Micronutrients and health

# Nutriview 2002/2

## Contents in brief:



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## Editorial:
# A complex task

The more that people seek to eliminate micronutrient deficiencies, the more they realize that they are fighting a many-headed serpent. Take iron deficiency anemia (IDA) as an example. It has been clear for a long time that the problem cannot be solved just by giving pregnant women iron supplements. Efforts to change people's diets so as to increase intakes of bioavailable iron or reduce iron absorption inhibitors fail, either because of the cost or because the target population cannot be convinced to make the extra effort. Food fortification is complicated by the dilemma of choice between high iron bioavailability or good stability and taste.

As research progresses, we begin to realize just how complex the problem is. To prevent IDA, it is not enough to increase iron intake alone; the body also needs adequate amounts of the vitamins A, C, E, $B_2$, $B_6$, $B_{12}$ and folate, as well as zinc and copper. Some of these nutrients improve iron absorption or mobilize iron stores; others are important for production of red blood cells or protection against oxidative damage. Recent surveys have shown that multiple deficiencies are not uncommon. In tropical countries, anemia prevention must also include measures to avoid blood loss caused by malaria and intestinal parasites.

This example* should sensitize all of us to the importance of finding a holistic solution that will lead to a sustainable improvement in global health and wealth. – *A. Bowley*

(* IDD is another: *see below*)

## Feature:
# Correction of iron deficiency improves response to iodine

One of the more impressive successes among recent nutrition efforts has been the widespread application of universal salt iodization to control iodine deficiency disorders (IDD). Nevertheless, the threat of iodine deficiency as a cause of preventable brain damage and mental retardation remains acute. To ensure that populations at risk have regular access to adequately iodized salt at an affordable price, authorities must create effective infrastructures for production, quality control and distribution. Even then, some individuals do not respond as expected. This might be because their diet contains goitrogens, food constituents that reduce thyroid hormone production. Other factors that have been shown to modify thyroid hormone metabolism, and so possibly increase the risk of IDD, are protein-energy malnutrition, and deficiencies of iron, selenium and vitamin A.

Since 1997, a team from the Swiss Federal Institute of Technology Zurich and the Ministry of Health of Côte d'Ivoire has conducted research into the influence of iron deficiency on the response to iodized oil and iodized salt [1,2,3]. Their findings strongly suggest that the efficacy of iodized salt is improved when iron deficiency is corrected at the same time.

### Anemia limits iodine effect

The studies were done in school-age children in a mountainous region of Côte d'Ivoire, where goiter is endemic. In the first study, all children between 6 and 15 years were screened for goiter and iron deficiency anemia (IDA). Almost half of them (45%) had goiter, and more than a quarter (27%) had IDA. Almost a fifth (19%) had both goiter and IDA.

The researchers then gave an oral dose of 200 mg iodine in oil to 109 goitrous children (53 without anemia, 56 with IDA) and observed the effects on goiter and IDA over 30 weeks. At the end of this period, 34 children with IDA (64%) were still goitrous, compared with 6 nonanemic children (12%). Mean thyroid volume was reduced by 45% in the nonanemic children, but only by 22% in those with IDA. Three anemic children and 2 nonanemic children did not complete the study.

At this stage, all the anemic children began supplementation with iron (60 mg ferrous sulfate four times a week for 12 weeks). This corrected the anemia in all but 6 children, and lowered goiter prevalence in the group to 20%.

### Double fortification recommended

In 1998, iodized salt was introduced to the region. Within a year, more than 80% of households were using it. To determine the effects of iron supplementation under these conditions, the team again screened 1014 children in the region's primary schools, and analyzed the iodine content of the salt used in the households. Although salt iodization and mean urinary iodine levels seemed adequate, 594 children (59%) had goiter. Iron deficiency was diagnosed in 224 of these children.

In the following comparative study, 85 children with both goiter and IDA took an iron supplement (60 mg ferrous sulfate four times a week for 16 weeks), while 81 took a placebo. All children were dewormed before starting treatment, and half the children in each group received a single oral dose of 200 mg iodine in oil.

Iron supplementation significantly decreased the prevalence of anemia and iron deficiency. Twenty weeks after the start of supplementation, the goiter rate was significantly lower in supplemented children (43%) compared with those who took placebo (62%). Children whose anemia at baseline was more severe or was not resolved by iron supplementation had a poorer response to iodine. The children who received iodine in oil showed similar results to those who did not, indicating that the intake of iodine with salt was not the limiting factor.

The researchers conclude that, if IDA is a nutritional factor that influences the pathogenesis of IDD, its impact might be greater than that of dietary goitrogens. Because of the high prevalence of both deficiencies in many populations, they recommend double fortification of salt with iron and iodine as a possible solution. To test the value of this recommendation, they developed a salt formulation containing iodine (25 µg/g) and encapsulated iron (1 mg/g) and compared its effects with those of the regular iodized salt in 377 iodine-deficient Moroccan schoolchildren[4]. After 40 weeks at a daily intake of 7–12 g salt, prevalence of IDA fell from 35% to 8% in the children fed the dual fortified salt. Improvements in biochemical and clinical indicators of IDD were also more pronounced than in those on iodized salt. Stability and organoleptic properties of both formulations were acceptable. – ■

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■ Feature:

# Development of iron fortified foods

Food fortification is often suggested as the best long-term approach to increase iron intake. To establish a successful food fortification program, however, it is essential to consider various important factors, including the choice of food vehicle and iron compound, the fortification level and ways to enhance iron bioavailability from the fortified food. The fortification process should comply strictly with good manufacturing practice and be closely monitored on a regular basis. This review aims to guide food manufacturers and others involved in the development of iron fortified foods [for more detailed information see references 1 and 2].

### Choice of food vehicle

The foods most frequently fortified with iron include cereal flours (to increase intakes in the general population) and infant foods (for targeted fortification programs). Fortification of condiments such as salt, sugar, fish sauce and soy sauce are alternative approaches to increase iron intake in large segments of the population. This approach could be particularly useful where consumption of industrially processed foods is low, where cereal flours are milled locally, and/or where rice is the major staple food, since it is difficult to fortify rice with iron. However, we are unaware of any large-scale programs to fortify condiments with iron at present.

### Choice of iron compound

The choice of compound should be carefully considered for each food vehicle, based on bioavailability of the compound and sensory evaluations of the fortified food. The compounds that are the most soluble, and thus the most bioavailable, often provoke unacceptable fat oxidation and changes of color, taste and odor during storage or food preparation. In this context, it is important to consider local conditions (such as temperature, humidity, packaging, storage time, food preparation and consumption patterns). Sensory panels should be trained to evaluate changes in flavor, aroma and color, and, when applicable, parameters such as texture and sedimentation. Monitoring of pentane formation as an objective indicator of fat oxidation during storage should also be considered. Cost is another important issue. As it varies with the source and the quantity purchased, we have not compared prices here. Some key characteristics of different iron compounds, including their relative bioavailability value (RBV) relative to ferrous sulfate and the foods commonly fortified, are shown in Table 1.

Compounds with the highest RBV should be the first choice for food fortification when acceptable organoleptically. In practice, ferrous sulfate is the only widely used water-soluble compound. If the water-soluble compounds cause unacceptable sensory changes to the food vehicle, the next step is to evaluate those that are soluble in dilute acid, such as ferrous fumarate. These cause fewer unacceptable organoleptic changes than water-soluble compounds and have a similar, or slightly lower, RBV in healthy adults. However, as they dissolve in the gastric juice during digestion, the RBV can be reduced in individuals with impaired gastric acid secretion.

One way to prevent or retard the negative sensory changes associated with compounds soluble in water or dilute acid is to encapsulate them, using a coating material such as hydrogenated oil, maltodextrin or ethyl cellulose. Encapsulated ferrous sulfate and ferrous fumarate are both available commercially. The coating material appears to have little effect on the relative bioavailability of these compounds in rat assays [3]. However, the instability of the coating material during food processing, in particular at elevated temperatures, could be a potential problem in some foods. So far, encapsulated compounds have not been widely used. Before including them in large-scale fortification programs, human bioavailability and/or efficacy studies should be made to demonstrate the usefulness of this approach.
The last choice for food fortification are the compounds that are insoluble in water and poorly soluble in dilute acid,

**Table 1: Characteristics of iron compounds for food fortification.** Adapted from Hurrell 1999 [1].

| Compound | Solubility[a] (potential for adverse organoleptic changes) | Approx. iron content (%) | RBV[b] in humans (%) | Common uses |
|---|---|---|---|---|
| Hydrated ferrous sulfate | ++ (high) | 20 | 100 | Infant formula, wheat flour with short |
| Dried ferrous sulfate | ++ (high) | 33 | 100 | shelf-life, bread, pasta |
| Ferrous gluconate | ++ (high) | 12 | 89 | None |
| Ferrous lactate | ++ (high) | 19 | 106 | None |
| Ferric ammonium citrate | ++ (high) | 18 | ND[c] | None |
| Ferrous ammonium sulfate | ++ (high) | 14 | ND | None |
| Ferric choline citrate | ++ (high) | 14 | ND | None |
| Ferrous fumarate | + (low) | 33 | 100 | Infant cereals |
| Ferrous succinate | + (low) | 35 | 92 | None |
| Ferric saccharate | + (low) | 10 | 74 | Chocolate drink powders |
| Ferric glycerophosphate | + (low) | 15 | ND | None |
| Ferrous citrate | + (low) | 24 | 74 | None |
| Ferrous tartrate | + (low) | 22 | 62 | None |
| Ferric pyrophosphate | Ø (negligible) | 25 | 21 – 74 | Infant cereals, chocolate drink powders |
| Ferric orthophosphate | Ø (negligible) | 28 | 25 – 32 | Infant cereals |
| Elemental iron powders[d]: | Ø (negligible) | | | Cereal flours, RTE[e] cereals, infant cereals |
| Electrolytic | | 97 | 75 | |
| H-reduced | | 97 | 13–148 | |
| CO-reduced | | 97 | ND | |
| Atomized | | 97 | ND | |
| Carbonyl | | 99 | 5–20 | |

a. ++ = freely soluble in water; + = poorly soluble in water/soluble in dilute acid; Ø = water-insoluble/poorly soluble in dilute acid
b. RBV = average relative bioavailability value (relative to ferrous sulfate)
c. ND = not determined
d. Current recommendation [4]: electrolytic elemental powder (Glidden A131)
e. RTE = Ready-to-eat

such as iron phosphates and elemental iron powders. Because they dissolve slowly and incompletely in gastric juice during digestion, iron absorption is difficult to predict, and depends on physical characteristics (size, shape and surface area of particles) of the compound, as well as the consumer's gastric acid secretion and the composition of the meal. Although little is known about the usefulness of the elemental iron powders, other than electrolytic iron powder, they are widely used for food fortification. A recent review by an expert panel concluded that the electrolytic iron powder of choice for food fortification at present is the commercial product known as Glidden A131 [4]. Due to the limited information available, no decision about the usefulness of hydrogen (H)-reduced, carbon monoxide (CO)-reduced, atomized or carbonyl iron powders was made. In rat studies, reduced iron powders with large particle size (100 mesh; >149mm) had the lowest bioavailability, so they should not be used for food fortification.

Other alternatives to be considered are sodium iron ethylenediaminetetraacetate (NaFeEDTA) and ferrous bisglycinate. The Joint FAO/WHO Expert Committee on Food Additives recently approved NaFeEDTA at a maximum daily intake of 0.2 mg iron/kg body weight for food fortification in supervised programs in areas with a high prevalence of iron deficiency (http://www.who.int/pcs/jecfa/summary53revised.pdf). The major advantage of NaFeEDTA is that it prevents iron binding to phytic acid, a potent inhibitor of iron absorption. This means that, when NaFeEDTA is added to cereal foods or to meals containing a considerable amount of phytic acid, two to three times as much iron is absorbed than when ferrous sulfate is used [5, 6]. Efficacy studies have also demonstrated the usefulness of NaFeEDTA in fish sauce, sugar and curry powder [5, 7]. Ferrous bisglycinate has been developed commercially, and it has not been possible to get a completely independent evaluation of its bioavailability. Its usefulness as a food fortificant is largely limited by unwanted color reactions and fat oxidation in cereal flours, and its high price. It may be useful as a fortificant for liquid milk and other milk-based products, however.

## Optimizing iron bioavailability

Addition of an iron absorption enhancer should be considered, especially when the food vehicle or the general diet contains significant amounts of absorption inhibitors such as phytic acid and polyphenols. Ascorbic acid is most commonly used, but an alternative might be sodium EDTA. Removal or degradation of phytic acid is another way to improve iron absorption, in particular from infant foods based on cereals and/or legumes.

Ascorbic acid increases iron absorption in humans from cereal meals, infant formulas and chocolate drinks fortified with ferrous sulfate, ferric chloride, ferric ammonium citrate, ferrous fumarate, ferric orthophosphate and electrolytic iron. The enhancing effect is dose dependent. It also depends on the level of iron fortification and the amount of inhibitors present in the meal. Based on published studies, a significant increase in iron absorption can be expected at a 6:1 ratio of ascorbic acid to iron by weight (2:1 molar ratio). This might not be sufficient, however, for meals with a very high inhibitor content. To enhance iron absorption from foods fortified with electrolytic iron, a weight ratio of 16:1 (5:1 molar ratio) may be needed [8]. Some uncertainty still exists concerning the influence of ascorbic acid on iron absorption from ferrous fumarate. A major limitation to the use of ascorbic acid is its susceptibility to losses during storage and food preparation. Storage losses can be unacceptably high, particularly under hot and humid conditions. Sophisticated packaging or encapsulation can largely prevent this degradation, but may be too expensive for many applications.

Sodium EDTA has the advantage of being stable during storage and food preparation and it is an accepted food additive in many countries [5]. Until now, the enhancing effect of sodium EDTA on iron absorption has only been demonstrated for ferrous sulfate. Based on current knowledge, it would appear that a molar ratio of EDTA:iron of 0.5:1 to 1:1 will enhance iron absorption from foods fortified with ferrous sulfate. This effect might also be expected with other water-soluble iron compounds, but it is still uncertain if it will enhance iron absorption from less soluble compounds.

Phytic acid is a potent inhibitor of iron absorption even at low concentrations, and it is not clear how much must be removed to achieve a meaningful increase in iron absorption. Clearly, the most pronounced effect will be achieved after complete removal or degradation. However, this might not always be achievable. Based on iron absorption studies in humans, it is estimated that reducing the phytic acid:iron molar ratio in iron fortified foods to <1:1 should result in a nutritionally significant increase in iron absorption. Phytic acid can be removed from cereals by milling, degermination, soaking, germination, water washing of milled flour, or fermentation. Phytic acid has been removed from soy by dialysis and ultrafiltration of protein isolate treated with acid or alkali. The most effective way to completely degrade phytic acid is to add commercial phytase [9].

## Choice of fortification level

The level of iron fortification should be based on information about dietary intakes of iron by the target population, their requirement for absorbed iron, the expected absorption of iron from the fortified food, and the consumption pattern of the food. It might be necessary to add 2 to 3 times more iron when using the more insoluble compounds such as elemental iron powders or iron phosphates than with ferrous sulfate.

Iron absorption from the fortified food should preferably be measured in the target population using radioisotopes or stable isotopes of iron. Compounds that dissolve slowly or incompletely in the gastric juice must be intrinsically labeled with isotope(s) before testing. Iron absorption from elemental iron powders or iron phosphates cannot be measured by extrinsic labeling techniques. Ideally all compounds to be tested should be labeled intrinsically and synthesized in collaboration with the manufacturer of the chosen commercial iron compound. This ensures that the labeled compound is equivalent to the commercial product. However, it is extremely difficult to synthesize isotopically labeled elemental iron powders or labeled encapsulated iron compounds identical to the equivalent commercial product. An alternative way to produce radiolabeled compounds is to irradiate the commercial elemental iron powders [10].

## Demonstrating a nutritional benefit

The usefulness of the fortified food should be demonstrated by monitoring the impact on iron status in well controlled "efficacy" studies, such as the recent six-month efficacy study which demonstrated that fish sauce fortified with NaFeEDTA improved iron status of Vietnamese women [7]. Effectiveness of a food fortification program is more difficult to evaluate since changes in iron status are monitored in less controlled settings, closer to the "real life situation".

Due to the numerous difficulties and great expense involved in organizing large scale studies, this evaluation is rarely made. Alternatively, the possibility to evaluate effectiveness (including cost-benefit analysis) during implementation of food fortification strategies should be explored. – *Lena Davidsson & Richard Hurrell, Laboratory of Human Nutrition, Institute of Food Science and Nutrition, Swiss Federal Institute of Technology Zürich, PO Box 474, CH-8803 Rüschlikon, Switzerland*

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Feature:

# Nigeria makes vitamin A fortification mandatory

On February 26th, 2002, Nigeria introduced amended Food Standards for sugar, wheat flour, semolina, palm and soya oils. The main reason for these changes was to accommodate the mandatory addition of vitamin A in line with the established Nutrition Policy of Nigeria. Details are shown in Table 1.

The launch was celebrated with a meeting at the Nicon Hilton Hotel in Abuja. Distinguished guests were Chief Kola Jamodu (Honorable Minister of Industry) and his Permanent Secretary, Mrs Doris Amlia (Director, Planning, Research, Statistics, NAFDAC), Dr John Ndanusa Akanya (Director-General, Standards Organisation of Nigeria), Chief Gray Longe (President, Flour Millers Association of Nigeria), Dr Christian Voumard (UNICEF Nigeria), the chairman of the National Planning Commission, representatives of the Federal Ministry of Health, the Federal Ministry of Education, WHO, USAID, the flour, sugar and vegetable oil industries, and the media.

In his opening address, Chief Kola Jamodu said that the Federal Government is committed to eradicating vitamin A deficiency in Nigeria. That is why it has established these Standards. He stressed how important it is for Nigerian food products to meet international standards. Speaking on behalf of the flour milling industry, Mr Yemi Ogunyemi (Flour Mills of Nigeria, Apapa) appealed to all stakeholders to work together and make fortified bread available at a price that Nigerians can afford.

Dr John Ndanusa Akanya described the efforts being made to ensure that all stakeholders are informed about the new Standards. Free information pamphlets will be made available to the public. Now it is important to push ahead and implement the Standards without delay, and to establish effective social marketing and monitoring measures. – *Sobo Onasanya, Biochemical Derivatives, Lagos*

**Table 1: Mandatory fortification levels of micronutrients** (Revised Nigerian Industrial Standards, 2000)[a]

| Product | Mandate | Nutrient | Amount to be added |
|---|---|---|---|
| Wheat flour | NIS 121: 2000 | Vitamin A<br>Vitamin B1<br>Vitamin B2<br>Niacin<br>Iron | 30 000 IU/kg<br>6.2 mg/kg<br>3.7 mg/kg<br>49.5 mg/kg<br>40.7 mg/kg |
| Wheat semolina/pasta | NIS 396: 2000 | Vitamin A | 30 000 IU/kg |
| Edible palm kernel oil | NIS 289: 2000 | Vitamin A | 20 000 IU/kg |
| Bleached and/or deodorized palm oil | NIS 230: 2000 | Vitamin A | 20 000 IU/kg |
| Edible soya bean oil | NIS 392: 2000 | Vitamin A | 20 000 IU/kg |
| Refined white sugar | NIS 90: 2000 | Vitamin A | 25 000 IU/kg |

a. The full text of these Standards is at <www.nutrivit.org/vic/staple/index.htm>

Feature:

# Kenya reviews nutrition strategy

In 1999, the Kenya Medical Research Institute conducted, jointly with UNICEF, the Division of Child Health of the Ministry of Health, the Applied Human Nutrition Unit of the University of Nairobi and the Social Science and Medicine-Africa Network, a national survey of anemia among young children, mothers and adult men. Nested in this survey was an assessment of iron, vitamin A and zinc status, as well as selected dietary, health and socioeconomic factors. Existing information was used to estimate anemia prevalence in school-age children and the elderly. On February 21/22, 2002, the results were officially presented in Nairobi with the participation of the Honorable Minister of Public Health, Professor S. Ongeri.

### Hidden hunger a major problem

The survey confirmed that anemia is a national public health problem of a magnitude sufficient to retard Kenya's socioeconomic development (Table 1). In this respect, children under 3 years of age, and pregnant and lactating mothers bear the largest burden. The main causes of anemia are inadequate intake and poor bioavailability of iron, and losses associated with malaria and hookworm. Vitamin A deficiency is also associated with an increased risk of anemia.

The high prevalence of vitamin A and zinc deficiencies shows that multiple micronutrient deficiencies constitute a significant public health problem in Kenya. The assessment of health services utilization makes it clear that there is considerable scope for improvement. In particular, laboratory capacity for anemia screening is inadequate, and only a minority of women take antenatal iron and folic acid supplements as recommended. One of the reasons for this appeared to be frequent shortages of supplements in the market.

Dr David Mwaniki (Kenya Medical Research Institute), who led the survey team, pointed out that the current situation delays cognitive and physical development, and makes poor pregnancy outcomes unavoidable. The costs and implications on quality of life for many Kenyans are enormous.

**Table 1: Findings of the 1999 Kenya National Anemia Survey**

| | Children | Mothers | Men |
|---|---|---|---|
| Number surveyed | 3229 | 3163 | 1183 |
| Age range (years) | <6 | 28.31±7.67 | 36.43±10.28 |
| Anemia (%): | | | |
| • mild | 19.2 | 28.0 | 26.2 |
| • moderate/severe | 54.2[a] | 21.2[b] | 5.1 |
| Iron deficiency (%) [serum ferritin <20 g/L] | 31.8 | 43.4 | 15.9[c] |
| Vitamin A deficiency (%) [serum retinol <20 µg/dL] | 84.4 | 50.7 | 42.4 |
| Zinc deficiency (%) [serum zinc <65 µg/dL] | 50.8 | 52.2 | 45.0 |
| Malaria parasites (%) | 36.9 | 19.7 | 18.7 |
| Hookworm (%) | 9.3 | 35.3 | 32.9 |

a. Highest anemia prevalence in children under 30 months (76.5%)
b. 34.5% of pregnant women had moderate/severe anemia compared with 18.6% of nonpregnant women
c. 5.3% of men had serum ferritin levels >30 g/L (iron overload)


*The Honorable Minister of Public Health, Professor Ongeri: "Malnutrition is not only morally unacceptable, but also economically!"*

### The way ahead

In its National Plan of Action for Nutrition, Kenya aims to reduce iron deficiency anemia in pregnant women by 30% by 2004, reduce malnutrition in children under 5 years by 30% by 2005, and eliminate vitamin A deficiency in children under 5 years by 2005.

To achieve these objectives, the following measures are proposed:

1. Formulate government policies to stimulate concerted multisectoral efforts in the public and private sectors;
2. Implement without delay a nationwide advocacy campaign to highlight the consequences of hidden hunger and the benefits of available intervention options;
3. Retarget and strengthen primary prevention measures for the general population.
4. Improve access to public health services, micronutrient supplements, hematinics, and control of parasitic diseases, especially for mothers and children;
5. Strengthen nationwide efforts to increase intakes and bioavailability of micronutrients through plant breeding, dietary modification and food fortification;
6. Seek innovative solutions to increase efficiency and reduce costs.

Dr Peter Eriki (WHO, Kenya) urged participants to pursue the food fortification and supplementation programs with high priority.

### Government backing assured

To expedite further action, the findings of the survey are to be widely disseminated among policy makers and senior program officers in the relevant sectors of governmental and non-governmental organizations. Key senior managers in health and related sectors will be asked to develop feasible intervention plans for control of anemia and micronutrient deficiencies. The micronutrients committee and its researchers should fine tune risk maps for different regions and associated factors, and design social marketing strategies as part of operations research to strengthen various interventions. The findings should also be disseminated to districts and specific communities who participated in the survey.

Professor Ongeri reminded everyone that malnutrition is not only morally, but also economically unacceptable. Kenya loses 1.5% of its GDP as a result of micronutrient deficiencies. By resolving this problem the country will achieve a huge economic benefit. He confirmed that his ministry will continue to work with the private sector to reduce micronutrient malnutrition, and undertook to take the legislation to parliament so that commonly eaten foods can be fortified. He also committed himself to positioning a policy statement for the way forward to ensure that Kenyan society is fully protected from micronutrient malnutrition, and urged all partners to collectively work out strategies to sustain the agenda. –

## News in brief:

### GAIN launched at UNO Summit

The Global Alliance for Improved Nutrition (GAIN) was officially launched on May 9th, 2002, at the Children's Summit in New York. It will become operational on July 1st. Rolf Carriere (previously with UNICEF) has been appointed as Executive Director; the Executive Board will have ten voting members, each representing a constituency group. More than US$20 million in funds are available for the first year's activities.

Further details, including guidelines for organizations wishing to apply for GAIN membership or a grant, can be found at the GAIN web site (http://www.gainhealth.org). –

## Internet:
# Nutriview in the ‘net


Following my editorials about nutrition sites on the Internet, several readers suggested we make this a regular feature in Nutriview. I am happy to comply, especially since it seems that every nutrition research and development organization has its own web site these days, making it even harder to keep up to date.

Of course, Nutriview also moves with the times. Since the beginning of this year, each new issue of Nutriview is immediately posted on the web site of NutriVIT (http://www.nutrivit.org/vic/staple/index.htm) together with those from 2000 and 2001. From there it can be downloaded as a PDF file. Thanks to email and the Internet, we have been able to streamline the production and distribution of Nutriview considerably. Communication with authors, reviewers and readers is much easier and faster now than when everything had to be printed on paper and distributed by telefax or air mail.

### Multilingual information center

NutriVIT is the Basel-based Association for Nutrition and Vitamin Information, which was formed in 1997 to raise awareness about the important links between nutrition and health. Sponsored by Roche Vitamins Europe Ltd, NutriVIT wants to help promote good public health by encouraging a healthy diet and lifestyle based on informed knowledge of vitamins and nutrition.

An unusual feature of NutriVIT is that information is provided in English, French, German, Italian and Dutch. The different language sections can be accessed directly from the home page. A Polish section will be added soon. Each national information center, as well as the home page, has sections for news, documentation and links to other sites.

While most of these centers address the needs of health professionals, the media and consumers in Europe, the VIC (based in South Africa) provides information primarily for people in sub-saharan Africa who understand English. It is at the VIC site (*see photo below left*) that you can find Nutriview alongside the Sight-and-Life newsletter, Fortification Basics and other documents associated with micronutrient interventions.

### South African links

Links to the VIC and Nutriview can also be found on the web sites of two other South African organizations, the South African Health Information Organization (http://www.sahealth-info.org/nutrition/nutrition.htm) and the Nutrition Information Centre of the University of Stellenbosch, NICUS (http://www.sun.ac.za/nicus). These sites provide nutrition information and services specifically for South Africans. The SAhealthinfo site includes an up-to-date food composition database and nutritional software to facilitate dietary investigations, a calendar of events, access to recent publications, and discussion groups. NICUS offers services for nutritional evaluations, as well as up-to-date, authoritative information on nutrition.

### IDPAS Iron World

Perhaps the most comprehensive list of iron nutrition on-line resources available is on the web site of IDPAS, the Iron Deficiency Project Advisory Service (http://www.micronutrient.org/idpas). It provides direct links to the sites of all United Nations organizations, multilateral organizations working in public health, university nutrition departments and to nutrition publications, including Nutriview.

IDPAS is a project of the International Nutrition Foundation and the United Nations University. The goal of IDPAS is to fill information gaps in international and national efforts to prevent and control anemia and iron deficiency in developing countries as well as countries in transition. This is accomplished mainly through the website, which currently features over 800 articles, reports, technical guidelines, presentations, graphics and other useful materials related to iron nutrition and deficiency issues. IDPAS also provides research services, as well as expert responses and referrals to questions from registered users, free of charge.
– *A. Bowley*



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