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CC: Farid Rahman at PO320A01
CC: Rhea Saab at INTERNET
CC: Stephen Simon at PO073A01
CC: Samir Sobhy at PO540A01
CC: Sergio Soro at PO410A01
CC: Stephen Umemoto at PO098A01
Subject: Fortification Update, vol.1, 1996

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----- Message Contents -----

This UNICEF UPDATE ON FORTIFICATION is intended to supplement the USI Update and to provide a summary of activities underway to fortify staple foods in countries where UNICEF has programmes. Readers are encouraged to send information to the Nutrition Section, H-10F, UNICEF New York, 3 U.N. Plaza, N.Y. 10017, phone (212) 824-6375, fax (212) 824-6463, e-mail: ndalmiya@unicef.org.

Best regards.

David Alnwick
Senior Adviser, Micronutrients
Nutrition Section

Fortification Update.
Vol. 1, 1996

Introduction:

The fortification of staple foods, such as cereal flour, sugar or vegetable oil with either iron, vitamin A, or a combination of these, may be encouraged and supported by UNICEF where there is evidence that this will help to reduce the prevalence of micronutrient deficiency in children and women.

This UNICEF UPDATE ON FORTIFICATION is intended to supplement the USI Update and to provide a summary of activities underway to fortify staple foods in countries where UNICEF has programmes. Please note our new address and phone numbers as of 20 April, 1996. Readers are encouraged to contribute information of interest to the Nutrition Section, UNICEF, New York, phone (212) 824-6369 (David Alnwick), (212) 824-6375 (Nita Dalmiya), fax (212) 824-6463, e-mail: ndalmiya@unicef.org.

Country Updates.

Brazil. An experimental project to fortify water filtration systems with iron is underway in day care centers in Riberio Preto, Brazil. Approximately 7mg of ferrous sulphate and 0.009mg of ascorbic acid (vitamin C) are being added to each liter of water contained in clay pottery water filtration systems. For more information on this project, contact Dr. Mark Beininger, at rbeininger@usp.br.

India. The Government of India has been fortifying milk with vitamin A since 1980. The number of dairies (milk cooperatives) in the country supplying vitamin A fortified milk to selected urban areas has increased to 62 in 18 states and the total production of fortified milk is estimated at 2.5 million liters. Fortification is only being recommended for milk which has been 'skimmed' or defatted, the objective being to replace the vitamin A loss which occurs due to the removal of fat. One kilo of vitamin A concentrate is recommended for fortifying 0.5 million liters of milk and the cost of 1 kg of concentrate is about \$70. The Government of India expects to bear the costs of this programme for the next three years.

Iran. The Ministry of Health and the National Cereal Organization of Iran are planning to fortify bread with iron with the assistance with UNICEF Tehran and WHO. UNICEF Tehran has been actively involved in assisting the Ministry of Health with conducting a national study on the prevalence of iron deficiency anemia and advocating for fortification.

1. **United States Agency for International Development (USAID):**
<http://www.info.usaid.gov>.
2. **The World Bank:** <http://www.worldbank.org/html/hcov/hdd/contents.html>
3. **National Library of Medicine:** <http://www.nlm.nih.gov/welcome.html>
4. **The Micronutrient Initiative:** <http://www.idrc.ca/mi/index.html>
5. **International Development Research Center (IDRC):** <http://www.idrc.ca>
6. **The International Committee of the Red Cross (ICRC):** <http://www.icrc.ch>
7. **World Health Organization (WHO):** <http://www.who.ch/>
8. **US Department of Health and Human Services:** <http://www.os.dhhs.gov/>
9. **Federation of American Scientists (Micronutrients and Agriculture Newsletter):**
<http://www.fas.org/pub/gen/fas/mnp/micro.html>
10. **Volunteers in Technical Assistance (VITA):** <http://www.vita.org>
11. **Food and Agriculture Organization:** <http://www.fao.org>.

OMNI Project's Sugar Fortification Manual. OMNI has recently developed a Manual for Sugar Fortification with Vitamin A. The three volume manual available in both English and Spanish, presents technical guidelines for the execution of a Sugar Fortification programme. Part 1 deals with guidelines for the development, implementation, monitoring and evaluation of a vitamin A sugar fortification programme, part 2 with technical and operational guidelines for preparing vitamin A premix and fortified sugar, and part 3 with analytical methods for the control and evaluation of sugar fortification with vitamin A. To obtain a copy of the manual, simply download it from the OMNI Web Page (address provided above) or order a copy by mail by writing to The OMNI Project, Attn: Information Dissemination, 1616 North Fort Myer Drive, Arlington, VA 22209.

New Publications from the MI.

"Micronutrient Fortification of Foods: Current Practices, Research and Opportunities". (Lotfi M., Mannar V., Merx R., and Naber-Van den Heuvel P.)
 Jointly produced by the Micronutrient Initiative, Ottawa and the International Agricultural Centre, Wageningen, this 108 page monograph provides a comprehensive and very up-to-date summary of the subject. It should be indispensable reading for all interested in developing micronutrient fortification programmes. The monograph has been included in the Nutrition Section's Mailing of the Month packet. For those who need additional copies of this monograph, please contact the MI directly at fax (613) 236-6163 or e-mail: milotfi@idrc.ca or vmannar@idrc.ca.

"Sharing Risk and Reward. Public-Private Sector Collaboration to Eliminate Micronutrient Malnutrition", Report of the Forum on Food Fortification, Ottawa, December 6-8, 1995. (The Micronutrient Initiative) This report, a collaborative effort of the MI, the Keystone Center and PAMM, summarizes the discussions and highlights the major themes of the three day Ottawa Forum on Food Fortification, and suggests areas for collaboration between the private and public sector. For additional copies of this document,

located at the CDC (Centers for Disease Control in Atlanta). The CDC has agreed to make any number of these units available for any UNICEF sponsored surveys. Country offices that are planning for an iron survey and that wish to borrow these machines should contact Abe Parvanta at the CDC, fax (770) 488-4728, phone (770) 488-4867, e-mail: ixp1@ccddn1.em.cdc.gov. Country offices will have to order their own supply of cuvettes, and should also indicate at the time of request for how long they wish to borrow the machines.

XVII IVACG Meeting, Fall 1997, Cairo, Egypt. The call for abstracts and meeting announcement will be mailed in the fall of this year. The deadline for submission of abstracts will most probably be December 31, 1996.

Lots of Interest in Micronutrients in the U.S.!

Fortification with Folate Hits the Headlines (repeat of newflash sent out on March 1, 1996). Following much debate in public health circles in the U.S., the Department of Health and Human Services and the Food and Drug Administration (FDA) announced in February that many foods in the U.S. will be fortified with folic acid to prevent birth defects.

Of relevance to UNICEF and other collaborators in micronutrient programmes, is the fact that the U.S. a country of 260 million people, has decided to fortify some food items (enriched breads, flours, corn meals, breakfast cereals, pastas, rice, and other grain products) consumed by the entire population in order to prevent a proportion of the 2500 cases of spina bifida or other neural tube defects (NTDs) occurring each year. In many developing countries, the potential benefits of iodizing salt and fortifying other basic foods with iron and vitamin A are likely to be larger than this. This news might be useful in making the point with partners that fortification is not just a developing country issue. Under the new FDA rules, specified grain products will be required to be fortified with folic acid at levels ranging from 0.43 mg to 1.4 mg per pound of product. Because over half of all pregnancies are unplanned and because these defects occur in the developing fetus before most women know they are pregnant, it is important that all women of child-bearing age consume the needed 400 microgrammes of folic acid daily. Under the new rules, manufacturers will be allowed to make claims on the labels that the fortified products contain folate or folic acid and that adequate intake of the nutrient has been shown to reduce the risk of NTDs.

Low Birth Weight and Folic Acid. A study just published by Scholl et al (Am. J. Clin Nut 1996, 63,520-525) raises the possibility that folic acid deficiency in pregnancy may increase risk of low Birth weight and pre-term delivery. The study was done in Camden, New Jersey, just across the river from UNICEF HQ, a city the authors describe as one of the poorest in the U.S. Women with the lowest intake of folic acid were found to have twice the risk of pre-term delivery and low birth weight compared to women with the highest intake, when other factors such as energy intake were controlled for.

mg as opposed to the current U.S. RDA which stands at 30-40mg. Researchers at the National Institutes of Health, also concluded that daily doses over 400mg have no value and that doses of 1,000 mg or more, which many people take as daily supplements or to prevent or treat illness could be hazardous. The study showed that beyond a dose of 400mg, the body's ability to absorb vitamin C diminished and that excesses were excreted. Unlike previous studies used to establish recommended amounts, this study bases its recommendations on what is best for the overall health of populations and not simply what is best to prevent a deficiency disease (scurvy for which the recommended amount is 10mg/day).

Although the 200mg level is more than three times the currently recommended amount, it is a level that can still be readily obtained from foods, especially if the latest advise of consuming five or more servings a day of fruits and vegetables is followed. However, the most recent national survey indicated that less of one third of the American population consumed five or more servings of fruits and vegetables a day, which suggests that unless people improve their eating habits, it may be necessary to take supplements or fortify commonly eaten foods with vitamin C for most of the population to consume 200mg/day.

- <http://www.fas.org/pub/gen/fas/mnp/micro.html>
10. **Volunteers in Technical Assistance (VITA):** <http://www.vita.org>
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Maize Flour Fortification Trial Project in Zambia. On behalf of the Micronutrient Initiative and UNICEF, Promarket (a consulting firm) visited a number of hammer mills in selected rural and urban areas of Zambia in 1995, where micronutrient deficiencies are significant and widespread. The objective was to determine whether maize flour could be effectively fortified in hammer mills and whether the resulting fortified flour would be affordable and acceptable to the local population. Promarket concluded that it appeared feasible to use an inexpensive blender to add a premix containing vitamin A, iron and other nutrients, to the maize flour produced at those mills. With UNICEF and MI assistance, a consultative group in Zambia and other agencies, are expected to convene to review the scope of this project, advise on the appropriate premix composition, promote this dosing trial among the selected hammer mill owners, monitor progress and identify ways to facilitate fortification at hammer mills on a larger scale, i.e., at the district level and, if possible, compare it with alternatives such as supplementation and diet modification.

A number of hammer mill owners in both rural and urban areas as well as a potential blender designer and fabricator have expressed an interest in this project. The blenders for dosing the micronutrient pre-mix are to be designed and fabricated in Zambia, then installed at the mills selected for the trial. UNICEF Zambia has estimated that about 50% of the maize flour consumed in the country is produced by individual families who harvest and dry

the maize themselves. The flour is then taken to the nearest hammer mill for grinding to a fine powder, and then cooked in water and consumed as *Nshima*, a paste-like staple food.

Manufacturers of micronutrient pre-mixes have indicated an interest and ability to design and produce a pre-mix powder that can meet the demands of Zambia in terms of nutritional value, cost, stability, and organoleptic characteristics necessary to ensure that the fortified food will look, feel, taste, and smell the same as the conventional, plain, unfortified flour. These firms have also expressed an interest in participating in the dosing trial. One firm has already conducted lab tests in which samples of maize flour produced in hammer mills from Malawi were blended with pre-mix. The *Nshima* prepared with that mixture looked to be no different than one made from flour alone. If successful in Zambia, this method of fortification could be promoted and applied in other countries. Already other countries in Africa and donor agencies, have expressed an interest in applying the concepts to be tested in Zambia.

Hemocue Hemoglobinometer. An equipment update to inform you that UNICEF Copenhagen will be including the hemocue hemoglobinometer in its forthcoming catalogue. These machines will not be stocked since the delivery time ex-manufacturer is estimated to be only 3 to 4 weeks. Leading experts in the field of iron are recommending the use of this machine to conduct rapid field surveys of hemoglobin status - the assessment that is most useful in promoting action on iron deficiency anemia.

The manufacturer has also donated a few units for loan to developing countries which are now located at the CDC (Centers for Disease Control in Atlanta). The CDC has agreed to make any number of these units available for any UNICEF sponsored surveys. Country offices that are planning for an iron survey and that wish to borrow these machines should contact Abe Parvanta at the CDC, fax (770) 488-4728, phone (770) 488-4867, e-mail: ixp1@ccddn1.em.cdc.gov. Country offices will have to order their own supply of cuvettes, and should also indicate at the time of request for how long they wish to borrow the machines.

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In women with the lowest intake of folate, the prevalence of low birth weight was about 20% (>2500g), compared to less than 10% in women with the highest folate intake. Folate was more strongly linked to risk of low birth weight than iron.

The study was a prospective observational study and did not conclusively prove that folic acid deficiency caused low birth weight. Proof would only come from intervention trials. The authors cite studies done over a decade ago in India and Denmark which showed that folate supplements did reduce low birth weight.

Folic acid intakes can be improved through increasing consumption of fruits and vegetables, and green leafy vegetables are a rich source. Intakes can also be increased by the fortification of food staples, or by supplementation. UNICEF supplies tablet containing both folic acid and iron. Although there is growing evidence that weekly iron supplements may be effective in preventing anemia (see Research in Action, No.2, 1995 - check this), it is not known whether weekly folic acid supplements would be effective, the conventional wisdom is that folic acid, being a water soluble vitamin, needs to be taken every day.

Calcium Reduces Risk of Death During Pregnancy. New research findings indicate that adding calcium to the diets of pregnant women can substantially lower their risk of high blood pressure during pregnancy and pre-eclampsia, the leading cause of death in pregnancy around the world. This study published in the Journal of the American Medical Association (JAMA) found that the incidence of high blood pressure was reduced by 70 per cent among women who consumed the equivalent of four servings of dairy products a day or 1,500mg of calcium. The incidence of pre-eclampsia was also found to drop by 62 per cent. A similar study conducted by the same Canadian University also links calcium to a small but scientifically significant drop in blood pressure in the general population.

The currently recommended daily allowance (RDA) for calcium for both men and women ages 11-24 years, and pregnant women is 1,200mg. For older age groups, the RDA is 800mg. These levels are believed to be easily available if dairy products are included in the diet and are considered adequate to meet the body's physiological needs (bones and cells). Other sources of calcium in the diet are leafy green vegetables, bones (soft bones from fish - sardines and salmon, and tips of poultry leg bones) and calcium fortified foods. Water is considered as a variable source.

This study's finding coupled with existing knowledge that pregnant women benefit from calcium in their diets since pregnancy is a time when the body's natural supply is depleted by the fetus' demands, leads to the conclusion that women (especially pregnant women) should routinely be advised to consume dairy products and take calcium supplements during pregnancy.

Study Recommends a Revised Daily Dose for Vitamin C. The results of a new federally

sponsored U.S. study find that the optimal daily intake of vitamin A should be more like 200 mg as opposed to the current U.S. RDA which stands at 30-40mg. Researchers at the National Institutes of Health, also concluded that daily doses over 400mg have no value and that doses of 1,000 mg or more, which many people take as daily supplements or to prevent or treat illness could be hazardous. The study showed that beyond a dose of 400mg, the body's ability to absorb vitamin C diminished and that excesses were excreted. Unlike previous studies used to establish recommended amounts, this study bases its recommendations on what is best for the overall health of populations and not simply what is best to prevent a deficiency disease (scurvy for which the recommended amount is 10mg/day).

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Other Updates.

International Conference on the Fortification of Sugar with Vitamin A, March 12-15, 1996, Guatemala City, Guatemala. An international conference was held in Guatemala from March 12-15, 1996, to review the potential of sugar fortification with vitamin A in meeting the World Summit for Children goal to virtually eliminate vitamin A deficiency. The meeting, organized, by UNICEF, INCAP and PAHO, together with the Guatemala Sugar Organization, was inaugurated by the President of Guatemala. Thirty two countries from Latin America, Asia and Africa were represented at this meeting by Government, sugar industry and UNICEF.

Estimates indicate that 100% of sugar in Guatemala is fortified. As a result, Guatemala has been able to reduce the prevalence of vitamin A deficiency by nearly one half. The programme has also been found to be more cost-effective than either supplementation or dietary diversification as a way of ensuring adequate vitamin A intakes in Guatemala. In Guatemala, the fortification of sugar with vitamin A resulted in a marginal increase in the price of sugar (by 2 per cent). It was recognized, however, that a variety of strategies were needed and that dietary diversification had many other benefits and needed to be vigorously promoted.

Honduras and El Salvador expect to have most of their sugar fortified by the end of 1996. Fortification has started in Bolivia and Brazil, and is about to start in Ecuador. Participants from many other countries, including South Africa and Malawi stated their interest in exploring the feasibility of sugar fortification in their respective countries. The meeting ended with the Guatemalan Minister of Health reading a consensus statement on the role of sugar fortification in tackling vitamin A deficiency. A more detail summary report and copy of the consensus statement can be obtained by sending an e-mail to ndalmiya@unicef.org with just the words 'Sugar Meeting Report Please' in the title line of the message.

News from OMNI (Opportunities for Micronutrient Interventions).

OMNI Update, Special Vitamin A Edition, March 1996. This Update includes news briefs on sugar fortification in Central America, the OMNI Web Site, and the Manual for Fortifying Sugar with Vitamin A. Details are the Web Page and Manual are provided below:

OMNI's New Updated Web Page. OMNI's web page provides information on a range of micronutrient issues and OMNI activities in English, French and Spanish. Resources include: OMNI publications, such as the OMNI Update series, OMNI Briefs, Micronutrient Fact Sheets and Manuals, information about OMNI research, etc. To visit OMNI's site, set your browser to <http://www.jsi.com/intl/omni/home>.

Addresses for other relevant web sites are listed as follows:

1. **United States Agency for International Development (USAID):**
<http://www.info.usaid.gov>.
2. **The World Bank:** <http://www.worldbank.org/html/hcov/hdd/contents.html>
3. **National Library of Medicine:** <http://www.nlm.nih.gov/welcome.html>
4. **The Micronutrient Initiative:** <http://www.idrc.ca/mi/index.html>
5. **International Development Research Center (IDRC):** <http://www.idrc.ca>
6. **The International Committee of the Red Cross (ICRC):** <http://www.icrc.ch>
7. **World Health Organization (WHO):** <http://www.who.ch/>
8. **US Department of Health and Human Services:** <http://www.os.dhhs.gov/>
9. **Federation of American Scientists (Micronutrients and Agriculture Newsletter):**