mills are consumed in all of these countries. Significant amounts of iron (as well as folic acid and perhaps other micronutrients) can be delivered safely and cost-effectively to many iron deficient population groups if wheat flour is fortified.

The cost effectiveness and long term sustainability of flour fortification should have strong political appeal within the Region where the public is well educated and has a high awareness of anaemia. Iron fortification of wheat at flour mills will require the active involvement of leaders and others in the food processing industry, the health sector and government agencies setting standards for food additives. The process of bringing fortification into a national policy framework and/ or common practice could be significantly accelerated if "champions" were identified within political bodies.

The policies and processes needed to have wheat fortified with iron and other micronutrients should be quickly and thoroughly determined in view of the regulatory and technical contexts of the Region, drawing from the long-established experience on fortification in many other countries. There was agreement at the consultation that each country should accelerate or rapidly initiate work to have wheat flour fortified. These efforts should be supported by regional meetings that would bring to-

gether participants from organisations controlling major flour mills, food additive regulators and appropriate technical experts.

Iron supplementation

For women who enter pregnancy with poor iron stores and moderate to severe anaemia, supplementation during pregnancy comes too late to fully correct the deficiency. Therefore, where: anaemia prevalence is high, fortified flour is not a regular dietary staple, and the availability of iron in the diet is low; regular iron plus folate supplements are the most cost effective and practical means to assist women of childbearing age to enter pregnancy with healthy levels of these nutrients. In addition women should receive supplementation with iron and folic acid during pregnancy and for two months postpartum.

Where the prevalence of iron deficiency anaemia among infants and young children six months to 18 months of age is high and iron fortified complementary foods are unavailable, supplementation with iron is recommended by WHO and UNICEF in order to prevent the negative consequences of iron deficiency anaemia including permanent impairment of their cognitive development.

The consultation concluded that preventive iron plus folate supplementation should be expanded to specific groups with high iron needs. The use of supplements to prevent iron deficiency in large population groups should also be explored.

Development of means and strategies to improve the effectiveness of supplementation and better supplements for young children were called for. Mechanisms by which families are willing and able to pay the small costs for micronutrient supplements should be developed and tested.

Integrated programmes

As mentioned above, it was recommended that all the above strategies should be implemented in an integrated fashion to ensure coverage of all high-risk groups. For example, fortification of wheat flour will not prevent iron deficiency for infants and young children who have high iron needs and who eat little amounts of wheat based foods. In addition, fortification, while helpful in providing women with good iron nutrition is not seen as a sufficient means of correcting iron deficiency or iron deficiency anaemia during pregnancy when iron needs are high. Therefore, work to initiate flour fortification should be done within an overall con-

text of multi-intervention iron programmes that include improved complementary feeding, education to improve diets and iron supplementation for the population of specific groups.

Linkages to other ongoing programmes

Examples of related programmes which should include relevant aspects of the recommended actions for control and prevention of iron deficiency are: Integrated Management of Childhood Illness (IMCI), essential perinatal care and care of the newborn, reproductive and maternal health, promotion of breastfeeding, and other micronutrient programmes (Iodine Deficiency Disorders, Vitamin A Disorders, etc.).

Monitoring and evaluation of programmes, information sharing

New interventions to prevent and control iron deficiency and iron deficiency anaemia need to be monitored and their impact evaluated. As more programmes are started, new combinations of strategies will be employed and effective models will take some time to build. Lessons on effectiveness and problems encountered need to be documented and shared in order for effective lessons to be widely adopted and to prevent mistakes from being repeated.

To support integrated approaches to preventing and controlling iron deficiency anaemia, a regionally oriented mechanism is needed that facilitates sharing country-level lessons learned, relevant regional activities, useful technical information from national and international levels and sources of various forms of international support. Further details regarding monitoring, evaluation and information sharing are given in section three of this report.

The consultation concluded that prevention and control of iron deficiency can be achieved through the effective adaptation, introduction and integration of a globally recommended package of interventions in countries throughout the Region. . Through such programmes, the basic human rights, related to adequate nutrition and good health will be better assured.

Consultation Background

Iron deficiency and its anaemia steal vitality from the young and old, threaten the health of pregnant women and impair the cognitive development of children. Although many national governments, major international agencies and donors have begun to look more seriously at this problem, very little progress has been made toward the global elimination of iron deficiency.

High Anaemia Rates — Limited Activities in the Region

In the countries of Central and Eastern Europe, the Commonwealth of Independent States and the Baltic States (CEE/CIS/BS), high anaemia levels among pregnant women are well recognised. In the many areas of the Region approximately one out of every two children less than five years of age and a similar proportion of pregnant women suffer the effects of iron deficiency anaemia. The incidence of iron deficiency in these groups is up to 100 percent in many areas.

Throughout the Region the disease is addressed mainly from a clinical perspective. These countries have well established policies to screen pregnant women and to prescribe oral iron supplements for those found to be anaemic. Children diagnosed through blood tests as anaemic are also routinely prescribed oral iron supplements. However, unlike most countries in the industrialised West, these countries do not yet have policies or programmes aimed at preventing and controlling iron deficiency and iron deficiency anaemia through a wide-scale public health and nutrition programme. None have policies aiming at providing their populations with staple foods such as wheat fortified with iron and other micronutrients. Health promotion activities with a goal of better iron nutrition remain weak and seldom focus beyond anaemia in pregnant women.

There was, until recently, a lack of widespread knowledge about the serious and often permanent consequences of iron deficiency anaemia on the cognitive development of young children and its overall negative impact on people's health. Now, however, there is growing recognition of these problems by national health authorities, and many have made clear their intention to address them.

Limited International Support to Reducing Iron Deficiency in the Region

For their part, UNICEF, WHO and other international and bilateral donors are increasing their commitments to support efforts to prevent and control iron deficiency and iron deficiency anaemia in this part of the world.

Since 1992, a number of new but limited public health and nutrition measures aimed at controlling iron deficiency anaemia in these countries have been supported by various international and bilateral agencies. For example,

- In 1993, UNICEF provided sufficient iron supplements for a 12-month cohort of all pregnant women to receive 60 mg of elemental iron per day in Belarus, Ukraine and the Russian Federation.
- A programme in Romania tested strategies to reduce iron deficiency anaemia.
- Most essential drug packages provided by donors throughout the Region have included iron plus folate supplements.
- In 1995, in collaboration with national governments and institutions, UNICEF and the International Nutrition Foundation (INF) began support integrated, multi-interventions programmes for Anaemia Prevention and Control (APC) in the Central Asian Republics and Kazakhstan (CARK). These programmes are phased and initially include iron supplementation for children less than two, pregnant women and women of childbearing age where anaemia levels are high, efforts to create national policies on wheat flour fortification, promotion of dietary practices aimed at improving iron nutrition and linkage of efforts to improve iron nutrition with related public health and nutrition programmes.

- In Russia, collaboration among the US Centers for Disease Control (CDC), UNICEF and a private flour producer aimed at demonstrating the positive effects of flour fortification with iron on anaemia prevalence.
- Studies and intervention efforts also have been undertaken in Uzbekistan, Kazakhstan, Moldova, Azerbaijan, and Georgia among other countries with support from various international and bilateral agencies, NGOs and universities.
- WHO EURO, in collaboration with UNICEF, is developing recommendations for improving complementary feeding practices that include improving iron nutrition among young children.
- WHO EURO, in collaboration with UNICEF, developed a three-day training package for health care professionals on “Healthy Eating during Pregnancy and Lactation” which addresses dietary measures to prevent and control iron deficiency anaemia.

1999 UNICEF/WHO Regional Consultation

Consultation organisers

In recognition of the seriousness of iron deficiency anaemia in many of these countries and the need to accelerate and coordinate current and new efforts to address this major public health problem, a joint *UNICEF/WHO Regional Consultation on the Prevention of Iron Deficiency Anaemia and Complementary Feeding* was organised and held 3–5 February 1999 in Geneva, Switzerland. Co-conveners of the consultation were the UNICEF Regional Office for Central and Eastern Europe, the Commonwealth of Independent States and the Baltic States (UNICEF RO CEE/CIS/BS) and the World Health Organisation European Regional Office (WHO/EURO). The Iron Deficiency Program Advisory Service (IDPAS) of the International Nutrition Foundation (INF) provided technical assistance.

Consultation participation

Among those invited were specialists and staff from the following organisations and departments: (see appendix for full listing of participants).

- Ministries of Health, Nutrition Institutes and Government Departments from countries in the Region with sections responsible for actions to control and prevent iron deficiency /iron deficiency anaemia in countries in the Region.

- UNICEF Regional, Area and Country Offices from the Region with sections involved in planning and carrying out health and nutrition programmes.
- UNICEF Headquarters Nutrition Section based in New York, NY USA.
- WHO Headquarters Micronutrient Section.
- WHO EURO (World Health Organisation Regional Office for Europe) based in Copenhagen, Denmark sections dealing with nutrition and with maternal health.
- PAMM (Programme Against Micronutrient Malnutrition), a multi-disciplinary venture aiming toward ending hidden hunger worldwide. Programs are supported, in part, by the United Nations Children's Fund, Dutch Ministry of Foreign Affairs, the United States Agency for International Development, the Micronutrient Initiative, Procter & Gamble, Hubert Fund and the International Life Sciences Institute.
- MI (The Micronutrient Initiative), an international project based in Ottawa, ON, Canada working on iron deficiency /iron deficiency anaemia and other micronutrients (supported by UNICEF, UNDP, CIDA and the World Bank).
- US CDC (United States Centers for Disease Control), an Atlanta, GA, USA based agency of the US Public Health Service, with a current activity supporting work on flour fortification in the Russian Federation.
- ILSI (International Life Sciences Institute), a Washington, D.C. USA based international group, supported mainly by the food industry, that works on micronutrient programmes and has developed new guidelines on anaemia and fortification. ILSI also houses the International Anaemia Advisory Group (INACG).
- INF (International Nutrition Foundation), a Boston, Massachusetts based organisation with activities that include nutrition and micronutrients advocacy, policy research and technical assistance in Central Asia since 1994.

Consultation goals and objectives

The goals of the consultation were to review the size and nature of the public health problem of iron deficiency in the Region and develop out-

lines for actions to address it. The consultation objectives were to:

- Familiarise participants with the situation regarding ID in the Region including its consequences in terms of economic losses, costs to health care systems and costs to individual health and cognitive development.
- Review the most recent guidelines and areas of technical consensus from international groups and other regions and consider their applicability or adaptability for use in the Region.
- Review new activities related to iron deficiency in the Region and judge applicability of lessons learned for other countries of the Region.
- Identify and set out measurable goals and potentially effective, affordable and sustainable interventions for the prevention and control of iron deficiency in pregnant women, young children and all women of childbearing age in the Region.
- Identify existing and potential partners within and outside the Region and outline how they can collaborate, support and assist in strengthening and accelerating national efforts to reduce and prevent iron deficiency in the Region and promote the adoption of improved complementary feeding practices.
- Present information on the current situation regarding complementary feeding and prevalence of iron deficiency anaemia in infants and young children; to progress the development of Guidelines on Complementary Feeding and Control of Iron Deficiency in 0–3 year olds with emphasis on the Central Asian Republics and the Former Soviet Union.²

The Structure of the Consultation Report

This document is based on the presentations, discussions and background papers presented during the consultation. It does not attempt to provide a full record of the presentations but rather to synthesise the information from these and other sources into sections that generally follow the consultation sessions. It concludes with actions recommended by the consultation group. The organisation of the report is as follows:

- Preliminary sections include an Executive Summary and Opening Statements at the Consultation by those representing UNICEF and WHO and Contents.

- Section one provides background information on the consultation, its goals participants an outline of the reports structure.
- Section two provides information on the nature of and general prevalence of iron deficiency anaemia globally and more specifically on the situation in the CEE/CIS Region, and outlines its causes and consequences relevant to pregnant women, women of childbearing age and children less than two years of age.
- Section three outlines the need and rationale behind an integrated strategy for control and prevention emphasizing multiple interventions (improved young child feeding practices, dietary education, fortification, supplementation, infection control, monitoring and linkage to other programmes). The section draws mainly from the sessions dealing with a new report on technical consensus concerning key issues related to iron deficiency anaemia. The section also draws from presentations by specialists on various anaemia related studies and interventions and provides background on an integrated the programmes to prevent and control anaemia currently being developed in five countries of the Region.
- Section four includes a WHO position paper on complementary feeding and control of iron deficiency in children under three year old in the European Region.
- Section five outlines the importance, relevance and potential of wheat flour fortification to make a major contribution in reducing iron deficiency /iron deficiency anaemia in the Region within the framework of an integrated strategy.
- Section six provides information on the continuing importance of the most widely used existing interventions of iron supplementation of high risk groups and also on the promotion of better dietary practices and behaviours among women for improved iron nutrition.
- Section seven outlines the consultation's recommendations on prevention and control of iron deficiency /iron deficiency anaemia for the CEE/CIS Region.
- Section eight provides references to publications and papers used to prepare for and presented to meeting participants.
- Section nine is the consultation agenda.
- Section nine is a list of participants with contact addresses.

Prevalence, Causes and Consequences of Iron Deficiency and Iron Deficiency Anaemia for Pregnant Women, Women of Childbearing Age and Children Less than Two Years of Age³

Healthy Iron Status

The iron status of the human body can be considered as a continuum with iron deficiency anaemia being at one end, resulting from a long term, negative iron balance. Normally, approximately 73 percent of the body's iron is incorporated into circulating haemoglobin and 12 percent in the storage complexes of ferritin and haemosiderin (found in the liver, spleen and bone marrow) Fifteen percent is incorporated into other iron-containing compounds, including enzymes of vital importance.⁴

To maintain good iron nutrition, humans need to replace iron lost through urine, stools and through the skin. Males have a basal iron loss of approximately .09 mg per day. Females average a daily loss of approximately 1.25 mg per day when basal losses and losses of menstrual blood are added together. During pregnancy menstrual losses do not occur, but women need approximately 1000 mg of iron overall during the full pregnancy period to make up increased blood volumes for the placenta and the foetus (about 6.3 mg per day in the third trimester).

Proportionately, infants need the highest amount of iron per kilogram of body weight to supply their rapidly expanding red cell mass and body tissue. Although infants need less iron than adults, they eat less. For the first four to six months of life, exclusive breastfeeding normally provides infants with sufficient amounts of highly bioavailable iron to complement the iron stores they received during foetal development. However, when breastfeeding is not then complemented by sufficient iron in highly

BOX ONE

Cut offs for WHO Definition of Anaemia

Age or Sex Group	Haemoglobin below (g/dl)	Haematocrit below (%)
Children 6–60 months	11.0	33
Children 5–11 years	11.5	34
Children 12–15 years	12.0	36
Non-pregnant women	12.0	36
Pregnant women	11.0	33
Men	13.0	39

Source: WHO

bioavailable forms haem-iron containing meats and iron fortified cereals, they are at greater risk than any other group of developing iron deficiency.

Iron Deficiency Anaemia

In the human body, when iron intake and absorption no longer meet the need of normal iron turnover and losses, and iron stores are exhausted then insufficient amounts of iron will be delivered to transferrin, the circulating transport protein for iron. This results in decreased transferrin saturation (less iron is contained in the iron binding sites), and transferrin receptors on tissue cell surfaces increase throughout the body. When the depletion is sufficient to affect haemoglobin synthesis, a state of iron deficiency anaemia results.

The mild, moderate and severe stages of iron deficiency anaemia each comprise a subset at the low end of the spectrum of iron status. (See Box one with the haemoglobin and haematocrit cut off levels defining anaemia).⁵

Evidence indicates that the prevalence of iron deficiency is double that of iron deficiency anaemia. When iron deficiency anaemia rates are above 50 percent in the group, the entire population group is likely to be iron deficient.⁶

Anaemia is the most common indicator used to screen for iron deficiency anaemia and this practice often results in the interchangeable use

BOX TWO

Definitions and Distinctions: Anaemia, Iron Deficiency and Iron Deficiency Anaemia

Anemia: Abnormally low haemoglobin level due to pathological condition(s). Iron deficiency is one of the most common, but not the only cause of anaemia. Other causes of anaemia include chronic infections, particularly malaria, hereditary haemoglobinopathies and other micronutrient deficiencies, particularly folic acid deficiency. It is worth noting that multiple causes of anaemia can coexist in an individual or in a population and contribute to the severity of the anaemia.

Iron Deficiency: Functional tissue iron deficiency and the absence of iron stores with or without anaemia. Iron deficiency is defined by abnormal iron biochemistry with or without the presence of anaemia. Iron deficiency is usually the result of inadequate bioavailable dietary iron, increased iron requirement during a period of rapid growth (pregnancy and infancy), and/or increased blood loss such as gastrointestinal bleeding due to hookworm or urinary blood loss due to schistosomiasis.

Iron Deficiency Anemia: Iron deficiency when sufficiently severe causes anaemia. Although some functional consequences may be observed in individuals who have iron deficiency without anaemia, cognitive impairment, decreased physical capacity, and reduced immunity are commonly associated with iron deficiency anaemia. In severe iron deficiency anaemia, capacity to maintain body temperature may also be reduced. Severe anaemia is also life threatening.

Source: R. Yip and S. Lynch (Iron Deficiency Anaemia Technical Consultation, UNICEF NY 7–9 October 1998).

of the terms “anaemia,” “iron deficiency,” and “iron deficiency anaemia.” This is incorrect, and many persons who are not yet suffering from iron deficiency anaemia have mild to moderate forms of iron deficiency where various cellular functions are impaired. Furthermore, some people may suffer from anaemia due to causes other than iron deficiency (See Box two).

Consequences of Iron Deficiency Anaemia

There are consequences of high rates of anaemia to the economic development of an area or country, just as there are both functional and developmental consequences to an individual and his or her immediate family.

Recently, new studies of the economic costs of anaemia have been completed indicating the massive cost burden of this disease and the cost effectiveness of reducing iron deficiency anaemia rates in children and women.⁸ Such studies consider lost productivity, health costs and lifetime costs related to the permanently impaired cognitive development of young children who develop iron deficiency anaemia.

In pregnant women, anaemia results in retardation of intrauterine growth, low birth weights, increased perinatal mortality and increased maternal mortality.⁹ For all types of persons, morbidity from infectious diseases is increased because anaemia adversely affects the immune system.¹⁰ Severe anaemia reduces the body's ability to monitor and regulate body temperature when exposed to cold. Iron deficiency can impair cognitive performance at all stages of life, and physical work capacity is significantly reduced.¹¹ Many studies show a relationship between iron deficiency and/or iron deficiency anaemia and reduced muscle function, physical activity, workplace and school productivity, mental acuity and concentration in older children and adults. Anaemic mothers are less able to care for their children at home. (See Box four).

Infants who become anaemic may suffer permanent impairment of cognitive development. Anaemia in young children has now been shown to correlate with lower cognitive test scores¹² with IQ tests showing a loss of 10–15 points. These effects do not improve when the anaemia is corrected or in later years. Iron deficient children are also more susceptible to poisoning from heavy metals (including lead).¹³

The overall effect of high levels of anaemia in children and women in a society affect its potential for technological advancement. They reflect a lack of determination by national leaders to assure the fulfillment of basic child right to adequate nutrition.

BOX THREE

Iron Deficiency Is Costly and its Prevention is Highly Cost Efficient

The WHO/World Bank-supported analysis of the Global Burden of Disease ranked iron deficiency anaemia as the third leading cause of loss of *disability-adjusted life years* (DALYs) for females aged 15–44 across the globe. Among men in this age group, iron deficiency anaemia is ranked among the top 10 disease burdens globally, reflecting the debilitating effects of anaemia even in this group. This factor was more important globally than war-related death and disability, and nearly as important as the global scourge of tuberculosis.

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Using different but equally compelling criteria, USAID produced a 1994 analysis estimating that in South Asia, a two-thirds reduction in anaemia would result in a US\$ 3.2 billion increase in agricultural production over the seven-year period 1994–2000.

On the effectiveness of education that analysis noted, “control of iron deficiency anaemia improves attitudes, capacity to concentrate, and school attendance.” While cost analyses are normally highly specific to site, situation, and specific programme goals, such studies can often allow useful comparison of various interventions.

Continued on next page

The USAID paper used World Bank data to compare various micronutrient programmes in terms of productivity and found that all interventions were cost-effective. Iron fortification was found to be second in terms of dollars gained for each dollar spent.

A recent paper prepared by the Micronutrient Initiative on the *Economic Consequences of Iron Deficiency* analysed relationships between anaemia and several economically quantifiable factors including:

- Lower future productivity of children,
- Lower current productivity of adults,
- Costs for care of low birth weight and premature infants,
- Costs of maternal mortality,
- Other consequences on growth,
- Decreases in immunity and increased absenteeism due to infectious disease,
- Increases in morbidity and mortality,
- Greater susceptibility to heavy metal toxicity,

Source: "Preventing Iron Deficiency in Women and Children: Background and Consensus on Key Technical Issues" UNICEF/WHO/UNU//MI, 7-9 October 1998; MI, Ottawa, Canada, in Press

Magnitude of the Problem

Global prevalence

Approximately two billion people in the world suffer from anaemia — that is one third of the world's population. It is believed that anaemia is caused by iron deficiency in the majority of these people, making iron deficiency the most prevalent micronutrient deficiency globally—more prevalent than vitamin A or iodine deficiency disorders.

There are major gaps in the various sources of information on this problem. However, as referred to above, estimates of the prevalence rates of iron deficiency anaemia at national, regional and global levels often use rates of anaemia as a proxy. For example, the iron deficiency section of the WHO Global Database, *Micronutrient Deficiency Information System (MDIS)*, focuses on pregnant women and preschool children. The majority of the data relate to anaemia rather than specifically to iron deficiency anaemia.

Although its damage is more heavily felt in the developing countries

(especially those of sub-Saharan Africa and South East Asia), where its links with poverty are more visible, iron deficiency anaemia and anaemia exist in every country of the world. The prevalence of anaemia in pre-school children is around five percent in North America and in Western Europe; the prevalence among these children in Eastern Europe is much higher (49% anaemia).¹⁴

In industrialised countries, the prevalence ranges from five to 16 percent. They are lowest in Western Europe (5% anaemic); North America (10% anaemic) and the highest is Eastern Europe (16% anaemic). In non-industrialised countries, 30% to 60% of non-pregnant women are anaemic with the highest rates in Asia and Africa. While iron deficiency is the main cause of anaemia in industrialised countries, in non-industrialised countries other factors such as malaria and parasitic infections (hookworm) often play a role.

According to the WHO database, in industrialised countries, the most affected groups are pregnant women (18% anaemic), school children (17% anaemic), non-pregnant women and the elderly, (both 12% anaemic). In the non-industrialised countries, the most affected population groups are pregnant women and school-aged children (both 53% anaemic), non-pregnant women (44% anaemic), preschool children (42% anaemic) and the elderly (51% anaemic).

The prevalence of anaemia is low for adult males in industrialised countries (4.7% anaemic), but in non-industrialised countries, no less than 1/3 of the adult males are anaemic.

Anaemia in the CEE/CIS/BS countries

The overwhelming majority of anaemia reported in the CEE/CIS/BS countries is believed to be a result of iron deficiency, and this was accepted as the basis for consultation discussions to reduce anaemia in the Region, as reflected in this report. There are also major gaps in the data on the prevalence rates of iron deficiency anaemia in the 27 countries of the CEE/CIS/BS Region and there are considerable differences among them. However, evidence provided by the Ministries of Health of these countries and from several research studies suggests that the iron deficiency anaemia prevalence among young children, women and pregnant women are high in many areas. In some countries in Central Asia and most likely in many oblasts of the Russian Federation approximately one out of every two children less than five years old and a similar proportion

of pregnant women, suffers the effects of iron deficiency anaemia. As noted previously, the incidence of iron deficiency is normally twice that of iron deficiency anaemia, meaning that nearly all members of these groups are iron deficient.

The size of the iron deficiency anaemia problem, and its impact on human and economic development, productivity and health should place it high on the agenda for public health interventions in these countries. However, until recently, there were no organised programmes to prevent iron deficiency anaemia in children, youth or non-pregnant women. In almost every case, the public health services of these countries continue to treat iron deficiency anaemia as a clinical issue and focus on treatment rather than prevention.

Despite some gaps in the information available on anaemia prevalence for some CEE/CIS/BS countries, considerable information is available from other countries in the region, which can be used to determine prevalence levels and in some cases to determine the causes of anaemia and iron deficiency anaemia as well. For example:

- In 1988 a nutrition survey by the Kazakhstan Institute of Nutrition in four regions of that country found 60 percent of non-pregnant and non-lactating women and 60 to 80 percent of pregnant women be anaemic, based on haemoglobin and haematocrit measurements.
- UNICEF assessments of the situation of children and women in Kazakhstan, the Kyrgyz Republic, Turkmenistan and Uzbekistan in 1992 and in Tajikistan in 1993 all found data from the Ministries of Health and other sources reporting high and increasing anaemia rates for women, and to some extent for children.
- Discussions by UNICEF staff with a variety of national health officials and researchers found anaemia rates to be anecdotally correlated with a variety of factors, ranging from physiological effects of environmental pollution, especially nitrates and insecticides (through over use of these substances for crop production and their eventual permeation of the food chain), to radiation (in the Semipalitinsk area where nuclear weapons testing had previously taken place). There is little objective evidence to substantiate these opinions.
- Other national health authorities have related high anaemia rates to issues such as low rates of *exclusive* breastfeeding (despite the wide-

spread practice of breastfeeding of infants to and beyond one year); the use of cow's milk and tea as early breastmilk supplements; poor diets of mothers (based on economic circumstances), the frequent use of tea (an inhibitor of absorption of foods with non-haem iron), and shortages of iron supplements for pregnant women.

- In 1993 a study by the Republican Research Centre of Maternal and Child Health of Kazakhstan (*Anaemia in Pregnant Women in Kazakhstan*) found that anaemia rates among pregnant women had increased more than six times in 13 years – from 6.6% in 1979–1980 to 40.2% in 1993.
- In 1993 a study by the Kazakhstan Institute of Nutrition reported that consumption of fruits, vegetables and meats had significantly decreased between 1990 and 1993 in that country. This finding meant there were both lower consumption of foods rich in haem and non-haem iron and of foods that enhanced the absorption of non-haem iron (foods rich in Vitamin C and haem iron). Additional studies funded by the World Bank in the Kyrgyz Republic¹⁵ and by CARE International in Tajikistan provided data confirming high anaemia rates in women.¹⁶
- A 1993 study by CrossLink International in the Muynak District of Uzbekistan found a prevalence of over 60 percent for anaemia in women of reproductive age and rates of approximately 80 percent for children less than three years of age. Correspondingly low serum levels of iron and ferritin found in this study led to the conclusion that iron deficiency was the major cause of anaemia among women and young children in that area.¹⁷
- The Demographic and Health Surveys in Kazakhstan (1995), Uzbekistan (1996) and the Kyrgyz Republic (1997) determined anaemia levels among women 15–49 years old and children less than three years olds. Anaemia levels among these women were 49 percent in Kazakhstan, 60 percent in Uzbekistan and 40 percent in the Kyrgyz Republic. Approximately one percent of these women had severe anaemia. In Kazakhstan, 69 percent of the children less than three years of age suffered from anaemia. In Uzbekistan and the Kyrgyz Republic, the percentages of children among this age groups suffering from anaemia were 61 and 50 percent, respectively.

- A UNICEF study on health and nutrition in Armenia carried out by the Institute of Nutrition of Italy found levels of anaemia among non-pregnant women, 15 to 49 years of age to be approximately 14 percent and approximately 18 percent for children 6–59 months of age.
- The Ministry of Health of Azerbaijan reported anaemia levels of 36 percent among non-pregnant women, 15 to 49 years of age, and 66 percent among children less than five years of age from a survey that was carried out by WHO/UNICEF and CDC.
- The level of anaemia reported for children in Bosnia and Herzegovina was 26 percent (see chapter 3 of the draft WHO/UNICEF publication “Guidelines on Complementary Feeding and Control of Iron Deficiency for 0–3 year olds, with emphasis on the Central Asian Republics and Former Soviet Countries,” available from WHO EURO in Copenhagen, Denmark).
- In the Russian Federation a longitudinal study carried out by researchers from the University of North Carolina at Chapel Hill¹⁸ with colleagues from Russian academic and government institutions found that the total dietary iron among the women in the study group was about two-thirds of the recommended level. Less than an eighth of total iron consumed was haem iron. When corrected for the intake of enhancers and inhibitors of iron absorption, the estimated absorbable iron was less than 0.5 milligrams a day. Consumption of inhibitors in grain products, tea and other foods was estimated to limit absorption to only 42 percent of the otherwise available iron. According to that study, the intake of usable iron among young women fell by eight percent between 1992–1993. Overall, children’s intake was less than the amount believed needed for adequate growth and optimal health. It was especially low during the summer months. Children from families with incomes below the poverty line tended to have lower iron intakes than children in better-off households.
- An investigation by UNICEF staff in late 1998 found that in the Russian Federation there were no specific guidelines for medical practitioners on the prevention and control of iron deficiency anaemia. Medical workers deal with anaemia as a clinical condition when found and treat it accordingly. The investigation found no examples of a public health approach to iron deficiency in Russia.

Causes and Factors related to Anaemia General Causes:

The most common cause of anaemia appears to be diet-related iron deficiency anaemia which is generally an insufficient quantity of dietary iron to meet the enhanced needs during specific life phases (infancy and young childhood, adolescence, and pregnancy). This deficiency is caused by consumption of low levels of iron in the diet, and/or low bioavailability of the iron that is in the diet (for example, due to the form of iron, the presence of high levels of absorption inhibitors, the lack of absorption enhancers).

In addition to these diet-related causes, iron deficiency in women of childbearing age is also associated with repeated pregnancies, bleeding associated with use of intrauterine devices (IUDs) for birth control and excessive menstrual bleeding.

Infections with helminths causing chronic blood loss (hookworm, schistosomiasis, and to a much lesser degree, trichuris) are another major cause of iron deficiency anaemia in areas where such infections are endemic. Other pathological blood losses (e.g., haemorrhoids, peptic ulcer, and other less common gastrointestinal diseases and malignancies) can also contribute to iron deficiency anaemia, as can processes that impair iron absorption and use: (e.g. malabsorption syndromes, chronic and/or repeated diarrhoea and rare genetic conditions).

The consequences of low socio-economic status that effectively raise anaemia rates include a lack of food security, inadequate or lack of access to health care and poor environmental sanitation and personal hygiene. Some genetic causes of anaemia are sickle cell disease, thalassaemia major and other haemoglobinopathies.

Causes of anaemia in the countries of CEE/CIS/BS Region

Several factors are thought to contribute to the current high levels of anaemia in the CEE/CIS/BS countries. While additional investigations are needed to understand the specific causes, some of these are likely to be common to particular population groups who live across large areas of the Region.

Iron Deficiency Anaemia in Women

The diets of many women in these countries do not make up for the iron they lose during menstruation. When this occurs over time a woman moves away from healthy iron status — first to a state of low iron re-

serves, then to iron deficiency and eventually to iron deficiency anaemia. Although the condition of pregnancy temporarily eliminates the iron losses from menstruation, it also significantly increases a woman's need for iron in order to support placental and foetal development and increased plasma volumes. If a woman enters pregnancy with low iron stores or in a state of iron deficiency it is most likely that she will become anaemic during her pregnancy. Even those pregnant women who receive and take iron supplements daily may not avoid this dangerous condition.

As noted previously, the 1993 study by CrossLink International in the Muynak District of Uzbekistan that found over 60 percent anaemia levels in women of reproductive age and levels of approximately 80 percent for children less than three years of age found correspondingly low serum levels of iron and ferritin leading to the conclusion that iron deficiency was the major cause of anaemia in this population group that appears to be similar in many respects to those in large parts of many other countries in Central Asia and Russia. However, factors ranging from environmental pollution with agricultural chemicals, to radiation, to various forms of infection, and to genetic factors in these populations are all speculated upon by some national and international specialists as causes for the high rates of anaemia in women in parts of these countries. WHO EURO called for additional assessments to be done to determine the causes of anaemia in women in countries within the Region.

Iron Deficiency Anaemia in Children

WHO EURO recently investigated feeding practices of children less than three years of age in the countries of the former Soviet Union and developed a position paper outlining major problems and providing recommendations intended to improve iron nutrition in this age group (see Section four for additional detail).

The causes of iron deficiency /iron deficiency anaemia in young children include the following:

- The early introduction of inappropriate breast milk substitutes and the late introduction of complimentary foods with high iron content and low bioavailablility (see section four for details);
- The increased iron needs related to rapid growth;
- Low iron stores at birth (due to low birth weight, umbilical clamping of the cord before placental blood was fully transferred to the new born);

Contributing to iron deficiency anaemia in young children in these countries are low rates of exclusive breastfeeding. Although many mothers breastfeed for up to and sometimes beyond one year, the practice of exclusive breastfeeding for four to six months is rare. Despite substantial work during the 1990s to promote breastfeeding through education of medical staff and to initiate Baby Friendly Hospitals, throughout the Region, most national authorities as well as officials of WHO and UNICEF suggest that much more needs to be done before exclusive breastfeeding becomes the common standard of infant feeding during their first four to six months of life (Infants born of mothers with iron deficiency anaemia are more likely to have low iron stores and to require more iron than can be supplied by breastmilk at a younger age).¹⁹

BOX FOUR		
Iron Bioavailability: Breastmilk vs. Cows' Milk		
	Iron content	Absorption
Breast milk	0.8 mg	50%
Cow's Milk	0.6 mg	10%

A related problem is the common use of cows' milk with much less absorbable iron (See Box four) as a complementary food or substitute for breastmilk. Early introduction of cow's milk also results in gastro-intestinal micro bleeding and therefore exacerbates the degree of iron deficiency anaemia and frequently has a negative effect on breastfeeding. Where infant formula must be used, it should be fortified with iron.

The situation is further affected by traditional dietary practices that include giving young children at and between meals tea and breads made with flour that includes high levels of the wheat husks. The teas most commonly used in these countries contain polyphenols that inhibit the absorption of the non-haem iron contained in cereals. Similarly, the wheat husks contained in these common flours contain phytates that also inhibit absorption of iron contained in wheat.

During the rapid growth of infancy and young childhood, children need to receive and absorb iron in greater quantities in proportion to their weight and normal dietary intake than during other periods of their life.⁷

In large portions of the populations of many countries of the CEE/CIS/BS Region, the current diets of older infants and young children do not result in sufficient quantities of iron being consumed and/or absorbed. Based on available information, an additional reason for this appears to be the difficult economic conditions that affect the food choices of many families.

The overall economic problems in these countries have affected food choices by lowering family purchasing power. Related factors include the decline in overall agricultural productivity in many of these countries and recent major problems in food distribution. Studies in Russia and Kazakhstan in the late 1980s and early 1990s found trends of lower meat consumption by families and that these changes in diet were based mainly on economic factors.

Although meat is a traditional staple in the countries of this Region, the issues noted above commonly contribute to young children's diets having low amounts of this type of food with its highly absorbable haem iron (liver, other meats and fish). Absence of meat in a meal, also removes the iron absorption enhancing quality of haem iron. This in turn lowers the bioavailability of the non-haem iron contained in cereals that are consumed.

Food costs and distribution problems, lower family purchasing power, traditional dietary characteristics of some groups and incorrect or outdated recommendations on the feeding of young children may all contribute to low consumption by children of foods containing substances such as Vitamin C, that, like the haem iron in meat, enhances the absorption of non haem iron found in commonly eaten cereal based foods (breads, noodles, pasta).

Another factor contributing to higher rates of anaemia in the Caucasus and in Turkey is the genetic condition of thalassaemia.²⁰

SECTION THREE

The Need for an Integrated Strategy to Prevent and Control Iron Deficiency Anaemia in the Countries of the CEE/CIS/BS

At the World Summit for Children in 1990 and at the International Conference on Nutrition in Rome in 1992, national leaders committed their countries to set up national actions to reduce micronutrient deficiencies during the 1990s. Economic analysis shows that iron deficiency anaemia can be prevented at low cost. This fact along with new information on the consequences of this disease should support a renewed call for national leaders to meet these commitments.

Despite promising trials of improved packages of interventions, little progress has been made during the past decade in reducing iron deficiency anaemia on a global scale. Part of the reason may be that iron deficiency has few overt symptoms that are easily recognised. One such terrible and unrecognized consequence of iron deficiency anaemia is the serious and often permanent cognitive impairment of young children, which has only been well established in the past two years. Even the overall negative health and productivity impacts of iron deficiency on all people, especially children under the age of five and pregnant women, is not well known by many public health officials and planners.

Development of new national programmes to control and prevent iron deficiency is often constrained by the common but erroneous perceptions that effective, practical and locally appropriate and affordable interventions are not available. Another serious constraint on development of programmes to address iron deficiency anaemia in the CEE/CIS/BS countries is the shortage of nutrition officials and technical resources available in many national health services and the current emphasis on other nutrition problems.

A related constraint, common among the countries in the Region is

the small number of officials and specialists in Ministries of Health assigned to work on nutrition in general and micronutrients in particular. This situation has grown worse as departments have been seriously downsized as part of health reform processes. In recent years most countries' nutrition related programmes have been oriented toward development of national nutrition policies, food safety, household food security, elimination of iodine deficiency disorders and promotion of improved breastfeeding practices. While officials are aware of anaemia, it is mainly seen as a problem of pregnant women that should be dealt with by providing those who are anaemic with oral iron supplements. Despite an interest in a more comprehensive strategy to reduce the prevalence of iron deficiency anaemia, most Ministries of Health in the Region are short of the staff needed to develop and manage another nutrition initiative. Noted at the consultation as well was the fact that UNICEF offices in the Region do not have posts for nutrition programme officers, much less for an officer specialising in the assistance to a country in the development of iron deficiency interventions.

Despite national and international commitments to reduce iron deficiency having been stated throughout the decade, constraints such as those noted above created the current situation where a new millennium is approaching with too little being done in this Region of the world about a serious and growing, but correctable, health and development problem for children and women. As stated by UNICEF at the consultation, this is also a matter of basic human and child rights.

Programmes aimed at improving iron nutrition need to obtain the support and understanding at the highest governmental levels and should be justified from the joint perspectives of economic significance, public health benefits, a response to individual needs and the importance of such programmes as a matter of basic human rights. The involvement of communities and the general population should be stressed in programme designs.

Those at the consultation representing international agencies, donors and technical assistance organisations made clear that there was, in fact, considerable support available to bring technical assistance from both within the countries and from outside the Region to assist national Ministries of Health and other organisations to develop new, expanded, and/or accelerated programmes to reduce iron deficiency among vulnerable population groups. There was major consensus that the best approach to

be taken should use an integrated package of interventions and involve a wide coalition of national organisations and relevant groups.

The Major Strategic Components of Programmes to Prevent and Control Iron Deficiency /Iron Deficiency Anaemia in CEE/CIS/BS Countries

The national approach consistently endorsed by all the major international agencies, the UN/ACC Sub Committee on Nutrition and many other groups and projects working to reduce and prevent iron deficiency calls for the integration of several intervention strategies into long term programmes. Because of the high levels of anaemia found in infants and young children, and problems related to their feeding in several countries in this Region, the consultation participants led by WHO EURO agreed that improving complementary feeding practices for children under three should be emphasised in all efforts to prevent and control iron deficiency anaemia in the countries of the Region.

The major interventions to prevent and control iron deficiency anaemia in the CEE/CIS Region were seen to include strategies and structured activities to achieve all of the following:

- **Improve complementary feeding practices of children 0 to three years old.**
- **Educate, inform and motivate women (and adolescents) on how to improve their diets and those of young children to increase iron intake and absorption.**
- **Introduce and promote fortification of appropriate staple foods, basic foods, and value-added foods with iron (and other appropriate micronutrients).**
- **Supplement all members of vulnerable groups with iron folate tablets or suspension (for children less than one year of age), at the least where the prevalence of anaemia in pregnant women is 40 percent or higher.**
- **Correct other nutrient deficiencies leading to anaemia.**
- **Reduce the incidence, prevalence and/or severity of infections influencing iron status (hookworm and schistosomiasis) and anaemia (malaria) where such infections are prevalent.**

- **Monitor and document all major strategies and interventions** using appropriate methods and mechanisms to adjust strategies toward greater effectiveness and sustainability,
- **Link intervention strategies to related health and nutrition programmes** (e.g. family planning, breastfeeding promotion, complementary feeding, reproductive health, IMCI).

A wide partnership is needed for new programmes

Advocacy efforts need to be developed and directed at the highest national political officials. Initially, clearly defined and well-resourced commitments are needed from national governments, donors, NGOs and the groups that can provide technical assistance, in order that new programmes to prevent iron deficiency in women and children could quickly be developed in the Region.

Within the framework above, the consultation participants agreed that countries in the CEE/CIS/BS Region should develop appropriate combinations of intervention strategies that lead toward the permanent, affordable and sustainable prevention of iron deficiency anaemia in vulnerable population groups. Involvement of many partners in addition to Ministries of Health was seen as a critical characteristic of successful programme planning as well.

For example, the food processing industry and food standards agencies are key partners in the introduction of fortified wheat flour and the mass media is a key partners in promotion and education efforts associated with improving diets, promoting breastfeeding, improved complementary feeding practices and compliance with supplementation protocols. Ministries of Education may have strong roles in supplements distribution, education for dietary change and food fortification in institutions.

Consultation participants also called for the development of new materials such as a comprehensive textbook and medical worker guide on anaemia, its causes, consequences, treatment, prevention and control, for distribution to medical schools and health training institutions throughout the Region. National institutions dealing with nutrition should develop such materials as quickly as possible.

Integration of all interventions is critical to reducing iron deficiency anaemia across groups

The importance of an integrated approach for the countries of the Region was stressed throughout the Geneva consultation. It was agreed that multiple approaches are needed and that no one single approach can eliminate the problem of iron deficiency anaemia in all of the vulnerable groups in a population. Programme planners should use all that can apply.

For example, dietary improvement will follow improvement in economic status, only if there is a better understanding of the causes of anaemia. This will involve strategies and activities to dispel current myths and to develop and put into effect new national dietary guidelines for adults, infants and young children. At the same time, fortification can help to improve the baseline iron status for the population and supplementation can be used to address the iron needs of high-risk sub-populations.

Experts with experience in developing programmes to prevent and control iron deficiency anaemia agreed that a major accomplishment of this consultation was the decision by participants not to try and decide on one or another strategy of the intervention strategies as being the most important.

Target Groups

New programmes should focus on the most vulnerable groups, especially:

- Pregnant women.
- Women of childbearing age.
- Infants and young children.
- Adolescent girls.

Monitoring, Evaluation and Information Sharing

New interventions to prevent and control iron deficiency and iron deficiency anaemia need to be monitored and their impact evaluated. To support integrated approaches to preventing and controlling iron deficiency anaemia, a regionally oriented mechanism is needed that facilitates sharing country-level lessons learned, relevant regional activities,

useful technical information from national and international levels and sources of various forms of international support.

National experts and programme officers of agencies attending the consultation, requested information related to iron deficiency anaemia which included the following::

- Effective activities, strategies and IEC materials to support improved complementary feeding and dietary guidelines and the promotion of supplementation.
- Technical innovations (and local adaptations) for setting up flour fortification equipment in new and older mills.
- Procedures for quality control of fortification, (mill level, consumer level).
- Sources of supplements including regional sources of iron supplements for infants.
- Rapid methods and study designs for measuring the effects of fortification in populations.
- Lessons learned and effective strategies for programme operations and resource requirements.
- International sources of technical and research support.

A Regional Example of the Integrated Approach: The CARK Anaemia Prevention and Control Programme

At the national level and in most subnational areas, the mix of strategies required to prevent and control iron deficiency will need to be phased in over time. How this occurs should be based on the local situation according to the severity of the problem, aetiological factors, resources, bureaucratic factors, socio-cultural conditions, the availability of managers and specialists to carry out various technical work, etc. However, within this phased approach, the major strategies should be integrated into a single multidimensional programme. Phasing should not be used as an excuse to only work on one type of intervention for prolonged periods. An integrated, phased approach was used successfully in developing plans for the Anaemia Prevention and Control Programme in the Central Asian Republic and Kazakhstan (CARK). A synopsis of how this programme was developing was presented at the consultation.

In 1996, the Kazakhstan Institute of Nutrition, together with UNDP, UNICEF, UNU and WHO called together leading nutrition specialists from the four republics in Central Asia and Kazakhstan to review a draft of the *National Nutrition Policy for Kazakhstan* with a goal of having similar policies developed by each country in the area.²¹ One result of this conference was a CARK area-wide *Nutrition Action Plan for the Central Asian Republics in the Context of Primary Health Care*. Regarding anaemia, this Action Plan called for development of national, integrated programmes to prevent and control anaemia that included the standard elements of:

- Nutrition education aimed at dietary modification.
- Fortification of cereal flours with iron.
- An expanded programme of preventive iron supplementation (weekly doses) to include all women of childbearing age.
- Appropriate monitoring and research.

The goal was to reduce high levels of anaemia among risk groups quickly, with a strong emphasis on helping improve the iron status of women *before* they came into pregnancy.

The Action Plan also included advocacy activities aimed at policy makers, a strong nutrition education component and linkage to related public health activities in the country.

Other sections of the Action Plan called for promotion of breastfeeding and the Baby Friendly Hospital Initiative (BFHI), improved food safety and food labeling, and elimination of iodine deficiency disorders through universal iodisation of edible salt.

During this conference, the Kyrgyz Republic presented its initial experience in fortifying wheat flour. Despite problems this initiative had led national specialists in the other four republics and some oblast officials to consider the option of fortifying flour with iron (in 1996, a Presidential Decree in Turkmenistan called for flour fortification with iron to be initiated in the country's major mills).²²

Regarding supplementation, the Nutrition Action Plan followed the 1996 recommendations of the WHO and UNICEF Joint Committee on Health Policies (JCHP) that called for universal, untargeted iron supplement distribution where the prevalence of anaemia in given groups was at least 30 per cent.²³ With anaemia prevalence for women and children

in these countries above this criterion, a major supplementation strategy was clearly called for in Central Asia.

A technical draft of an Anaemia Prevention and Control (APC) strategy for CARK countries outlining the situation and proposing this integrated strategy was developed by the Kazakhstan Institute of Nutrition (KIN) and UNICEF with support from the INF.

Concerns about supplementation effectiveness when carried out on a large scale, costs and sustainability led to a plan that phases the development and introduction of the APC programme over a period of five to eight years with the initial phase devoted to advocacy and national research. The APC programme draft was presented to the Iron Working Group of the UN/ACC Sub Committee on Nutrition in Kathmandu, Nepal at its 1997 the annual meeting (See Box five)

One major factor that constrained earlier efforts by donors to advocate for expanding actions to reduce iron deficiency anaemia was the widespread concern about the common problems of non-compliance in taking oral supplements (and administering them to young children). There are well known arguments that a large, unsupervised supplements-based programme has never proven effective in reducing anaemia.²⁴ Those planning the APC programme for Central Asia reviewed the common factors identified as influencing poor supplementation compliance in the context of what was known about the health systems and populations there. When reviewed in the context of the medical services and populations of Central Asia, many factors negatively affecting compliance seem surmountable by setting up and carrying through a well-designed, integrated iron deficiency anaemia prevention and control programme (See Box six).

An expanded strategy of iron supplementation was found to be potentially effective in the context of the integrated approach. However, national refusal to cooperate on a programme using daily supplementation, and promising results in the literature on the use of weekly supplementation protocols led to a six month study of the efficacy of weekly supplementation. Children under one years of age, pregnant women and women of child bearing age were the study groups. The effectiveness of weekly supplementation was scheduled for evaluation as part of the programme during it expansion to oblast size. The approach was also reviewed and approved by the UNICEF Nutrition Section in New York.

The CARK APC programmes began field operations in 1995 and included four phases:

BOX FIVE

Comments of the SCN Working Group On the CARK APC Programme Plan

"... the UNICEF Area office for the Central Asian Republics and Kazakhstan (CARK AO) raised the problem of iron deficiency anaemia to the level of a "public health crisis." There was a consensus that an emergency approach was warranted, given the reported levels of iron deficiency anaemia in children (about 60%) and mothers (about 80%) reported in Demographic and Health Surveys in two of these countries (Kazakhstan and Uzbekistan) and similar but more limited data in the other three (Turkmenistan, Kyrgyz Republic and Tajikistan).

The point was made that it is unconscionable to let anaemia continue at the rates that exist in these countries when the resources and skills to prevent it are available... The proposed response will be major programmes of cereal fortification, iron supplementation, nutrition education and social mobilisation for improved meal composition. Based on the extensive PHC facility system, high levels of literacy and well-trained health cadres in these countries, the effort will be phased-in on a national scale. Iron supplementation of vulnerable groups will follow weekly protocols and the results will be closely monitored. Working group members were surprised by the extent of the problem in these countries."

Source: Report of the SCN Working Group in Iron, Nepal 1996, SCN Secretariat Geneva, Switzerland

- I. *Completion of required research on weekly supplementation and trials on fortification, development of the APC Programme Strategy and preparations for subnational implementation.*
- II. *Implementation in five subnational areas of education/supplementation components with ongoing assessment and networking of lessons learned leading to strategy improvements.*
- III. *National expansion (based on successful progress in Oblasts and securing of additional funds.*
- IV. *Assessment and documentation.*

BOX SIX

General Factors Affecting Compliance with Iron Supplementation Reviewed in the Context of Central Asia

General Constraints on Supplementation Success

Lack of knowledge and concern about anaemia

Individuals do not perceive themselves to be ill

Forgetfulness or lack of motivation to take a supplement frequently (daily) and over a long period

Dose-related gastro intestinal side effects (nausea, diarrhoea, constipation, gastric discomfort)

Factors related to General Constraints in the Central Asian Republics and Kazakhstan

There is strong knowledge and concern about anaemia in the health community and broad familiarity in the general populations that are highly literate and medical service oriented.

There is likely a poor perception of illnesses related to anaemia, particularly among women and young children. To address this will require public education both to understand and recognise the signs of anaemia, and, more importantly, to understand the large risk of anaemia and its consequences. The channels for such education are available and open.

If weekly supplementation protocols are established coupled to national/area education campaigns aimed at instilling a strong motivation to take the pill, and side effects are effectively reduced, then compliance should be significantly increased. Research and adaptive design on this issue can be undertaken simultaneously with initiation of a subnational programme thereby providing lessons learned for further adaptation before national implementation is attempted.

Side effects should be significantly reduced by a weekly supplementation protocol because there is less chance of iron overload in stomach and intestinal tissues.

continued

<p>Unacceptable colour, taste or other characteristic of the supplement</p>	<p>The CrossLink International study did not identify the taste or colour of the supplement as having any negative effect on compliance. However, the acceptability of an oral suspension for use in supplementing children under one year old needed testing (crushed 1/2 60 mg tablet mixed with weaning foods may be more acceptable and far less expensive).</p>
<p>Fear that the supplement is a contraceptive</p>	<p>Given the education level of the population, there is little chance that iron supplementation tablets will be confused with contraceptives or be seen as having a contraceptive effect.</p>
<p>Lack of supportive education and counselling</p>	<p>Good counselling and education need to be an integral part of all anaemia prevention and control programmes, extending well beyond attempts to achieve high compliance with supplementation to include improved dietary management, better breastfeeding practices, avoidance of iron absorption inhibitors, etc.</p>
<p>Lack of compliance by functionaries to their work protocol</p>	<p>Poor compliance with work protocols by PHC level staff in Central Asia is not foreseen as a major problem, based on experience of working with the health care system. Such an effort will require clear instructions and a strong and clear training strategy for staff and pre-service for health professionals and paraprofessionals.</p>
<p>Poor distribution and/or supply of a supplement to delivery outlets</p>	<p>As proven throughout Central Asia, the drug distribution systems can be effective and monitored to PHC level (ARI/ CDD Drugs, essential drug kits and EPI Vaccines). However, with girls and women of childbearing age included, alternative channels ranging from high schools to traditional groups, women-to-women groups and work place focal points need to be identified for pill distribution and counselling/education.</p>

*Oblast and rayon level workshops at subnational areas.

In the first phase (June 1997–July 1998), a study tested the efficacy and effectiveness of weekly iron plus folate supplements for children less than two years of age, women of childbearing age and pregnant women in an area of Kazakhstan with high levels of anaemia in all three groups. Simultaneously programme planning and development of training and nutrition education materials were completed. Advocacy and trials related to flour fortification went on throughout this phase along with work in breastfeeding and BFHI.

In July 1998 the CARK APC Programmes went into a phases of subnational implementation beginning in one Oblast of Kazakhstan. By late 1999, based on ongoing monitoring of Oblast level efforts in all five countries, recommendations will be made to authorities concerning the national level programmes.

In keeping with recommendations of the UN/ACC SCN and other groups, the CARK APC programmes include simultaneous efforts to initiate area-wide fortification of wheat flour with iron and folate, supplementation of young children and all women of childbearing age, orientation and education of clients and ongoing monitoring and adjustment of the initial activities and methods.

Highlights of the CARK APC Programmes in 1998–early 1999 included:

- Development/printing of communication packages.
- Provision of drug supplies (iron folate supplements) (one year).
- Area-wide training of trainers workshop (Kyzylorda, Kazakhstan).
- Early assessment and programme adjustments (Kazakhstan and Kyrgyz Republic).
- Ministry of Health and KIN letters reinforcing the programme and an APC Programme Newsletter across five countries.

Social and environmental factors in favour of efforts to prevent iron deficiency/iron deficiency anaemia in this Region

As identified during planning of the APC Programme in the CARK countries, there are several other characteristics of these countries and other countries in the Region that should give well planned and executed iron deficiency anaemia prevention and control programmes a good chance of success.

Meat is a traditional and preferred dietary staple

While economic constraints have curtailed the amounts of meat eaten by many families, there are few major religious or cultural restrictions that restrict consumption of this rich dietary source of iron.

Children come first at the family table

Unlike cultural practices in many societies there are no major groups in the CEE/CIS/CE countries whose traditions cause females or children to receive less iron rich food than male or adult family members. Across the societies of these countries, regardless of economic status, families tend give priority in terms of food quality and quantity to the children, both girls and boys.

High education and literacy facilitates nutrition education

High education rates among the great majority of people, both men and women, in these populations result in a widespread awareness of iron deficiency anaemia and that this condition is a problem. The high literacy rates add potency to the use of mass media and written materials aimed at promoting better iron nutrition based on new guidelines for infant feeding and dietary education of adults.

Good access to PHC Services and a working medicine distribution system

Unlike many other regions, access to primary health care remains high in these countries. The ability of the PHC systems and private sector pharmacies to distribute basic drugs, including iron supplements, to most of the populations has been demonstrated. Unfortunately there is poor understanding by the PHC staff of the causes of anaemia and they can often exacerbate the problem by giving the wrong advice. Therefore continuing education of PHC staff is needed.

High consumption of wheat flour and high percentage of central processing of wheat

Wheat flour is a staple food and most wheat flour is processed in large mills. These factors make the fortification of wheat flour an excellent strategic component in improving iron nutrition in the CARK area. Circumstances are even more favourable in the more developed countries in this Region.

The situation throughout the Region has good potential for successful programmes compared to those countries where, for example, children

and women are the last members of the family to receive meat if meat is eaten at all, where illiteracy remains high, where there are no centrally processed staple foods suitable for fortification with iron or where the primary care system cannot effectively deliver the logistical and distribution sides of supplementation.

The most productive approach will be to invest in efforts that can eventually assure effectiveness of large-scale programmes. If developed properly, programmes to prevent and control iron deficiency /iron deficiency anaemia can also be used to improve the status of other micronutrients as well.

Improving Complementary Feeding: A Key Strategy to Improve Health and Control Iron Deficiency in Young Children

A major topic of the consultation was the importance of healthy complementary feeding of children under three years old in the Region. A group from WHO presented a “*WHO Position Paper on Complementary Feeding and Control of Iron Deficiency in Under Three Year Olds in the European Region.*” In addition a draft of “*WHO/UNICEF Guidelines on Complementary Feeding and Control of Iron Deficiency for 0–3 Year Olds with Emphasis on the Central Asian Republics and the Former Soviet Countries,*” had been circulated to all participants for their review before the consultation and then presented and discussed during the meeting (publication is anticipated by the end of 1999).

Key messages from these documents and related presentations are presented in this section, along with the full text of the WHO position paper on the issue (See Box seven on next page).

Current Infant Feeding Practices in the Region

It has been suggested that the nutrient recommendations in the Former Soviet countries may not be in agreement with international standards, therefore a WHO task force was established to conduct a review of other Former Soviet Feeding Recommendations. The former Soviet infant and young child feeding guidelines were compared with international recommendations. One of the objectives was to identify practices likely to precipitate or exacerbate the prevalence of anaemia. The following recommendations were identified from the former Soviet literature:

Breastfeeding Recommendations:

- Late initiation of breastfeeding, up to 6-12 hours after birth was recommended, particularly in sick women including those with anaemia.
- Pre-lacteal feeds of 5% glucose were recommended until lactation was established.
- Exclusive breastfeeding was recommended for the first month (although not widely practised).
- Breast milk was recommended as the main feed until 4 – 4.5 months of age.
- Breastfeeding was recommended to cease completely by 10 - 11 months of age.
- Breast-feeds were recommended to follow a strict schedule, such as:

The importance of a night break between feeds was often emphasized. Following the six feeds/day regimen, a 6.5 hour break was advised, and this break increased to eight hours on the five feeds/day schedule and some authors allowed feeds to deviate by 10–15 minutes from the above schedule.

Non-adapted formulas in the Former USSR comprised of:

- Diluted fresh or fermented cow's milk with added sugar, vitamins and minerals.
- The introduction of cow's milk diluted with cereal water was recommended at 2-3 months (50 ml pure cow's milk or kefir, 45 ml cereal-water and 5 ml 100 % sugar syrup).

Former USSR recommendations for the introduction of weaning foods included:

- Additional fluids, primarily tea & water with sugar, were recommended for all infants.
- So-called 'fruit' juices (jam with water) was recommended at one month of age.
- Introduction of unmodified cow's milk (at four months) and pure kefir (three months).

- Recommendations on the introduction of solids included fruit to be introduced at two months, egg yolk (hard boiled) at three months and curd at four months.
- The addition of sugar and salt solutions to infant foods was sometimes recommended.
- Cereal porridges with added sugar, syrup, salt and butter was recommended at four months.

It is of particular concern that in cases of diagnosed anaemia (and rickets), porridge and other solids were recommended to be introduced earlier than four months.

These findings agree with the results of a comprehensive review of the surveys on infant and young child feeding practices in the region, which show the early introduction of liquids and semi-solid foods during the period when exclusive breastfeeding is recommended. Water and herbal teas are introduced at around 1-2 months, with tea at 2-3 months and fruit juices at about 3-4 months. Tea has an inhibitory effect on iron absorption and furthermore, the too early introduction of supplementary drinks including tea, water and cow's milk, causes displacement of breast milk intake.

Of particular concern, is the introduction of cow's milk at about 4-5 months. This is likely to have a negative impact on the iron status of infants, firstly because cow's milk has a low iron content; secondly, compared with breast milk the iron in unmodified cow's milk has poor bioavailability; and thirdly, the early introduction of cow's milk can cause micro-bleedings of the infant's immature gastrointestinal tract leading to blood loss.

In addition, meat and liver, which represent the best sources of haem iron for infants over six months of age and contain a 'meat factor' believed to enhance the absorption of non-haem iron, are introduced at a relatively late age (about 8-9 months). Together these factors make a major contribution to the poor iron status of infants and children.

The promotion of exclusive breastfeeding for the first 4-6 months of life, coupled with the timely introduction of cow's milk, is therefore anticipated to have a dramatic positive effect on the improvement of iron status in infants within the Region.

It was recommended that feeding patterns and nutritional status of infants and young children should be monitored regularly. This will en-

able problems to be identified and strategies to be developed to optimize the health of young children.

Possible Explanations for the Current Feeding Practices in the Region

In most of the former Soviet countries semi-solids appear to be introduced at less than four months of age when the infant's digestive, renal, immune and neuromuscular systems are immature and designed to cope with breast milk alone. The early introduction of semi-solids clearly either precipitates and/or exacerbates prevalence of anaemia. Protein is regarded as the most important nutrients for infant growth. The former Soviet 'Physiological Norms' for protein in infants and young children are more than three times greater than the values recommended by international committees. The use of these physiological norms to assess the adequacy of protein intake in countries of the former USSR has led to erroneous claims of widespread protein deficiency. Also there appears to be concern that infants may become protein deficient perhaps because breast milk has a relatively low protein concentration. Consequently, by the age of four months, most infants receive egg yolk and curds. By six months of age when, according to WHO recommendations complementary feeding should just be starting, these figures had risen to over 90%. As a result of all the findings reported above, a revision of complementary feeding guidelines in these countries is recommended.

WHO Recommendations on Complementary Feeding

WHO recommends the revision of complementary feeding guidelines for the former Soviet State countries, to convey the following messages:

- Introduction of liquids (tea and water) to supplement breast milk before four months hinders the successful initiation and continuation of breastfeeding and is an obstacle to the promotion of exclusive breastfeeding which offers the maximum benefits to both.
- The widespread belief and recommendation for a high protein diet to ensure good growth and development may result in the early introduction of foods such as curds, kefir and egg yolk, which can restrict growth by providing too much protein and insufficient energy for growth.

Recommendations addressing all these issues are covered in detail in the new publication 'Complementary Feeding and Control of Iron Deficiency for 0-3 year olds in WHO European Region' drafts of which are available from WHO, Copenhagen.

There is international consensus, based on scientific evidence from countries where protein energy deficiency is widespread and women are severely undernourished, that even very underweight women can breastfeed successfully. Moreover, in countries such as India where women have much lower BMI's than in the European Region, lactational failure is very uncommon. In contrast there is an unsubstantiated belief in Former Soviet countries, perpetuated by health professionals, that loss of weight is a contra-indication to breastfeeding. A UNICEF project conducted in Kazakstan and Uzbekistan, to re-educate health professionals to support and encourage breastfeeding, has shown that nearly all women can breastfeed satisfactorily thereby dispelling this long-standing myth. Health professionals require education and training to provide them with the information they need to reassure mothers that neither being underweight nor anaemic are obstacles for successful breastfeeding.

It is important that women receive advice on how to improve their nutritional status. The importance of achieving a balanced diet, including plenty of fresh fruit and vegetables, for all women of child-bearing age should be stressed. The Healthy Eating in Pregnancy and Lactation Training Module and booklet for mothers, provides useful information. Anaemia during pregnancy appears to be common. Substantial expansion of the erythrocyte mass increases iron requirements in the second and third trimester of pregnancy. It is therefore important to inform women which foods are good sources of iron and to recommend foods containing enhancers of iron absorption (liver, meat, vegetables and fruit). Foods rich in inhibitors of iron absorption should also be highlighted (tea, cereals, fiber-rich foods).

A recurring question was raised during the Consultation relating to the inability of anaemic mothers to breastfeed. There appears to be a strong belief that anaemia is a contraindication to breastfeeding. However, the international literature and published scientific evidence support the fact that anaemia does not prevent women from breastfeeding. Furthermore, lactation helps reduce the likelihood of anaemia in a number of ways:

- i) Breastfeeding accelerates the contraction of the uterus to its pre-pregnant size, reducing the risk of haemorrhage and thereby preserving maternal iron stores;
- ii) The iron cost of breastfeeding is generally less than the cost of menstruation, as a result of the lactational amenorrhoea produced by exclusive breastfeeding for several months;
- iii) The absorption of iron from the gastro-intestinal tract is enhanced in lactating women;
- iv) Lactation increases mobilization of the body's iron stores.

It should be stressed that low rates of breastfeeding are not due to physiological barriers, but to psychological ones. Thus, improvements in nutritional status and the prevention of anaemia will not automatically result in increased breastfeeding rates. Extensive campaigns are needed to promote, protect and support breastfeeding concentrating especially on counseling.

In summary, nearly all women if motivated and encouraged can successfully breastfeed even if anaemic or underweight. As the countries of the former USSR and CAR move into a market economy, they represent a new market for infant formula companies to target and exploit. If women are encouraged to buy breast milk substitutes, this will impede the chances of successful breastfeeding initiation. It is therefore essential that all countries in the Region adopt laws based on the International Code of Marketing of Breast Milk Substitutes, in addition to encouraging and supporting all women in their decision to breastfeed. These recommendations on the International Code are primarily for policy makers but it is vital that health professionals working at the district level understand the importance of this issue.

BOX SEVEN

WHO Position Paper “Complementary Feeding and Control of Iron Deficiency in Under Three Year Olds in the European Region”

The health, nutrition and growth of infants and children of Kazakhstan and the Central Asian Republics (the Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan) compares very poorly with those born in the Western European Region. Mortality and morbidity are high, stunting is common, and there is evidence that the prevalence of iron deficiency anaemia may be as high as 70% in some groups of young children.

Formerly the Central Asian Republics were part of the Soviet Union and nutritional and dietary recommendations for infants and young children were based on Soviet guidelines. With the break-up of the Soviet Union, there has been a rapid deterioration in the public health of countries that were part of it. Data on the prevalence of iron deficiency and anaemia for the European Region, particularly the Central Asian Republics, are sparse, and there is a need for large-scale surveys to procure baseline information on the food availability and dietary patterns of target populations, which would then enable key questions to be answered. These include: what is the iron content of the diet and how bioavailable is it? Is it sufficient to meet the theoretical requirements of the population, and particularly those groups most vulnerable to iron deficiency? What is the prevalence of iron deficiency? If the iron content of the diet is sufficient, why is the prevalence of iron deficiency so high? These questions must take into account the physical and social environment, and factors related to child care, food safety and the prevalence of infection, all of which impact upon the iron status of mothers and children.

Strategies that have been used to combat iron deficiency in other countries have been based on substantial scientific evidence. However, these strategies are not necessarily transferable to the European Region, particularly the Central Asian Republics. It is therefore vital to understand the aetiology of iron deficiency within these regions before public health strategies are launched.

A WHO working group has therefore been formed (see members below*) to develop guidelines on complementary feeding and control of iron deficiency for 0–3 year olds in the WHO European Region. These guidelines will be based on WHO and UNICEF publications (*Complementary Feeding of Young Children in Developing Countries* (1998), and *Complementary Feeding – Weaning from Breastmilk to Family Food* (Draft: 1998); WHO: Geneva), on

recommendations from national guidelines of member states of the WHO European Region, and other relevant publications and surveys. The Guidelines will include a detailed overview of the current situation concerning the mortality, morbidity, growth and nutritional status of the infants and children of the Central Asian Republics, followed by nutrient recommendations, focusing in particular on iron requirements. The importance of breastfeeding will be reviewed and stressed, followed by the theory and practice of complementary feeding.

It is the view of the working group that the prevention and treatment of iron deficiency in infants and young children will be most effectively achieved by improvement of complementary feeding practices. Not only is there an urgent need to develop modern, evidence-based guidelines for complementary feeding appropriate for the needs of mothers and children of these transition countries, but also to address nutritional deficits other than iron deficiency alone, if their health, growth and nutritional status is to be improved. To that end the members of the working group recommend that the prevention and treatment of iron deficiency be integrated within guidelines for the complementary feeding of 0–3 year olds living in the Central Asian Republics. Under conditions where there is strong evidence that the iron requirements of infants cannot be met by unfortified complementary foods, iron fortification of infant foods to help combat iron deficiency is justified.

A Quote relating to fortification taken from the Micronutrient Initiative:

"Fortification of a food stuff with iron makes sense only if iron deficiency is related to low iron intake, low iron bioavailability, or both (and not for example, parasites), thus the aetiology of the iron deficiency must be determined beforehand."

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The High Potential of Wheat Flour Fortification to Make a Major Contribution to Reduction of Iron Deficiency/Iron Deficiency Anaemia in the Region within the Framework of an Integrated Strategy²⁵

The Rationale for Fortification of Wheat Flour with Iron

Fortification adds vitamins and/or minerals to a food to increase its overall nutritional content. Participants at the consultation endorsed the fortification of wheat flour with iron and other micronutrients as a highly appropriate component within the multiple-intervention strategy agreed as needed to prevent and control iron deficiency anaemia in the CEE/CIS/BS countries. Because bread and pasta are staple foods throughout most of the Region, the fortification of wheat flour with iron provides a powerful means of delivering substantial amounts of this essential micronutrient to many population groups.

In countries where there is a high dependence on processed foods and the food processing industries are streamlined and automated, food fortification began playing a major role in the health of the populations beginning over fifty years ago (See Box eight). In some of these countries several nutritional deficiencies have been eliminated. Today almost one quarter of the iron intake in the US diet comes from fortified sources, much of that from wheat-flour products,²⁶ and new regulations (1998) have added folic acid to the standard flour fortificant mix.

Niacin, another micronutrient, became a food fortificant in the United States in 1938. According to the Micronutrient Initiative (MI), deaths from niacin deficiencies dropped from more than 3000 per year in the USA to

BOX EIGHT

Examples of Countries Fortifying Flour with Iron and Their Fortification Rates

Country	Iron (Mg/Kg)
Canada	29 – 43
Chile	30
Costa Rica	28.7 – 36.4
Dom. Republic	29.29
Ecuador	58.65
El Salvador	28.70
Guatemala	55.65
Honduras	28.7
Nigeria	28.9 – 36.7
Panama	28.8
Saudi Arabia	> 36.30
UK	> 16.5
United States	44.1
Venezuela	20

Source: Micronutrient Initiative

negligible levels by 1949. The current low levels of iron deficiency anaemia among the general population in the United States are attributable to fortified food sources.

Flour fortification based on relatively recent policies in Chile and Venezuela has substantially improved iron status in the overall population. Chile has an iron deficiency anaemia rate of less than one percent. Most observers attribute this to a strong flour fortification program. More recently, all corn and wheat flour in Venezuela was fortified with iron, vitamin A and B vitamins. Iron was added at a level of 20–30 ppm, contributing an estimated 48 percent of the RDA for iron in the average Venezuelan.

The swift and dramatic impact of flour fortification in Venezuela is shown through studies of anaemia in children (ages 5, 7 and 15 years) living in Caracas slum areas during the years immediately before and af-

ter fortification.²⁷ The prevalence of iron deficiency, determined by measuring the serum ferritin concentration, and the prevalence of anaemia were reduced from 37 percent to 19 percent respectively in 1992 to 15 percent and 10 percent respectively in 1994 among this group. During this period, no other nutrition interventions were taking place and economic pressures were causing an overall decline in the quality of the diet among the poorer classes of the country.

Flour fortification should be a cost-effective and simple way of delivering iron to many people who need it. In this Region, flour fortification can deliver iron to most of the populations without major changes in food production or consumption patterns and without changes in customary diets. If countries of the CEE/CIS/BS Region develop the necessary policies, solve technical and resources issues necessary for widespread addition of iron and other micronutrients to wheat flour, nutritional benefits similar to those demonstrated in other countries should be achieved.

Widespread production of fortified wheat flour could, in time, reduce the currently important role of preventive iron supplementation for large population groups, where anaemia prevalence is high. Lower costs and, more importantly, far fewer issues related to delivery and compliance make wheat flour fortification a preferred intervention for many groups. Fortification processes can be added to existing food production and distri-

BOX NINE:

Per Capita Wheat Flour Consumption

Country	Kg/Year
Russia	139.3
Albania	89.7
Belarus	61.7
Romania	146.9
Ukraine	140.5
Kyrgyz Rep.	138.7
Kazakhstan	204.1
Turkmenistan	176.1
Azerbaijan	179.8
Venezuela	110
Chile	118

Source: Micronutrient Initiative

bution systems and may be implemented relatively quickly. Based on these factors, wheat flour fortification can be a key, cost-effective, highly sustainable element in overall national efforts to control and prevent iron malnutrition.

Depending on the level of fortification chosen, an average person in many countries in the Region could receive from 30% to 80% of the Recommended Daily Allowance (RDA) of iron from fortified flour (See Box nine). Assuming an intake of 100 kg per year of wheat flour, fortified with 30 mg of iron per kg, the increase in iron consumption would be 3000 mg of iron/year or the equivalent of 60 mg of iron/week for 50 weeks. This is the same amount of iron that has been shown to be effective in correcting mild anaemia (when taken as an oral iron supplement) among women in a 1996 study in Kazakhstan.

While such projections are impressive, it is important to re-emphasise that young children would simply not consume sufficient quantities of wheat products to meet their iron needs even if all the wheat used in their households was fortified. This is one reason why the new recommendations on complementary feeding are so important. However, policies should be put in place to assure that all commercially produced complementary cereals for children, whether produced nationally or imported are fortified with iron and other micronutrients. Any infant formula that is required should also be fortified with iron. Pregnant women also have iron needs that cannot generally be met through normal consumption of iron fortified wheat products. However, flour fortification can help to assure that women throughout the population enter pregnancy with adequate iron stores and without folate deficiency (provided fortification includes at minimum iron plus folic acid).

It is important to note that food fortification does not aim at providing 100 percent of daily micronutrient needs. Food fortification generally aims toward filling the gap between actual intakes from other dietary sources and the RDA. Fortified flour consumed in average quantities can fill substantial gaps in iron nutrition for those population groups with average iron needs and for whom this fortified food is available and replaces the non-fortified flour in their diets.

Positive Factors that Support Wheat Flour Fortification in the Region

When iron deficiency anaemia is spread throughout a wide area and is the result of a combination of low iron intake and low bioavailability,

iron fortification of common foods offers several advantages. For example, it is the most direct approach to reducing many micronutrient deficiencies and fortification does not rely on individual compliance and can be implemented in ways that make it nationally sustainable on a long-term basis in countries of this Region.

For many families and individuals in these countries, fortified wheat flour would deliver iron in a food vehicle that is consumed daily, often with each meal. This would provide the nutrient in low and constant amounts that correspond to physiological needs. Several studies show that this maximises the health benefits of additional iron. Generally, individuals who are not at risk for iron deficiency can consume additional iron safely because the human body itself is one of the most efficient regulators of iron absorption. When iron stores are sufficient, absorption rates fall to less than one percent.

Food fortification has been called a “silent solution” to hidden hunger because it does not require significant change in purchasing and consumption habits. While the adult population must be educated to purchase and prefer fortified products, these fortified foods are staple foods that are already on the market and part of the diet. Once the food is purchased, few compliance problems arise. The costs of iron fortification (usually well less than US\$.25 per year per person) normally represent less than one percent of retail cost.

As an intervention that is part of an overall integrated strategy for preventing and controlling iron deficiency anaemia, flour fortification can help protect the bulk of the populations who regularly consume flour. This will allow national programme for the prevention and control of iron deficiency (programmes that deliver dietary education or iron supplements, as well as other public health measures) to focus more narrowly on specific groups needing additional iron, especially infants, young children and pregnant women.

Fortifying Wheat Flour: Current Processes and Skills should Facilitate Production and Marketing in the CEE/CIS/BS Countries

Most countries where wheat flour is a staple food have legislation calling for either voluntary or mandatory fortification with iron (and other micronutrients). The major exceptions are the CEE/CIS/BS countries. Nutrition experts from these countries blame this mainly on the bureaucratic centrism in the leaderships of the former command economies and

a lack of clear information and explanations of the process of wheat flour fortification, its costs and benefits.

Among various global regions, these countries should make strong candidates for developing and carrying out effective flour fortification policies.

The argument for fortified flour in the Region is clear: Anaemia is a major health problem.... Iron deficiency is a significant cause of the anaemia....Wheat is a good vehicle to carry iron....Most wheat is milled centrally...Wheat flour is already a staple food regularly consumed in relatively constant amounts by almost all the population groups throughout most of the Region.

Wheat flour is a major component of the energy intake of men, women and children over three years of age across a wide range of socio-economic strata including the poor. During the past decade wheat flour is the one food that many report has increased in amount in their daily diet.

Overall, wheat products are consumed in higher quantities in this Region than in other nations that have reported successful experiences in reducing micronutrient deficiencies through flour fortification.

Throughout the CEE/CIS/BS Region food processing is often centralised, processed food production and consumption are growing, new large scale flour mills are being constructed and some Governments have begun revising many of food additive standards and the standards for flour fortification.

Enrichment Replaces Micronutrients Lost During Processing and Fortification and Adds Additional Amounts of others Not Occurring Naturally

As a cereal grain, wheat has a considerable content of iron and several other nutrients. However, much of the iron and other micronutrients are lost during the milling process. In the countries of this Region wheat flour is generally processed in mills at a high rate of extraction. For example, Russia uses an extraction rate of 81 percent, close to 100 percent of the available flour yields. Such high yields, however, also include higher levels of bran (containing phytates) and therefore more seriously inhibit iron and zinc absorption.

Whole wheat has 38.8 ppm of iron and wheat flour has 11 ppm (43% of the iron in whole wheat). Whole wheat has 29.3 ppm of zinc and wheat flour has seven ppm (39% of the zinc in whole wheat). Restoration is the

process of adding back the nutrients lost during the milling process. Fortification is the adding of nutrients in an amount greater than what naturally occurs in the basic product and/or adding nutrients that did not naturally occur. In the USA, Canada and the UK, standards for adding micronutrients to wheat flour were initially set at levels designed to replace those lost during processing. Wheat flour is now fortified in these countries to provide additional micronutrients for which widespread deficiencies exist.

Iron fortification compounds and levels

While no industrial sources of appropriate iron compounds have been identified in the Region, when fortification becomes common it is likely that the production of required fortificants will become a profitable business in some of these countries. Various iron compounds and premixes of iron and other micronutrients are currently and readily available in nearby countries.

The stability of iron compounds, such as ferrous sulphate, that are appropriate for fortifying flour is good and the effects of processing and baking are negligible.²⁸

Selection of the appropriate level of a nutrient to add to a cereal grain during milling is based on several factors. "Upper level constraints" are the highest level of the nutrient that can be added without adversely affecting the product's (flour) quality or acceptance. The calculation should consider:

- The average amount of the fortified food consumed.
- The level of recommended daily intakes (RDI) of the nutrient.
- The percentage of the RDI to be achieved through consumption of the fortified food (taking into account intake and absorption).
- Other sources of the nutrient in the average daily diet.

The recommendations for iron fortification of flour presented at the consultation and listed here are based on iron fortification experience in many countries and aim toward assuring fortification practices are safe, effective and do not negatively affect the quality of the flour produced.

- White wheat flour should be enriched with iron as a general policy.

- How much iron should depend on the flour consumption and iron intake deficit in the population.
- A minimum addition of iron is the amount needed to restore the iron that was present in the whole grain product before milling, or the addition of 30 ppm.
- Other micronutrients may be added if needed.
- Ferrous sulphate and ferrous fumarate are the preferred sources to add when they can be used without affecting the quality of the flour.
- For white flour made with an extraction rate below 82 percent and a shelf life requirement of less than one month in hot humid areas and three months in cool, dry areas, 30 ppm iron should be added in the form of ferrous sulphate.
- For all other white flour made with an extraction rate below 82 percent, up to 60 ppm iron should be added in the form of reduced iron (the level of iron added depends on how much wheat flour is consumed by the population).

The Micronutrient Initiative states that some regional conformity on fortifications standards helps simplify free trade of milled cereals and foods made from those cereals.

In many of the CEE/CIS/BS countries, products made from wheat flour are generally marketed and distributed efficiently and purchased and consumed on a regular basis. Sizable amounts of wheat flour move directly from the mill to central bakeries daily. Many new flour mills have been constructed in the past seven years in these countries and more are under construction. Flour fortification equipment had been installed and flour fortified in at least three countries on a trial basis since 1995 (Russia, Kyrgyz Republic, Turkmenistan). The newer mills should have no difficulty integrating fortification technology into their milling process. This has already been demonstrated in Turkmenistan. In the Kyrgyz Republic it has been shown that older mills can adapt their processing lines to accept fortificant-dosing equipment at relatively low costs.

Given the potential of fortified flour to reduce iron deficiency and iron deficiency anaemia in women and adolescents, several participants at the consultation questioned why flour was not being fortified with iron and other micronutrients throughout the Region (see Box ten).

BOX TEN

Key Advocacy Questions on the Fortification of Wheat Flour on CEE/CIS/BS Countries

Why don't all people in countries where there is iron deficiency have the right to eat only fortified flour?

Why is flour produced in these countries in an unfortified form, when its fortification with iron could make a major contribution toward eliminating iron deficiency anaemia?

Why don't the regulations on food additives in countries in the Region call for fortifying flour with iron and other needed micronutrients?

Source: Consultation discussions

In general, the added cost of fortifying wheat with iron is low, typically less than US\$1.00 per metric ton of flour. Incremental costs are usually less than one percent of the wholesale cost of flour, and typically lower than the annual inflation in the cost of flour. However, it is misleading to suggest that flour fortification is inexpensive in the context of the tight budgets and shortages of hard currency of many mills. When fortification is first introduced at a major mill new with a capacity of say 100 metric tons per day, new equipment costs will likely range from US\$ 4–10 thousand. If fortification is being done at 45 parts per million with enrichment mix costing US\$ 4.00/kg, the annual fortificant cost will be approximately US\$ 40,000 plus shipping. Such costs, while exceedingly small when measured per kg of fortified flour or per person per year, must still be met by producers that often have little access to hard currency.

Based on the current directions, pace and impact of the transition processes in the countries of the Region, some countries may need donor assistance in setting up flour fortification and for initial supplies of equipment and fortificant. In other countries where new private mills are rapidly being built flour fortification can begin with only limited technical assistance or with little or no outside help. Even where outside help is needed initially, flour fortification should shift to a market based strategy that relies on private investment and is required by consumer demand. If new Government standards for flour fortification are set, enriched flour may quickly become a standard form of production of wheat in large, centralised mills and a standard product of flour producers.

Flour fortification should be an important strategy to help realise the goal of eliminating iron deficiency and iron deficiency anaemia as well as addressing other micronutrient deficiencies. Some donor assistance is likely to be needed initially in many of these countries, and effective fortification policies and programmes for the large countries in the Region will require active collaboration among their scientific community, the government, private industry, consumer groups, international agencies and specialists with experience in relevant fields.

International agencies have a major role to play in advocacy, initial coordination and orientation of millers and others and in assisting with equipment investments and technical training.

Iron Supplementation and Public Education for Dietary Change: Other Key Strategies for Preventing and Controlling Iron Deficiency/Iron Deficiency Anaemia in the CEE/CIS/BS Countries

Effective large-scale programmes of iron supplementation are expensive and complex but may be needed where iron deficiency anaemia prevalence rates are high and fortified flour is unavailable. Around the world supplementation is the recommended intervention for most pregnant women even where fortified flour is available and diets are generally rich in meats containing haem iron. It was pointed out that in the United States, despite diets being generally rich in iron due to high meat consumption and where micronutrient fortification of flour and many other foods is accepted and common, the public health service still recommends that pregnant women routinely take iron supplements

Supplementation may also be necessary for young children in many areas until family resources and educational efforts allow and convince mothers to provide high amounts of iron-rich complementary foods (or well-fortified complementary foods become widely available and affordable). On the other hand, the cost of supplements and problems related to their effective delivery to target groups and compliance in taking them, make the strategies of education for dietary change, that lead to better iron nutrition, and flour fortification highly desirable.

Iron Supplementation

Experience from the Region has shown that it will take time for advocacy, planning and implementing the national policies and regulations needed to allow fortified wheat flour to be produced and then to have it

distributed to and accepted by large portions of populations. Therefore, expanded and strengthened strategies for oral iron supplementation may be the only way to quickly alleviate the current burden of high anaemia levels among pregnant and non-pregnant women and to quickly reduce the massive numbers of children now suffering permanent cognitive damage because they suffer from anaemia at an early age.

In the declaration of the 1990 World Summit for Children, signed by all countries in the Region, one goal for the year 2000 was the reduction of iron deficiency anaemia in pregnant women by one third from 1990 levels. In the countries of this Region, current and past efforts to control iron deficiency anaemia using oral iron supplementation have generally followed a clinical approach to pregnant women found to be anaemic. The normal prescription was 60 mg (elemental iron) plus folate to be taken in tablet form three times a day for 30 days. For pregnant women who are not anaemic, daily use of 60 mg of iron in an oral tablet may or may not be prescribed.

In 1996, UNICEF and WHO made official recommendations that called for an expansion in the use of oral iron plus folate supplements to control and prevent iron deficiency anaemia in children less than two years of age and women of childbearing age. Until fortified flour is widely available, the expansion of the groups currently targeted for oral iron supplements and new supplementation activities, focussing on prevention as well as control of iron deficiency anaemia, would help address the current problem in the CEE/CIS/BS countries.

It is expected that oral supplementation will continue to fill iron and folate nutrition gaps for specific groups especially pregnant women and children less than two years of age. As noted previously these groups will not receive adequate iron from fortified wheat even when required policies and production make it widely available.

Two important issues covered in the consultation and in several other meetings on iron nutrition are:

- The need to build programmes that include children less than two years of age as one of the primary target groups for interventions.
- The importance of expanding the strategies for protecting pregnant women from the effects of iron deficiency anaemia by assuring that they enter pregnancy with good iron stores and without being folate deficient.

In 1998, the International Nutritional Anaemia Advisory Group (INACG), UNICEF and WHO published a new set of *Guidelines for the Use of Iron Supplements to Prevent and Treat Iron Deficiency Anaemia*. These guidelines mainly cover the use of oral supplements for the treatment and prevention of iron deficiency anaemia in children, pregnant women and women of child bearing age.

Children 6–24 months of age

The targeting of iron deficiency in children less than two years is critical because of the likelihood that many members of this age group will become anaemic due to iron deficiency and thus face the prospect of permanent damage to their cognitive development and negative effects on their physical development and overall health.

The new and soon to be published WHO/UNICEF guidelines on Complementary Feeding and Control of Iron Deficiency in the Central Asian Republics and the Former Soviet Union recommend breastfeeding be exclusive and after six months, mothers should complement breast milk with foods with a high iron content (pureed liver meat, etc). All countries should translate and implement this new publication into national recommendations.

While exclusive breastfeeding for the first four to six months of life is crucial, and the iron in breastmilk highly absorbable, the amount of iron in breastmilk is small. The iron obtained through exclusive breastfeeding of a baby, combined with the iron stores at birth generally provides a rapidly growing infant with the quantities needed up to an age of four to six months. After four to six months of age, infants generally need to receive iron plus folic acid supplements, where iron rich or iron-fortified complementary foods are not widely and regularly consumed,

According to the INACG/WHO/UNICEF guidelines where high levels of anaemia exist — oral supplementation should be universal for children beginning at six months of age (for low birth weight children, supplementation should begin at two months of age). If the prevalence of anaemia in children is not known, the prevalence of anaemia in pregnant women should be taken as a proxy indicator.

Consultation discussions raised the need to improve the forms of iron supplements because pills can be dangerous (in terms of choking) for children less than 12 months. In some countries UNICEF is supplying suspensions containing iron but the shipping costs of such preparations

are high when the programme targets large populations of children. The costs could be cut if an iron or a multivitamin with iron preparation for young children could be mixed and packaged at the primary care level.

Ultimately, improved feeding practices of infants and young children, including exclusive breastfeeding and proper introduction of complementary foods rich in haem iron may make supplementation of this age group no longer necessary. This illustrates the importance of all countries assessing current feeding practices and developing their own national feeding guidelines to prevent iron deficiency in infants and young children.

Assuring women enter pregnancy with good iron stores

There has been an expansion of target groups for programmes with a goal of protecting pregnant women and their foetuses from micronutrient deficiencies. Some programmes now include not only pregnant women themselves but also all women of child-bearing age.

One benefit of folic acid supplementation (normally combined with iron supplements and flour fortification premixes) is that it prevents the folate deficiency associated with neural tube defects that occur in some developing foetuses. However, because this critical stage of foetal development occurs during the first 25 days of pregnancy, the folate deficiency prevention and correction of this deficiency should begin before pregnancy occurs. Similarly, iron status at the beginning of pregnancy is the strongest determinant of iron status at the end of the pregnancy (this factor is stronger than supplementing a pregnant women with oral iron). For these reasons, and the positive impact of good iron nutrition on overall health and productivity, preventive supplementation for women of child-bearing age is now an accepted option where anaemia prevalence is high, food fortification is not yet in place or where iron fortified foods are unavailable.

Programmes that include the use of oral iron plus folic acid supplements for children 6–12 months of age, women of child bearing age and all pregnant women are in developmental phases Kazakhstan and the four countries in Central Asia. These programmes use a weekly dosing regime and are being carried out initially in areas where flour fortification has not been started. All of these programmes are well integrated with specific strategies for improvement of diets in all target groups in ways that should improve iron nutrition.

Among all populations, including those in industrialised countries, most women will become iron deficient during pregnancy unless they

take iron supplements. As noted by several experts and as outlined in the INACG/WHO/UNICEF guidelines, supplementation of pregnant women in areas where there are high levels of anaemia should be universal. Routine, iron supplementation during pregnancy is now an essential part of public health efforts to prevent and control iron deficiency anaemia, assure good maternal health during pregnancy and birth and assure that infants begin life with good iron stores. Even after fortification and/or pre-pregnancy supplementation succeed in raising and maintaining the iron stores of women at healthy levels, many will require iron supplementation during pregnancy.

Lessons from existing programmes and trials on how to improve supplementation compliance by pregnant women need to be considered during the planning and monitoring of expanded supplementation activities. These lessons include:

- The importance of the infrastructure, training and resources to maintain an uninterrupted supply of good quality iron supplements (see WHO training pack developed for Central Asian Republics and Former Soviet Countries in collaboration with UNICEF on “Healthy Eating During Pregnancy and Lactation”).
- Attention to those logistics and distribution factors necessary to allow women to comply with supplementation protocols. Experience in Central Asia and elsewhere demonstrates that it is essential to carry out a well-planned process that monitors and uses information gained to improve supplementation compliance.
- Integration of iron supplementation activities with antenatal care, promotion of breastfeeding, improved infant and young child feeding practices, family planning, reproductive health, control of infectious diseases and other primary health care services.

Multiple micronutrient supplements

Participants at the consultation called for the standard ferrous sulphate and folic acid supplement to be evaluated in comparison with the potential benefits and relative costs of adding additional micronutrients. Additional nutrients with the most potential to improve health and nutritional status in the Regions include vitamin A, zinc, and riboflavin. A high prevalence of iron deficiency is frequently associated with zinc deficiency.

Weekly supplementation protocols

Where weekly supplementation is used in programmes to prevent iron deficiency and iron deficiency anaemia, monitoring of both efficacy and effectiveness are important. Experiences, both positive and negative should be reported nationally and to the international community.

Sustainability of supplementation

As a principle programmes should aim toward developing means by which families or individuals purchase iron supplements. Current costs for a one-year supply based on a prevention-oriented dosage of 60 mg of elemental iron plus 400 µg of folic acid per week ranges from US\$0.12 to US\$0.52. Supplies needed for a pregnant women using a dosage of 60 mg elemental iron plus 400 µg of folic acid per day for 48 weeks range from US\$ 0.74 to US\$3.30). If long term or wide scale supplementation becomes a necessary means of preventing and controlling iron deficiency, policies and mechanisms to have families and individuals pay for the supplements will most likely become necessary.

Dietary Improvement through Communication for Behaviour Change

Given that the cause of iron deficiency is largely dietary in this Region, where no data is available, assessments should be carried out on adult dietary patterns and current infant and young child feeding practices. These assessments will need to include meal composition in order to estimate current iron intake and identify practices that are likely to be inhibiting or enhancing iron absorption.

Communication for dietary behaviour change is a necessary part of any programme that seeks to combat iron deficiency and anaemia in a sustainable manner. However in most cases, communication strategies programme components aiming toward fortification and supplementation, are unlikely to be adequate in either preventing or controlling iron deficiency and anaemia. Fortunately the diets of most persons in the countries of CEE/CIS/BS contain considerable amounts of iron, more so than in many other regions. Good sources of iron such as meat are culturally acceptable and desirable, but economic hardship over the past 15 years or so appears to have reduced meat consumption, both lowering the levels of haem iron consumed and reducing this strong enhancer of non-haem iron absorption. This change in dietary patterns is further complicated

by the fact that major inhibitors of the absorption of non-haem iron are common in dietary patterns, e.g. tea and wheat bran. Moreover some foods that enhance iron absorption are not frequently consumed, e.g. vegetables and fruit.

Specialists note that efforts to improve dietary iron bioavailability through changing the consumption of iron absorption enhancers or inhibitors are unlikely to improve iron status substantially if non-haem iron intakes are low. This may be more likely to be true in other regions where dietary staples are low in iron, e.g., unfortified white rice, white flour. However, in this Region there remains an excellent opportunity for many families to improve dietary iron availability, despite economic hardship, by increasing liver and meat consumption in those within the household most at risk. What will be important is that the populations at risk know why and how this can be done.

There was broad agreement at the consultation that greatly improved communication strategies for dietary improvement are critical. An integrated approach to prevention and control of iron deficiency /iron deficiency anaemia that includes food fortification and iron supplements for high-risk groups must also incorporate an explicit, well-conceived Information/education/communication (IEC) strategy that aims toward people improving food choices and meal composition in terms of good iron nutrition.

The strategy should include use of the channels of the public health service, NGOs and other ministries and the mass media to deliver effective messages that advise the public based on new national dietary guidelines for women, infants and young children. IEC strategies aimed toward changing the food consumption behaviours of large and diverse populations also need to address the fact that many people have limited resources. As economic status improves, messages can encourage families to eat more of the foods that are iron-rich and that enhance iron absorption which are already common to their diets.

When appropriate, IEC strategies should also include messages encouraging compliance in the use of iron supplements and promoting the use of fortified flour.

Iron deficiency is truly a hidden hunger. A major challenge for communication strategies in support of iron nutrition programmes in this Region will be to overcome a lack of motivation to meet this threat to health and development that is most often not immediate or easily recognised.

Communication plans and activities will need to use participatory approaches to develop locally relevant communication processes. Channels and messages that are based on local preferences will more effectively promote better choices of foods and meal patterns and infant feeding practices that leading to greater intake and absorption of iron by those family members most vulnerable to iron deficiency. Participation in problem assessment and analysis enables people to understand better the dietary determinants of iron deficiency and identify opportunities to overcome dietary constraints in locally appropriate ways. In this Region, efforts should be made to avoid top-down educational approaches in favour of more participatory ones. Mechanisms for effective communication from the community to the government agencies will need to be identified and used. However, community-based communication must be balanced with advocacy activities aimed at various Governmental levels where policy decisions often influence community access to the types of foods with highly available iron. Ministries of agriculture, trade and industry make important contributions to the availability and affordability of iron rich foods.

IEC strategies need to include plans for training of health workers and others who will, in turn, help with education and counseling of parents. Paediatric clinics will need to provide up-to-date feeding advice for children based on new national guidelines.

Overall an effective communication plan for prevention and control of iron deficiency anaemia (IDA) needs to have four major components:

- Advocacy.
- Support for effective training.
- Support for effective counseling
- Messages and materials and a programme for public education.

Recommendations for Action

Based on the background materials, the presentations and consultation discussions, participants formed into four working groups and developed specific recommendations on key issues related to the prevention and control of iron deficiency and iron deficiency anaemia for countries of this Region. The recommendations of each subgroup were then discussed and either validated or modified in a plenary session.

The major overall recommendation from the consultation was that programmes to prevent and control iron deficiency/iron deficiency anaemia should follow an integrated, long-term, approach, which includes six strategic components of strategies for:

- Strategy 1: Development and implementation of new national guidelines for complementary feeding to control iron deficiency.
- Strategy 2: Development of a comprehensive IEC strategy for dietary change to improve iron nutrition.
- Strategy 3: Fortification of wheat flour (and complimentary foods) with iron and other micronutrients.
- Strategy 4: Improve the use of oral supplementation of specific target groups with iron and folate.
- Strategy 5: Programme monitoring, evaluation and documentation.
- Strategy 6: Linking of strategies to other relevant programmes.

A summary of the more detailed major recommendations of the consultation for the successful implementation of the above strategies are listed below. The general recommendations apply to all strategic components 1-4 of the integrated programme listed above, while other recommendations concentrate on the successful initiation and sustainability of each of these specific components.

General Recommendations

Recommendation 1: Expand IDA Programme Target Groups

All countries in the Region should Expand Target Groups for National Policies and Programmes to Prevent and Control Iron Deficiency/ Iron Deficiency Anaemia

The groups to be the focus of new programmes and policies should be:

- All children under two years of age.
- Women of childbearing age.
- All pregnant women.
- All adolescent girls.

Recommendation 2: Where Needed, Assess Prevalence and Causes of Anaemia

All countries with insufficient data on the problem should rapidly assess anaemia prevalence and, where possible, verify the causes of anaemia.

- In this Region existing research and health records should be used, as opposed to new surveys to learn about anaemia prevalence in various vulnerable groups.
- If the prevalence of the anaemia problem is not known or data is insufficient, sample surveys can be done to obtain haemoglobin measurements (preferably using hemocues or similar instruments) and provide information on the most vulnerable groups.
- For increased cost effectiveness, haemoglobin measurement should be added to both regularly scheduled or intermittent health and nutrition surveys whenever data on anaemia is needed. Future national health and nutrition surveys should include determination of haemoglobin status.

- A proxy measurement that can be used to determine the levels of anaemia in young children in a population is the level of anaemia in pregnant women in that population. (In several studies these rates have found to correlate at over 95%).
- Haemoglobin levels must be interpreted in relation to adjustments for altitude.
- UNICEF offices in the Region should have on hand or be able to rapidly supply Hemocues and test strips that can be borrowed by national groups for surveys and research.
- The development of a non-invasive method for the detection of anaemia is highly desirable and support for such a method and related instruments is encouraged.

Recommendation 3: Strategic Advocacy Is Needed to Reduce IDA

Each country in the Region should define and develop advocacy strategies and plans to support major new efforts to prevent and control Iron Deficiency/Iron Deficiency Anaemia. Elements of this plan should include the following:

- Messages and effective presentation channels that demonstrate to political leaders and others that:
 - Iron deficiency anaemia is a major health risk and has massive economic costs based on losses in productivity loss, health care costs and loss of human potential (children losing cognitive potential).
 - The prevention of IDA should be implemented as a matter of economic importance and human rights.
- A new alliance to support, agree on and build a sustainable, integrated, long-term national programme to prevent and control iron deficiency. Alliance members will need to include representation from a wide cross section of public and private sectors at all levels, who will be stakeholders in the programme design, implementation and outcome.
- Plans to secure the resources needed for initial programme activities from governments, donors, loans, private sector, and, in the long run, families and individuals.

Recommendation 4: Development of Linkages Between Strategies to Control Iron Deficiency Anaemia and Other, Related Programmes.

Examples of related programmes which should include relevant aspects of the recommended actions for control and prevention of iron deficiency are:

- Integrated Management of Childhood Illness (IMCI),
- Essential perinatal care and care of the newborn,
- Reproductive and maternal health,
- Promotion of breastfeeding, and
- Other micronutrient programmes (Iodine Deficiency Disorders, Vitamin A Disorders, etc.).

Recommendation 5: Programme Monitoring, Evaluation and Documentation

Monitoring and Documentation Should Support All Programmes to Prevent and Control Iron Deficiency Anaemia

- As a part of all new programmes to prevent and control iron deficiency and iron deficiency anaemia in children and women, national authorities should assure that monitoring, evaluation and documentation procedures are included.
- To assure effectiveness, plans and procedures for monitoring, documentation and evaluation need to be explicit. Specific mechanisms to address problems as new interventions are initiated should be developed and used.
- Monitoring plans should include measurement of:
 - National norms and standards traditionally used in each country.
 - How well programmes reach their target groups.
 - Compliance and reasons for not complying.
 - Effectiveness of the programme.
 - Effectiveness of training, education, counseling and media support.

- Linkages between dietary change, supplementation intervention, fortification and other primary health care interventions.

Recommendation 6: Medical Curriculum and Health Professional Materials on Iron Deficiency and Iron Deficiency Anaemia Should be Improved

Throughout the Region, medical training curriculum and professional preservice training and in-service training related to anaemia, iron deficiency, iron supplementation, dietary practices and related topics should be revised and updated along with other relevant documents and texts. The following should be initiated urgently:

- Academic curriculum in medical schools should be revised and updated according to current knowledge and international guidelines as soon as possible.
- Production of a publication on “Prevention and Control of Iron Deficiency Including Infant and Young Child Nutrition” could serve both as a textbook and as general guidelines for health professionals.
- National and international experts in health, nutrition and medical education should participate in the development of these textbook/guidelines and an appropriate national research institute should coordinate this work.
- A collection of recent expert reports and publications on the control and prevention of iron deficiency anaemia should be provided to the group(s) working on curricula and text revisions.
- Collaboration and technical assistance by UNICEF and WHO should be provided for the production and duplication of public education brochures and other materials on the prevention of the anaemia and their dissemination.

Specific Recommendations

Recommendation for strategy 1: Development and Implementation of New National Guidelines for Complementary Feeding to Control Iron Deficiency.

National Governments in collaboration with donor and technical agencies and groups should promote and support better breastfeeding policies, and the development and implementation of national complemen-

tary feeding guidelines and a comprehensive IEC Strategy to control iron deficiency in 6-24 month old children. The following actions should be incorporated into such efforts and, where necessary, receive international support:

- Conduct rapid assessments to determine current infant and complementary feeding practices, with the goal of developing new guidelines and a comprehensive IEC strategy for the control and prevention of IDA, to be implemented by a wide range of partners. The following areas need to be explored:
 - Factors related to the promotion of continued and stronger support for exclusive breastfeeding for the first 4-6 months and extended breast feeding duration beyond 12 months, even if mothers are anaemic. E.g. evaluation and expansion throughout the region of the programmes to create baby-friendly hospitals (in accordance with the UNICEF 10-step initiative) and to implement the International Code on Marketing of Breastmilk Substitutes.
 - Current actions that provide good iron nutrition at family level that can be incorporated. (consumption of eggs, meat, liver).
 - How to promote complementary feeding, beginning at about six months, that includes iron rich foods, such as earlier introduction of puréed liver, meats, vegetables and fruit juices.
 - How to promote delayed introduction of cows' milk until nine months.
 - What are the currently used complementary foods that offer opportunities for fortification (commercial complementary foods, cows milk).
- Develop national guidelines, based on international recommendations, on how to improve current feeding practices to reduce the degree of iron deficiency anaemia in young children. Key messages should include the following facts:
 - For nutritional, emotional, immunological and other health reasons, exclusive breastfeeding for the first 4-6 months of life is optimal.

- Most mothers regardless of their nutritional status, including the presence of anaemia, can successfully breastfeed if motivated and supported in their decision to do so.
- When infant formulas or cows' milk is used, these products should be enriched with iron.
- Production and distribution of iron-fortified fermented milk products and other complimentary foods should be encouraged in addition to conventional methods of micronutrient supplementation.
- As called for in the Innocenti Declaration, Governments should use national situation analyses and surveys to monitor the protection, promotion and support of breastfeeding.
- Where the situation warrants, relevant international and bilateral organisations should provide emergency food aid for malnourished pregnant and lactating women.
- Partners in developing and carrying out IEC strategies to improve iron nutrition should include partners from all ministries and sectors involved with food production, health, feeding programmes, media and NGOs.

Recommendation for strategy 2: Development of a Comprehensive IEC Strategy for Dietary Change to Improve Iron Nutrition.

Similarly to the recommendation for strategy 1, National Governments in collaboration with donor and technical agencies and groups should support the development of new national dietary guidelines and a comprehensive IEC Strategy to control iron deficiency throughout the population. The following actions should be incorporated into such efforts and, where necessary, receive international support:

- Conduct rapid assessments to determine current family dietary practice which can be used as the basis for the development of new national dietary guidelines for adults, infants and young children.
- Outline an IEC plan and strategies to reach all sectors of the population, to include the following considerations:
 - Incorporation of any new national dietary guidelines for adults, infants and young children.

- The target audiences for messages such as mothers, families, health workers, school pupils, etc.
- Appropriate and effective content and channels for delivering these messages.
- Identification and training of those who will carry some of these messages (health workers, teachers, etc.)

(The advocacy, communication strategies, and supporting materials developed for the CARK APC programme may be useful examples and provide some important lessons learned for other countries in the Region).

Recommendation for strategy 3: Fortification of Wheat Flour (and Complimentary Foods) with Iron and other Micronutrients

Universal fortification of specific foods, in particular wheat flour, with iron and folic acid (and perhaps additional micronutrients) is recommended for all countries in the Region. Specific recommendations to initiate and support fortification include the following:

- Foods to consider for fortification include the following:
 - Cereal flour and cereal products should be fortified with iron (and other micronutrients).
 - Imported cereal flours should conform to the enrichment standards of the recipient countries.
 - Complementary foods for infant feeding should be fortified with iron as appropriate.
 - School meals should contain bread or other products fortified with iron.
 - Multiple food fortification should be considered.
- Actions are needed to assess feasibility and initiate widespread fortification of wheat flour. Advocacy for the process should come from the alliance working to control iron deficiency. With support from international agencies, investigations should be conducted to assess the political, technical and regulatory constraints and opportunities. Necessary actions to address any constraints and build on opportunities should be taken in order to initiate widespread wheat flour fortification.

- Determine and agree on roles of all counterparts (Government, private, NGOs, mass media etc.) and stakeholders. Together they should develop a “Plan of Action for Flour Fortification to Assist in Preventing and Controlling Iron Deficiency “ with a schedule of realistic target dates for key actions. Include the identification of appropriate institutions/technical groups (including specialists from the flour industry) to provide overall leadership for the following:
 - Advocacy and coordination of flour fortification activities.
 - Decisions on: standards for flour fortificants and fortification, the necessary technical information and endorsements required, grades of flour to be fortified, the appropriate fortificant or mix of fortificants and the appropriate level of these fortificants and quality control procedures to ensure the level, and the most effective means of approaching and working with the agency (Goskomstandard) that sets standards for food additives.
 - Programme monitoring, evaluation and documentation of work on flour fortification including baseline studies and evaluation of the impact of flour fortification on reduction of ID and IDA and the economic effect of flour fortification
 - Technical training and communication.
- If appropriate, identify and arrange for a “project manager” for full time work on flour fortification for 12-24 months.
- Agree on the principle that any “pilot” work will be done within a national framework and overall schedule of going to national scale.
- International agencies, including UNICEF and WHO should collaborate with national efforts to initiate widespread production of fortified wheat flour. This should include assistance and funding support (where feasible) for the following:
 - Advocacy/technical visits aimed at key political and technical decision makers, as well as other agencies and donors to build support and capacity for flour fortification and all other components of the integrated strategy to prevent IDA
 - Organising and funding national participation at technical meeting(s) on fortification in 1999/2000 that include relevant deci-

sion makers including flour and pre-mix producers and potential producers.

- Identification of technical assistance and relevant documentation as well as mechanisms sharing information and experience in this field within the region
- Rapid national feasibility and impact assessments
- Development/technical review of national “Wheat Flour Fortification Plans of Action.”
- The acquisition by flour mills of precision feeders of the fortificant and of some initial supplies of fortificant/enrichment mix if needed. Intervention sustainability should be a major criterion of national proposals requesting international support for equipment and/or commodities for interventions such as flour fortification and oral supplementation.
- The establishment of national monitoring systems, and provision of required supplies such as Hemocues and test strips.
- Development of practical guidelines for standards and quality control of fortificants, premixes and fortified wheat.
- A regional (or sub regional) technical group(s) to harmonise standards for inter-border trade and custom regulations of wheat, wheat flour and fortified food products.
- An investigation of existing and potential regional suppliers of iron and other micronutrient fortificant compounds and premixes.
- Development of generic communication materials
- Improve food regulations to support better nutrition in each country of the region, with emphasis on the following:
 - Change the standards for food additives to allow for/require fortification of wheat flour with iron and folic acid and other micronutrients as are found to be deficient in the population.
 - Require nutritional labeling of food products to provide information for consumers and facilitate nutrition education.
 - Revise and update current food regulations concerning enrich-

ment and fortification of foods to comply with current knowledge and international regulations.

- Require that imported food meet food regulations and policies of recipient countries.

Recommendation for Strategy 4: Improve the Use of Oral Supplementation of Specific Target Groups with Iron and Folate

National Governments should strengthen and develop policies and programmes that improve the use of iron supplements for prevention and control of iron deficiency and iron deficiency anaemia. New programmes should be integrated with the other recommended strategies and also include the following policies:

For all supplementation strategies

- To be effective existing efforts and new strategies for preventive supplementation should include the following components:
 - Well-designed strategies for effective pill distribution or social marketing (if pills are to be bought by women).
 - Training of health workers and others on counseling of mothers regarding anaemia to increase compliance and ensure that they are given the correct dietary advice and feeding instructions at the same time as being given a prescription.
 - Collaboration with the mass media to promote and explain good dietary practices and complementary feeding practices. Where needed, messages should also promote compliance by targeting women to take supplements and to give supplements to young children where necessary.
 - Support from schools and major enterprises where women work in terms of supplement distribution and promotion of compliance and better dietary practices.
 - Support for planned monitoring of programme progress and impact.

For treatment of people diagnosed with severe anaemia

- Persons with severe anaemia should be treated according to WHO Protocols (see Box eleven).

BOX ELEVEN

Clinical Treatment of Anaemia

Age group	Dose	Duration
> 2 years	25 mg 100–400 µg folic acid daily	3 months
2–12 years	60 mg 400 µg folic acid daily	3 months
Adolescents and adults	120 mg 400 µg folic acid daily	3 months
Pregnant women	120 mg 400 µg folic acid daily	3 months

After completing three months of therapeutic supplementation, pregnant women and infants should continue preventive supplementation regimes

Source: Guidelines for the Use of Iron Supplements to Prevent and Treatment of Iron Deficiency Anaemia, R. Stoltzfus, M. Dreyfuss. 1998. INACG, WHO, UNICEF.

For prevention of IDA in all women of childbearing age

- To protect women from iron deficiency during pregnancy (and to protect the foetus from folate deficiency-related birth defects), countries in the Regions should adopt a national health and nutrition policy and support necessary actions that call for and assure that all women of childbearing age develop and maintain good iron stores (see Box twelve).
- Wheat flour fortification should be the preferred intervention in this Region to ensure that women enter pregnancy with good iron stores. However, where fortification is unfeasible, and/or will take some time to implement, preventive supplementation of women of childbearing age with iron and folic acid should be strongly considered.
- Until iron fortified foods are widely available and anaemia levels among women drop below 20%, a universal supplementation regime should be developed for all women of childbearing age. To increase cost effectiveness, national demographic data regarding the age ranges where most women of various groups give births should allow a narrower age range for preventive supplementation within the overall fertile range.

BOX TWELVE

Iron Dosage for Preventive Supplementation in Women of Childbearing Age

Research is ongoing to determine the most cost effective dosing regime for iron supplementation to this group in various contexts. The efficacy of once or twice weekly supplementation in this group appears promising, and the operational efficiency of intermittent dosing regimens is being evaluated. While policy recommendations are being formulated, programme planners should adopt the dosing regime believed to be the most feasible and sustainable in their community.

Source: INACG/WHO/UNICEF

Note: A dosage of 60 mg (elemental iron) and 400 µg in pill form per week for women of childbearing age was found to be efficacious in raising haemoglobin and iron stores over a period of six months in Kazakhstan in a study conducted by the Institute of Nutrition in 1996.

- Where anaemia levels of women in a population are lower than 20 percent, a targeted programme based on periodic screening should be considered.

For supplementation of Young Children

- Children found to be moderately anaemic when tested should be *treated* with oral iron supplements as outlined in WHO/National guidelines for treatment of anaemia.
- In the countries of this Region, where anaemia prevalence in children under one year of age is over 20 percent, universal supplementation of children between six months and 18 months, with appropriate dosages of oral supplements, should be used to improve health and prevent permanent impairment of cognitive development. (See Box thirteen)
 - National Governments, and agencies such as UNICEF and WHO should encourage national/regional development and production of acceptable, affordable iron supplements that can be given safely to children under one year old. (swallowing pills may pose a choking hazard for infants) For example: supplementation preparations

BOX THIRTEEN

Iron Supplements Dosage for Young Children

The daily dosage of 12.5 mg iron 50 µg folic acid based on 2 mg iron/kg body weight/day is recommended for children less than 24 months of age INACG/WHO/UNICEF.

Note: The weekly dosage of 30 mg (iron syrup) per week for children 6–12 months and 60 mg iron 400 µg folic acid (in pill form) for children one year to 18 months is currently being used in population based programmes in four Central Asian Republics and Kazakhstan. This dosage was found to be efficacious in a study in Kazakhstan in 1997.

based on fermented milk, or supplementation preparations that can be mixed with complementary foods.

- The use of additional micronutrients (particularly, Riboflavin, Zinc, Vitamin A) should be considered for children between 6 and 18 months.
- Mothers and families with young children should be counseled, provided with educational materials on how to improve their children's complementary foods and, to the degree possible, supervised to assure success of these preventive efforts.
- In areas where the level of anaemia in this age group is below 20% screening of infants for anaemia can be considered if feasible.
- Iron and Folate Supplementation of Pregnant Women
- In countries of this Region, all pregnant women should generally receive iron and folate supplements throughout pregnancy and at least two months post partum (see Box fourteen).

BOX FOURTEEN

Iron Dosage for Pregnant Women

A dosage of 60 mg a day of elemental iron and 400Fg per day of folic acid are the current recommendations of INACG, WHO and UNICEF for pregnant women who begin supplementation early in pregnancy.

Source:INACG/WHO/UNICEF Guidelines).

Endnotes

1. "Anaemia Prevention and Control in Central Asia and Kazakhstan," "Anaemia Control in Romania," "Anaemia Assessments in Moldova and Azerbaijan," "Flour Fortification in the Russian Federation," etc
2. "Complementary Feeding and the Control of Iron Deficiency Anaemia in CCEE/CIS/CAR and the Baltic States." Presentation by WHO during WHO/UNICEF consultation, Geneva 3-5 February 1999. WHO Regional Office for Europe EUR/ICP/LVNG 01 01 07. Copenhagen. 1999.
3. This summary of general background on iron deficiency anaemia, its causes and consequences relevant to pregnant, women of childbearing age and child prevalence of iron deficiency anaemia globally and then more specifically in the Region was based on the sessions by Dr. Bruno de Benoist, and the reports from Russia, Azerbaijan, CARK AO, and standard information on this health and nutrition problem.
4. The haem iron compounds include myoglobin, cytochromes, catalases, and peroxidases. The non-haem iron compounds include NADH and succinic dehydrogenases; xanthine, aldehyde and alphaglycerophosphate oxidases; phenylalanine hydroxylase and ribonucleotide reductase. Alphaglycero-phosphate oxidase, for example, shuttles electrons across the mitochondrial membrane. Also important are the iron-dependent enzymes proline, lysine hydroxylase and a number of others including enzymes involved in DNA replication.
5. Over the past two years there has been a growing agreement among specialists that the usefulness of the current WHO blood haemoglobin level cut offs defining anaemia, levels of anaemia severity as well as the designation of appropriate populations levels and specific cut-off levels for serum ferritin should be given consideration by an expert committee convened by WHO.
6. When individual haemoglobin levels are below minus two standard deviations of the distribution of haemoglobin in an otherwise normal population of

the same sex and age, and living at the same altitude, iron deficiency anaemia is considered to be present. Twenty five percent of a normal population would be expected to be below this threshold. In other words, iron deficiency anaemia represents a subset of iron deficiency at the lower end of the distribution. The prevalence of iron deficiency anaemia in a population, therefore, is a statistical, rather than a physiological concept. It reflects only that proportion of the population with iron deficiency severe enough to impair erythropoiesis.

7. The emphasis of intervention programmes focusing on iron deficiency anaemia prior to the early 1990s was almost exclusively on improving the iron nutrition of pregnant women. The well-known 1990 World Summit for Children produced goals included reducing the prevalence of anaemia in pregnant women but made no mention of the prevention or control of this micronutrient deficiency in young children of groups of adolescents, women or men at other ages. In 1995 the WHO/UNICEF Joint Committee on Health Policy first made reference to the need to reduce and prevent anaemia in groups other than pregnant women.

8. References for economic analysis used by the UNICEF/WHO/UNU/MI workshop included: Murray, C., Lopez, A. (eds.) *Global Burden of Disease and Injury*. (Vol. I). 1996. Harvard University Press, Cambridge, MA, USA; Sanghvi, T., et al. *Economic Rationale For Investing in Micronutrient Programs: A Policy Brief on New Analysis*. USAID Office of Nutrition Vitamin A Field Support Project. 1994; Levin, H. Cost Benefit Analysis of Nutritional Programmes for Anaemia Reduction. World Bank Observer, Vol. 1 No. 2, 1986.; Ross, J. , Hutton, S. Economic Consequences of Iron Deficiency. Micronutrient Initiative, Ottawa, ON, Canada, 1998.

9. Viteri, F. .1997. "The Consequences of Iron Deficiency and Anaemia in Pregnancy on Maternal Health and the Foetus and the Infant," *SCN News*, No. 11, pp. 14-18.

10. WHO/UNICEF/UNU 1993 Workshop, p. 4.

11. WHO/UNICEF JCHP, p. 4.; Scrimshaw, N. 1990, p. 8.

12. Holst, M. 1998. Nutrition and the Life Cycle: Developmental and Behavioural Effects of Iron Deficiency Anaemia in *Nutrition Today*, Vol. 13 No. 1, Jan-Feb, pp. 27-36. (Based on the 1997 Avanelle Kirksey Lecture, presented by B. Lozoff at Perdue University Infants), p. 29.

13. WHO/UNICEF /JCHP p. 6.

14 Dr. B. de Benoit noted that this data should be treated with caution because there are weaknesses in the WHO database regarding the Eastern European countries.

15. "Children and Womens Nutrition in Tajikistan," CARE International, 1994
16. "Nutritional Conditions of the Kyrgyz Population," B Popkin and A. Martinchik, World Bank study. 1994.
17. This study of the prevalences and causes of anemia in Muynak District of Karkalpakstan in Uzbekistan, was led by C. Morse.
18. The longitudinal survey has been repeated four times, involved interviews with a representative sample of 3,188 women of reproductive age in more than 6,000 households about diet and other life style characteristics, Among them, the women had 1,764 children aged 13 or younger.
19. UNICEF-WHO The World Summit for Children: Strategy for Reducing Iron Deficiency Anaemia in Children 1994. The UNICEF-WHO Joint Committee on Health Policy, JCHP30/95/4.5, December 1994. UNICEF and WHO, p. 5.
20. Thalassemia major and thalassemia minor are single-gene recessive inherited blood disorders characterised by the defective production of haemoglobin Thalassemia major is a serious life threatening condition that normally manifests itself after six months of age. Without treatment, those affected usually die of infection or heart failure in the first years of life. Thalassemia minor can very closely resemble mild anaemia. No treatment is necessary unless iron deficiency is present. Iron stores in people with thalassemia minor are normal, and dietary manipulation is unlikely to have a significant effect. People with thalassemia minor are not at risk of iron overload and are not at any greater risk of complications from iron in the diet than anyone else in the general population. From the report of a WHO EMRO Consultation in 1998.
21. The meeting was co-chaired by the WHO-EURO Nutrition Adviser, the Director of the United Nations University Food and Nutrition Programme and the Director of the Institute of Nutrition in Kazakhstan The UNICEF Executive Director, then visiting Kazakhstan, also attended.
22. Flour fortification was supported by technical and supply assistance from UNICEF, and two mills were set up for fortification at a level of 35 ppm for FeSO₄ in November 1996 Fortification standards are currently being worked out for Tajikistan, Kazakhstan and Uzbekistan, and fortification of flour in some oblasts is expected in Kazakhstan and Tajikistan in 1997.
23. "Mid-Decade Situation: Progress Toward Reduction in Iron Deficiency," Report of the UNICEF-WHO Joint Committee on Health Policy, 15-16 May 1996, WHO, Geneva
24. Iron Supplementation During Pregnancy: Why Aren't Women Complying?" WHO/MCH, 1990, WHO Geneva; and "Low Compliance with an Iron Supplementation Programme: A Study among Pregnant Women in Jakarta, Indonesia," *American Journal of Nutrition*, 57, Pp. 135-139.

25. This section is based on the presentations of R. Yip, V. Mannar, G. Maberly, N. Scrimshaw, WHO/EMRO, CARK, CDC, and working group recommendations, overall recommendations.

26. Flour fortification with B vitamins began in Canada in Newfoundland during 1944 with four years deficiencies that had been found in nearly 20% of the population had dropped to negligible levels. In fact, Newfoundland was so convinced of the benefits of mandatory fortification that it made continuation of flour fortification a condition of the charter when it joined the Canadian Federation.

27. An early response to the effect of iron fortification in the Venezuelan population, M. Layrisse, J. Chaves, H. Mendex-Castellanos, V. Trooper, B. Bastardo, E. Gonzolez, *American Journal of Clinical Nutrition*, Vol. 64, 1997, pp. 903-907.

28. Based on many years of test baking and commercial experience, it is clear that the addition of significant levels iron and other vitamins to flour and bread, when done properly, does not alter in any way the taste, colour, appearance or general baking properties Fortification of wheat flour is truly invisible to the consumer.

SECTION EIGHT

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(If assistance is needed in obtaining any of the listed references, please contact the UNICEF CEE/CIS/BS Regional Office)

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SECTION NINE

Agenda

Joint UNICEF/WHO Iron Deficiency Anemia Consultation 3–5 February, 1999

Centre International de Conférence de Genève (CICG), 9 Rue de Varembe,
Geneva, Switzerland

Overall Rapporteur: *G. Gleason*

Wednesday 3rd February 1999

Chairperson: *R. Shrimpton*

Rapporteur: *U. Kartoglu*

9 :00 – 10 :00 Introduction and Objectives

- Opening remarks and welcome statement by UNICEF/WHO (*J. Donohue/A. Robertson*)
- Introduction of participants
- Consultation goals and mode of work (*A. Tibouti*)
- Prevalence of Iron Deficiency and Iron Deficiency Anemia global trends (*B. de Benoist/R. Yip*)

10:00 – 11:00 Break

11:00 – 12:30 Assessment of the current situation

- Existing information on nutrient intake and nutritional status of young children and women in the Region (*extent and magnitude of consequences*) CEE/CIS & Baltic States - *A. Baturin/G. Gerasimov*
- CARK – *N. Scrimshaw/A. Sharmanov*
- Armenia/Azerbaijan – *F. Branca/A. Parvanta*
- Russian Federation – *A. Parvanta/M. Lazarev*

12:30 – 14:00 Lunch

Chairperson: *V. Mannar*

Rapporteur: *D. Popovic*

14:00 – 16:00 Major intervention approaches for the prevention and control of IDA

- Overview on Flour fortification (*R. Yip*)
- Role of supplementation to prevent IDA (*N. Scrimshaw/ R. Yip*)
- Programme support and dietary change (*G. Gleason/A. Saparbekov*)
- Flour fortification options and strategies (*V. Mannar*)

16:00 – 16:30 Break

16:30 – 18:00 Program experience on IDA control in CEE/CIS and MENA/EMRO region

- Practices on addressing IDA during USSR (*A. Baturin/ G. Gerasimov*)
- CARK experience in addressing IDA (*Priorities, Possibilities, Constraints and Lessons Learned*) (*N. Scrimshaw/CARK team*).
- MENA/EMRO experience in fortification/challenges in sustainability (*A. Verster /S. Shuqaidef*)

Thursday 4th February

Chairperson: *T. Sharmanov*

Rapporteur: *T. Gotsadze*

9:00 – 10:30 Evidence for need to control IDA

- Functional consequences of ID and IDA on children and women (*A. Malaspina and ILSI team. N. Scrimshaw*)
- Outcome of UNICEF/WHO/UNU/MI Technical Workshop in preventing IDA among women and children and its implication for CEE/CIS/BS region (*R. Shrimpton/N. Scrimshaw/V. Mannar/ B. de Benoist*)

10:30 – 11:00 Break

11:00 – 12:30 Complementary Feeding and the Control of IDA

- Review of former USSR recommendations (*WHO*)
- Current practices in complementary feeding (*F. Branca*)
- Complementary feeding and IDA (*K. Michaelsen*)

12:30 – 14:00 Lunch

Chairperson: *A. Baturin*

Rapporteur: *R. Elsom*

14:00 – 15:30 European Recommendations on Infant and Young Child Feeding

- Outline of new recommendations on complementary feeding in the Region and its role in the improvement of IDA among children. (*K. Michaelsen*)
 - Recommended nutrient intakes (*A. Robertson*)
 - Healthy eating during pregnancy and lactation (*A. Robertson*)
- 15:30 – 16:00 Break
- 16:00 – 18:00 Linkages with other programmes and inter-agency collaboration
- Linkages with other programmes
 - IMCI (*I. Lejnev*)
 - Reproductive and Maternal Health (*V. Mangiaterra*)
 - Breastfeeding/BFHI (*A. Robertson/H. Khatib*)
 - Outline of potential technical assistance from participating organizations and their role in the Region.
- Panel discussion moderated by *J.J. Donohue with G. Maberly/ A. Malaspina/ V. Mannar/ N. Scrimshaw/ A. Parvanta*)

Friday 5th February

Chairperson: *R. Kösa*

Rapporteur: *A. Malyavin*

9:00 – 11:00 Working Groups

- Background info on the different working groups and expected outcome (*G. Gleason*)
- Working Groups
 - Advocacy and Communication on IDA programs (*T. Sharmanov/ G. Gleason*)
 - Expanding coverage and improving effectiveness of supplementation programs for pregnant women, young children and adolescent girls (*N. Scrimshaw/R. Yip*).
 - Food Fortification opportunities/strategies/support measures (communications, regulation, quality assurance). (*G. Maberly/ V. Mannar/I. Parvanta*)
 - Components of national plan of action and regional plans (*R. Shrimpton/A. Verster/A. Robertson*)
 - Role of Complementary feeding in preventing IDA (*K. Michaelsen/ A. Robertson*)

11:00 – 11:30 Break

11:30 – 12:30 Session Continued...

–Group work continued

12:30 – 14:00 Lunch

Chairperson: *R. Yip*

Rapporteur: *G. Gleason*

14:00 – 15:30 Presentation in Plenary

15:30 – 16:00 Break

16:00 – 17:45 Recommendations and Conclusions

– Drafting of recommendations (*Representatives of Working Groups*)

– Conclusion and Recommendation for future action (*T.Sharmanov,/
A. Roberston/G. Gleason*)

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