SCN News, Number 09 – Focus on Micronutritients

Table of Contents

Table of Contents

SCN News, Number 09 – Focus on Micronutritients

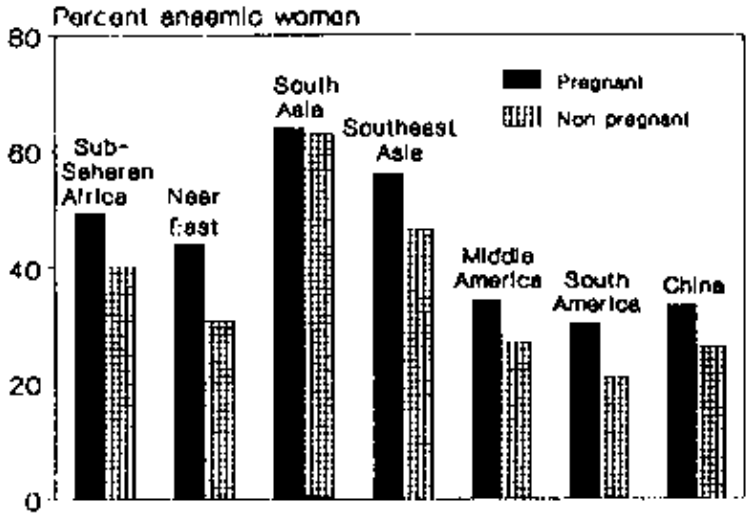
UNITED NATIONS NATIONS UNIES

ADMINISTRATIVE COMMITTEE ON COORDINATION – SUBCOMMITTEE ON NUTRITION

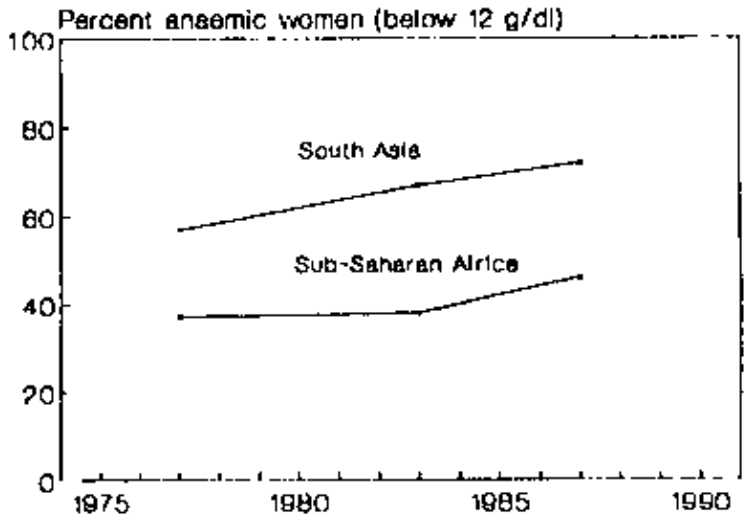
Mid 1993

A periodic review of developments in international nutrition compiled from information available to the ACC/SCN

FOCUS ON MICRONUTRIENTS



Anaemia, 1980s (Adult women, 15–49 years old)



Trend in Anaemia, 1977–1987 (Nonpregnant adult women, 15–49 years old)

Recent ACC/SCN publications

Second Report on the World Nutrition Situation. Volume I: Global and Regional Results (1992)

Second Report on the World Nutrition Situation. Volume II: Country Data (1993)

Nutrition–Relevant Actions – Some Experience from the Eighties and Lessons for the Nineties (1991) (SOA No.10)

Book developed from the original background paper for ACC/SCN meeting on nutrition policy held in London in November 1990. Proposes a framework for the analysis of policies and programmes affecting nutrition, before reviewing experiences during the 1980s in several countries, and moving on to consider options for improving nutrition in the 1990s. Complements and expands on Supplement to SCN News No.7 “Some Options for Improving Nutrition in the 1990s”.

Nutrition and Population Links – Breastfeeding, Family Planning and Child Health (1992) (SOA No. 11)

Report of symposium on “Nutrition and Population” held at the 18th Session of the ACC/SCN in New York in February 1991. Includes papers on the linkages between family planning and nutrition programmes, reproductive stress and women's nutrition, and breastfeeding, fertility and population growth.

Nutritional Issues in Food Aid (SOA No. 12) (1993)

Report of symposium on “Nutritional Issues in Food Aid” held at the 19th Session of the ACC/SCN in Rome, February 1992. Includes papers on the support of public works by food aid as a nutrition intervention, which age groups should be targeted for supplementary feeding, effects of supplementary feeding in the growth of children with infection, experiences of feeding programmes, and protecting refugees' nutrition with food aid.

Effectiveness of Vitamin A Supplementation in the Control of Young Child Morbidity and Mortality in Developing Countries (SOA No. 13) In press

The full report of findings summarized in the article of the same name on page 17 of this issue.

Copies of these publications can be obtained by writing to the ACC/SCN Secretariat. A charge of US $10–$20 per copy – price depending on size of volume and number of copies ordered (a discount is available) – will be made to those requesting from Australia, Europe, Japan, New Zealand, North America, to help cover costs.

SCN News is issued twice–yearly by the Secretariat of the UN ACC/Sub–Committee on Nutrition.

Your contribution to future issues would be welcome. Please send us items for inclusion in “News and Views”, “Programme News” and/or “Publications”. Letters to the Editor for possible publication in future issues are also most welcome. SCN News aims to help the sharing of experience in nutrition.

If you wish to receive additional copies of SCN News, or would like to suggest other names to be added to our distribution list, please write to us.

Dr John B Mason, Technical Secretary, ACC/SCN, Room X48, c/o WHO Headquarters, Avenue Appia, 20, CH–1211 Geneva 27, Switzerland. Fax: (41–22) 798 8891 Phone: (41–22) 791 0456

Dr Abraham Horwitz, Chairman, ACC/SCN, Director Emeritus, PAHO, 525 Twenty–third St. N.W., Washington, D.C., 20037, USA.

Edited by John Mason, *Assistant Editor* Vila Elliot, with contributions from Marito Garcia. We are most grateful for contributions as shown in *Sources* after articles.

We gratefully acknowledge funding assistance from the United States Agency for International Development (USAID) for the preparation and printing of this issue of SCN News

Addressing Micronutrient Malnutrition

The following article is adapted and edited from the paper "Best Practices in Addressing Micronutrient Malnutrition" by Judith McGuire, The World Bank, 1818 H Street NW, Washington DC, 20433.

Vitamins and minerals cannot be synthesized by the human body. They must be provided by the diet. The amounts needed are small – micrograms or milligrams a day – so they are called "micro" nutrients. They are necessary for the regulatory systems in the body, for efficient energy metabolism and for other functions (cognition, immune system, reproduction). In this paper the focus is on vitamin A, iron and iodine even though there are many more micronutrients including some that are suspected of being deficient in some developing countries. The three focal nutrients were selected because they are known to be deficient widely in developing countries, we know how to treat them, and we can measure progress unambiguously. Deficiencies of these nutrients cause illness, death, learning disabilities, and impaired work capacity.

The causes of deficiency vary from nutrient to nutrient and across regions. Iodine deficiency is largely an environmental problem – iodine–deficient soils and water exist in the high mountain ranges and in flood plains where the primordial iodine has been depleted over millennia. Plants grown in such soils and water lack iodine, so human beings and animals eating those plants become iodine deficient (iodine is not a necessary nutrient for most plants). It is not unusual to see goitres in cows and sheep just as in human beings. The animals exhibit low wool production, inadequate growth, and poor reproductive performance. Human beings are affected even more profoundly. Certain foods – cassava and cabbage, for instance – impair the utilization of iodine in the body and can precipitate iodine deficiency in marginally adequate populations. Good food sources of iodine (seaweed and seafood) are highly perishable, culture specific, often expensive and are rarely eaten by affected populations. Food fortification is usually necessary for prevention of iodine deficiency in iodine–depleted geographic areas. Iodized salt is the commonest micronutrient–fortified food.

Iron deficiency is largely due to the low absorption of iron from foods. Red meat and animal blood (consumed in many traditional societies) are the best sources of highly absorbable iron, but meat is not affordable or religiously acceptable to large numbers of people in developing countries. For infants, most iron comes from breastmilk in which the iron is highly absorbable but present in low concentrations. Most of the iron in the diet comes from grains, legumes, and vegetables, from which the absorption is usually 5% or less. Absorption can be increased three to seven–fold by eating acidic foods, especially those rich in vitamin C, along with iron–containing foods. Tea and coffee can severely inhibit iron absorption when taken at the same meal. The low absorption of iron in the diet can double the requirement for iron intake.

Vitamin A is found preformed in animal foods (especially liver and milk). Vitamin A precursors, found primarily in plant products (generally leafy green vegetables, yellow and red fruits and vegetables, and red palm oil), can be converted into vitamin A in a ratio estimated as 6:1. Vitamin A intake is often inadequate because of the seasonality of food sources, the early abandonment of breastfeeding, and the practice of not giving vitamin A–rich foods to young children. Vitamin A is also destroyed by improper processing and storage because it decomposes in light. Vitamin A absorption may also be impaired where the diet is very low in fat or where intestinal parasites are prevalent.

Deficiency Diseases

During rapid growth, micronutrient intake must increase or else growth failure or deficiency diseases develop. It is during these periods that deficiency symptoms are most prevalent. For this reason, preschool–aged children, adolescents, and reproductive–aged women are high priority target groups. School–aged children are a secondary target group because of learning problems associated with micronutrient deficiencies. Anaemic adult workers are a third target group; for example, iron supplementation has been shown to significantly improve work output in Indonesia and Kenya.

There are important interactions between micronutrient deficiencies and infectious diseases. Vitamin A deficiency and measles, for instance, act synergistically to exacerbate the severity of measles and precipitate vitamin A blindness and death. Severe anaemia is often jointly caused by malnutrition, malaria, and hookworm. It is difficult to attribute a proportion of micronutrient deficiencies to these health problems, but surely prevention of micronutrient deficiencies must play a role in infectious disease control, and vice versa.

Iron deficiency and iodine deficiency are associated with abnormal lethargy and low work potential. Work output of men working on piece rate jobs has been directly related to the severity of anaemia. For a 10% increase in haemoglobin, there is a 10–20% increase in work output.

Night–blindness, a reversible symptom of vitamin A deficiency, impairs the ability to see under poor lighting conditions. Women often show increased prevalence of night–blindness during pregnancy which may mean their ability to make meals, mend clothes and take care of other chores in the semi–darkness of the home is compromised. Children may be unable to get around in the dark and students may be incapable of studying except in broad daylight. Soldiers may be unfit for duty except in broad daylight.

When moderate or severe deficiencies coincide with critical development stages, they can cause prolonged or permanent dysfunction. Iron deficiency, for instance, is associated with poor attention span, inadequate fine motor skills, and reduced memory retention. If this occurs during critical stages in preschool cognitive development or during schooling when specific skills are being taught then the child may never catch up. In Chile, investigators have found that iron deficiency in early infancy, even if corrected upon diagnosis, still resulted in learning disabilities years later in school. Investigators in Thailand and Indonesia found that iron–deficient children treated with iron supplements improved (cognitive skills and performance on achievement tests) but they never performed at the level of non–anaemic children.

Iron–deficiency has been associated with prematurity and low birth weight (LBW). While adequate health and nutrition care can compensate for prematurity or LBW, often such children have lingering frailties (immune system dysfunction, growth failure) which increase the child's risk of morbidity and mortality throughout childhood.

Deficiency can be Lethal

All three micronutrient deficiencies are associated with increased mortality. Severe vitamin A deficiency (keratomalacia) has very high fatality rates (60%) but even subclinical deficiency is associated with a 23% increase in preschooler mortality in areas with endemic vitamin A deficiency. Severe anaemia causes heart failure. It is estimated that 20% of maternal mortality is due to anaemia, directly (heart failure) or indirectly (inability to tolerate haemorrhage). In addition, fatality rates in children hospitalized with severe anaemia have been estimated to be 31 % unless they receive immediate blood transfusions.

Maternal iodine deficiency is responsible for high rates of still birth and neonatal mortality – on the order of 0.5 to 1% of pregnancies in endemic areas. In addition, foetal iodine deficiency can result in severe, irreversible mental retardation and neurological disorders (cretinism) and limited lifespan. Less severe handicaps associated with foetal iodine deficiency include deafness, muteness and mild to moderate mental retardation. These handicaps are irreversible and severely limit the learning capacity, occupational choices, and future earnings of these individuals.

Iodine–deficiency the woman on the left is adult

Vitamin A deficiency is not only potentially lethal, it also causes monocular or complete blindness. In endemic areas, blindness rates are about 0.01% of children under 6. The chances for a blind or visually handicapped child to get appropriate schooling are extremely rare in developing countries. These children also have limited options for earning a livelihood and become a long–term burden for their families.

Poverty & Deficiency

While poor people are more likely to suffer from micronutrient malnutrition, micronutrient intake is not necessarily linearly related to income. Iodine intake, for instance, may be constant regardless of income because its concentration in food is a product of environmental iodine concentration. The very wealthiest consumers may ingest adequate iodine because they can afford to buy seafood or iodized salt marketed in elite grocery stores, but most consumers get insufficient iodine.

In the case of iron, income does seem to be related to both quantity and quality of iron content of the diet. Iron is found in most staple grains and legumes. As income rises initially, so does intake of staple foods. As income rises further, meat consumption increases and hence the quality (absorption) of iron in the diet increases.

Vitamin A and Vitamin C (which helps in iron absorption) behave erratically with respect to income. Because these vitamins are concentrated in perishable fruits and vegetables (especially dark, green, leafy vegetables), consumption depends very much on availability. In rural areas, wild foods contribute considerably to vitamin A intake. These wild foods may have an image of low status foods or foods for unsophisticated consumers and it is not unusual to see vitamin A consumption decrease as income rises in the bottom quintile as traditional foods are disdained. In the highest income groups, as cultivated fruits, refrigeration, and dairy products become more affordable, vitamin A intake rises further.

Higher micronutrient intakes do not necessarily follow increases in income or calories because consumers in general neither know what nutrients they need nor what food provides those nutrients. The micronutrient content of foods is a hidden quality to the uninformed consumer. Calories or bulk are more detectable since everyone knows when he is hungry and when he has had enough to eat. People generally eat to fill their stomachs and perhaps to meet emotional needs (if they have that luxury). There is no natural hunger for iron, vitamin A or iodine. The signs that someone hasn't eaten enough of them are subtle and delayed and they may not seem severe or diet–related to the person directly affected. Even cretinism and blindness are more likely to be attributed to divine retribution than they are to diet. This lack of consumer awareness of micronutrient intake and deficiency makes consumer education central to the success and sustainability of any micronutrient programme. Appropriate monitoring and surveillance are needed to create awareness of effects of micronutrient programmes on well–being.

Some micronutrients (particularly vitamins A and C and iodine) are heavily concentrated in a few foods, so just eating more food or more kinds of food is not necessarily going to give more of those micronutrients unless consumer demand has been directed to the right foods. Even apparently similar foods differ dramatically in their micronutrient content. In the Philippines, for instance, horse radish tree leaves contain 14mg of vitamin A per 100 grams while sweet potato leaves, which for all intents and purposes serve the same culinary role, contain only 3mg per 100 grams. If the price of horse radish tree leaves increases, people may substitute more sweet potato leaves but probably not in a ratio of one–to–four.

Over the last twenty to thirty years, per capita income has risen in most regions, and calorie availability has, in general, paralleled per capita income trends. Micronutrient trends, however, bear little resemblance to calorie trends.

Indirect Programmes

Food and agriculture policies can affect the consumption of micronutrient–rich foods by altering their availability and price. Agricultural policies can promote horticultural crops, legumes, edible tree crops, social forestry and, cropping patterns and preservation practices that nurture and conserve micronutrient–rich foods. Agricultural research can enhance the concentration and productivity of micronutrients in crops. General agriculture sector efforts can be used to enhance production of fruits and vegetables, red meat for local consumption, legumes, and tree crops bearing edible leaves. Particular attention needs to be paid to the problems of marketing perishable foods.

Improving the efficiency and coverage of health care systems should have a positive effect on micronutrient malnutrition, through improved health and hygiene, early intervention in disease, and monitoring growth and development. In a good health system, personnel are trained to detect and treat deficiencies, efficient management and logistics of pharmaceuticals assures ready supply of supplements, and, most importantly, the most vulnerable economic groups have access to health care. In order to treat severe deficiency states, health care providers need to know how to diagnose the deficiencies, have on hand the appropriate pharmaceutical supplies, equipment, and counselling materials, and a referral system is needed for intractable

or severe cases. Preventive micronutrient programmes are needed where micronutrient malnutrition is a public health problem, even where health systems work well.

In addition to the distribution of supplements, health providers need to prevent or treat the diseases that exacerbate micronutrient malnutrition – measles and acute respiratory infections, for instance, can precipitate vitamin A deficiency. In vitamin A deficient regions, all cases of measles, chronic diarrhoea, acute respiratory infections and severe malnutrition should be treated with vitamin A according to therapeutic protocols. Hookworm increases iron losses. Malaria causes anaemia through mass destruction of red blood cells and is especially serious for pregnant women. Excess fertility also drains women's iron stores since each pregnancy exacts an iron (and probably other micronutrient) cost to the mother unless remedial supplementation takes place. Prolonged breast feeding can extend the interbirth interval and thereby enable the lactating women to rebuild iron stores. Attention to these underlying health problems is a necessary adjunct to direct micronutrient programmes but it cannot address the primary causes of micronutrient malnutrition.

Solutions

The solutions thus go well beyond traditional health and nutrition systems. In order to generate multisectoral strategies and maintain momentum, it is often politically expedient to identify micronutrients as a special topic in human development which means that no single sector or institution “owns” micronutrients. While certain health structures may deliver micronutrient supplements for the short term (for example. Expanded Programme on Immunization delivery of iodine or vitamin A capsules), private food industry (with proper governmental oversight) may be responsible for delivery of the long term solution (e.g., iodized salt). National strategies must be opportunistic and use existing delivery vehicles where they serve the need. But effective strategies may need to create temporary vertical programmes to have measurable impact in the short term which, in turn, generates popular and political support for long term solutions. In sum, national strategy development must be multisectoral even though implementation is sectoral. It must take a very specific look at micronutrients separately from other health and nutrition problems even if the actual solution is ultimately done within the health sector or within on–going nutrition programmes.

One of the most attractive attributes of micronutrient interventions is their low cost and high cost–effectiveness. Costs are so low, in fact, that most of the intended beneficiaries can afford to pay for the food and pharmaceutical sources of micronutrients they need. The cost to society of micronutrient malnutrition far outweighs the cost of addressing it, so even though they may be inexpensive, it is defensible for the government to pay for such programmes for public health reasons.

Micronutrients are so inexpensive that all food secure households should be able to afford the nutrients, whether they derive from natural food sources or synthetic vitamins and minerals. Food–insecure households that periodically or continually do not get enough to eat in quantitative or caloric terms, are unlikely to be able to increase their intake of micronutrient–rich foods in the absence of an increase in overall food intake. They would probably need a targeted food distribution or subsidy programme. Although synthetic micronutrients are inexpensive, the markup on them by commercial manufacturers can be substantial. If private markets are to be used for production and distribution of micronutrients for public health purposes (as in contraceptive social marketing) then some regulation, consumer education, and price controls may be needed.

Assuring Access to Micronutrients

The options for addressing micronutrient deficiencies directly include:

1. *Dietary change:* Encouraging the consumption of nutrient–rich foods – red palm oil, dark green leaves, mangoes and various wild fruits – which may be available but underutilised by the deficient population.

2. *Fortification of food or water:* Adding nutrients to foods including bread, flour, noodles, water, salt, sugar, cookies, dairy products, weaning foods, curry powder, soya sauce, monosodium glutamate and bouillon cubes.

3. *Pharmaceutical supplementation:* Tablets, capsules, injections and oral tonics. In the case of vitamin A and iodine, megadose preparations provide protection for prolonged periods (4–6 months for vitamin A and 1–3 years for iodine).

To address micronutrient malnutrition is technically easy and cost–effective. What is required is political commitment and strategic planning. Very few countries with micronutrient malnutrition have mounted

comprehensive national programmes to address the problem. This is largely due to lack of national advocacy and weak national institutions aggravated by insufficient donor interest. Iron programmes are the most neglected interventions, probably because supplementation through antenatal care has been the primary focus.

In order to increase the intake of micronutrients, the supply must be available, be it from pharmaceuticals, fortified foods, or natural foods. With pharmaceuticals, the key supply issues are physical access, logistics, and medical gatekeeping (via prescriptions). In the case of fortification, supply is assured first by making sure that the food vehicles for fortification, the level of fortification, and the chemical fortificants are properly selected and second, by making sure that the food industry is actually complying with fortification regulations. Where dietary change is promoted as the solution to micronutrient malnutrition, the availability and price of the foods promoted needs to be reinforced by food policies and agricultural programmes to promote production, processing, and efficient marketing of such foods. Often the key food is breastmilk, so health care professionals and maternity hospital administrators need to promote and protect breastfeeding.

Achieving and sustaining high coverage has been the most frequent problem encountered in micronutrient supplementation programmes. This is largely because such programmes have relied on existing health care delivery systems (which have low coverage) or because vertical delivery programmes were not able to sustain momentum. Flagging enthusiasm can be corrected by supportive supervision, retraining workers and marketing efforts to sustain demand for supplementation. Attributable impacts which are valued by beneficiaries should be monitored and reported back to decision−makers and service providers. In the absence of such positive feedback vertical programmes inevitably lose the enthusiasm and political support they originally garnered.

Supplementation

Most universal vitamin A supplementation programmes have failed to sustain high coverage over time. In Nepal, where a carefully designed pilot programme was carried out with highly motivated, trained and supervised community health workers, a vertical vitamin A supplementation programme achieved 75% coverage in the first year and increased to 80% in the second year. The integrated health care cum capsule alternative programme reached 72% of the target population in the first year and 81% in the second year. These rates are attributed to extensive training, close supervision, and high motivational level of community health workers. In Indonesia, a vertical programme was introduced in 1980 over and above the existing primary health care programme, to boost coverage levels rapidly. This came about because of strong political support for the Vitamin A programme. After two years coverage had increased from 6% to 77%. Today coverage has fallen below 50%. If a high intensity programme like Indonesia's achieves 65% coverage only with special attention, then normal programmes are not likely to achieve that coverage level at all. Moreover, the 20% left out are probably at highest risk for micronutrient deficiencies.

Vitamin A Saves Sight [Source: WHO. 'Let There Be Sight']

In Bangladesh the “universal” vitamin A supplementation programme, which uses existing health care providers, covers only about 36% of the target population (and probably the least vulnerable) largely because

the public health care system has poor coverage. Furthermore, coverage has fallen over time because the intended beneficiaries do not perceive the need for vitamin A or the threat of vitamin A blindness. Very rarely is any social marketing done for capsule distribution programmes. Perhaps if the intended beneficiaries actively sought out the supplements, coverage would not be so low or decline over time. Social marketing of capsules in Indonesia increased capsule coverage from 27 to 40%.

One option in vitamin A supplementation programmes is “medical targeting” – delivering the supplements only to ill children (particularly those with xerophthalmia, measles, diarrhoea, and lower respiratory infections) on the rationale that those are the children who need the supplement most. Ill children are likely to be brought to a health center, which facilitates distribution. It is difficult to know the coverage of such programmes because the total target population (sick children) is unknown. It is also very difficult to undertake outreach in this situation. Nonetheless, medical targeting can be an economical means of getting vitamin A to a subpopulation of children who need it badly.

The Expanded Programme on Immunization (EPI) can deliver supplements to the periphery. In many countries, 80% or more of the young children are immunized. If the EPI structure can deliver supplements to those and older children in the same villages, a major advance in coverage of micronutrient supplements is possible. Even more important than reaching the 6–, 10–, and 14–week old children on immunization days, however, is case finding. Vaccinators need to seek out children and women in the same villages who missed vaccinations (or supplements). Because health personnel may not regularly see most patients, it is imperative to use every encounter with the formal health system, as an opportunity to reach target groups. This happens when a child is seriously ill or when the EPI vaccinator visits the village or home.

India seeks to improve young child coverage of vitamin A through a two–track approach involving both the health system and the Integrated Child Development Services (ICDS) programme. Under the Child Survival and Safe Motherhood initiative, children under one year of age receive vitamin A supplementation from health teams through the national immunization programme. Older preschool children receive vitamin A supplementation twice yearly from health workers operating at the ratio of one for around three villages. ICDS provides nutrition, health and education services to children under 6 years of age in close to half of India's rural areas. In villages where it operates, some 250,000 village–based workers administer vitamin A to children twice yearly. Where supplies are stable, vitamin A supplementation is available on demand; however, in most cases, administration is through semiannual campaigns. Midwives and, increasingly, ICDS workers, also are being enlisted to provide megadoses of vitamin A to women immediately after childbirth, thereby assuring maternal adequacy and transfer of sufficient vitamin A to babies through breast milk.

Other potential sources of increased coverage could be schools, agricultural extension agents, religious leaders and private pharmacies. In a Moslem country, for instance, iodine capsules could be distributed by local mosques on Eid, the celebration ending Ramadan. By using existing infrastructure and reaching out to vulnerable individuals in surrounding areas, coverage could be greatly expanded. The problem with a multisectoral delivery system is that at the state or national level it is difficult to coordinate among ministries.

Many countries have difficulty managing the supplies of pharmaceuticals (supplements), particularly at the clinic level. The logistics, supply management, procurement and management information systems issues which need to be addressed for pharmaceuticals in general, also need to be applied to micronutrient supplements. The World Health Organization's Essential Drugs Programme, which includes micronutrient supplements, has helped minimize the number of drugs that need to be ordered; and UNIPAK (UNICEF) has played an essential role in bulk procurement, quality control, and customized packaging for recipients. At the national level, however, resupply is often weak, procurement faulty, and distribution slow. A recent review of iron supplementation programmes by the ACC/SCN found that supply and logistics, not client non–compliance (as had been expected), were the primary causes for programme failure. In Tanzania, vitamin A was almost dropped from the essential drug lists because it was not “moving”. Health care workers did not know when to prescribe it. Further training of health care providers and community education remedied the problem. Demand generation should help signal to health care providers and managers that increased supplies are expected but the health care providers may also need training and motivation to meet increased demand from consumers and to prescribe correctly. Supply problems also appear when targeting criteria are not strictly adhered to. If low priority clients receive the supplements, then more needy individuals will be short–changed if supplies are limited.

Private stores should be considered as a potential delivery vehicle for micronutrient supplements where public drug management is not adequate. This has been tried with some success in contraceptive social marketing. In many places, private demand for “vitamins” is great, even if sometimes misguided. If private channels are used, great care must be taken to inform consumers about the kind of supplement to take, the dosage, who is

to take it and when, and the dangers of overdosing. Regulation and monitoring of drug supply chains is needed to prevent fraud and assure quality control. In Nigeria, the private pharmacies are used to deliver the iron tablets prescribed at the health clinic. Supplementation programmes can be enhanced through education, targeting, and ensuring supplies are available.

Fortification

Fortification of food has been responsible for eradicating most of the vitamin and mineral deficiencies in developed countries. Fortification of margarine with vitamin D is thought to have eliminated rickets from Britain and Northern Europe in the early part of this century. Fortification of refined flour with iron in the US and Sweden is credited with the dramatic reduction of anaemia. In Switzerland, which was the first nation to iodize salt in 1929, iodization immediately prevented cretins from being born where it was implemented. In Mali, new strategies have been tried by iodizing well water with substantial effects on iodine deficiency within a year. In Thailand, local water supplies have been fortified by hand mixing water with iodine. Commercial food fortification is particularly appealing because if the right food is selected, coverage takes care of itself. An ideal food vehicle for fortification is not available in every situation, however. But dietary habits are changing rapidly as food industries develop so fortification is likely to be feasible in the near future in most countries.

Once governments have mandated fortification, it is incumbent on food industry and its regulators to assure that the nutrients are in fact in the fortified food. In the past, fortification advocates have sought a single food for fortification but now it appears that it may be more effective to select several food vehicles in order to reach different segments of the population who have different diets. The cost of the fortified food should not be so high that it becomes unaffordable by the poor (who need it most).

Fortification is simple in food technology terms and defensible in public health terms even though it changes or limits consumer choice. For a number of public health reasons – prevalence among a broad spectrum of the population, serious and costly health effects of the deficiency, cost–effectiveness of prevention versus case management – it is justifiable to regulate industry in this instance because markets simply do not work efficiently for the socially optimum outcome. Consumers do not know or cannot detect beneficial or harmful substances in their food supply. They usually are not sufficiently informed to demand properly fortified food. Hence, governments need to intervene and one way is through regulating fortification. The two most important determinants of success in fortification programmes are selection of the right food(s) to fortify and industry compliance with fortification regulations.

While micronutrient deficiencies are a health problem, implementation of fortification is carried out by private food industry. Health Ministers in several countries are notable for being willing to exercise control over and motivate private industry. In fact, linkages between the Health and Industry Ministries is usually weak. In such cases it is proposed that a specified set of responsibilities and actions be passed on to the Ministry of Industry so that they exert direct control over the industry. In Bangladesh, the Small and Cottage Industries Corporation which licenses and regulates the functioning of salt producers and refiners, has been empowered with the implementation of the iodization programme and its monitoring at the production level. Retail and consumer level monitoring will have to be the responsibility of the Ministry of Health through the provincial and district–level health network.

Dietary Modification

Natural food sources of vitamin C (which enhances iron absorption) and vitamin A and, to some extent, iron, are inexpensive, culturally acceptable, and widely available. The trouble is that they are not given to the most vulnerable individuals, or storage is difficult, or they are unavailable seasonally. The most important dietary sources of these nutrients are dark green leafy vegetables, yellow and orange fruits and vegetables, legumes, and red meat. Some of these foods are cultivated and others are foraged. Among the cultivated foods are tree crops (fruits, red palm oil, and edible leaf trees), legumes, field crops (horticultural crops, leaves of tubers, and yellow fleshy tubers), and small stock. The foraged foods tend to be trapped or picked in uncultivated land and forests. These include wild fruits and berries, small animals, and green leaves.

For the cultivated foods, agricultural policies can send some powerful signals to farmers to encourage (or discourage) certain crops. Agriculture research and extension can make particular crops more profitable or feasible to cultivate. In Thailand, agriculture extension agents were used to distribute ivy gourd plants and to advise on its cultivation. When the so–called “disease resistant” crop developed insect and mould problems, modern scientists in collaboration with traditional herbal experts solved the problem. Horticultural crops generally require copious water and yield highly perishable products. Public policies which improve water availability and preservation and markets for perishable foods would help promote horticulture. In Mauritania,

it was found that gardeners needed assistance with marketing surplus vegetables. Horticulture (as well as most field and tree crops) is usually promoted because of export or employment/income potential. Cash crops are useful for generating income but export vegetables may not be meeting local demand for micronutrient–rich foods. Both the crops themselves and the cultivation and processing methods may be different when locally–consumed vegetables are produced rather than exportable vegetables.

One area where agricultural policy has not been used extensively is in the encouragement of home gardens. Because these provide food primarily for home consumption, they may not have the status of marketed crops either to policy makers or to extension agents. They are usually women's domain and cultivated in more traditional ways which further denigrates their status. Home gardens can be both a major household food resource and a source of income. The Asian Vegetable Research and Development Center, affiliated with the Consultative Group on International Agricultural Research, has developed several garden designs which serve both nutritional and income generation purposes. Much more could be done to elevate the status and productivity of home gardens.

With foraged crops, the key policy issues relate more to land use and preservation of natural resources than to active cultivation. Forest land, meadows, wetlands, fallow land, and even weeds in cultivated fields have supplied traditionally much of the variety (and micronutrients) in people's diets. Many of these foods are unavailable in markets. From an environmental and nutritional standpoint, it is desirable to preserve these lands in the wild state or to encourage nearby communities to husband them wisely. In Nepal, when women were encouraged to manage their own forests, they were able to protect wild foods they depended on. Proper preservation of foods is particularly important for vitamin A which is often highly seasonal in its availability. In Haiti, mango preservation practices have been developed to spare the vitamin A content. Dried mango has developed as a local industry as well which generates income for women.

To support a diversified food base, food policies should be developed which give due weight to dietary quality, derivation of foods (particularly non–staple foods), and the overall trends in the food supply. In many countries, narrow policies to promote either food grains or export crops have reduced production of legumes, generally a good source of both protein and iron. A shift from sweet potatoes or yams to cassava may be seen as desirable from a calorie perspective or an adaptive response to high population density, but it has serious ramifications for vitamin A availability and, in the case of cassava, iodine nutriture. The destruction of forests can seriously limit nearby people's access to meat, edible leaves, and fruit. Monitoring and active policy intervention to reverse such negative trends are needed.

Demand for Micronutrients

In general, well–designed social marketing projects have achieved increases in amount and frequency of vitamin A–rich food consumption, as well as changes in attitudes, among target groups. These include a number of small projects in India and several regional projects in Asian countries. Experience in Indonesia, Bangladesh, Philippines, Nepal, and Thailand, suggests that dietary behaviour can be changed when communications strategies are designed appropriately. These programmes, all of which were oriented toward increasing intake of vitamin A–rich foods, show that consumers will improve their diets if given the proper incentives.

For use of food *fortification,* extensive testing of feasibility with manufacturers, and of acceptability of fortified food to consumers, is needed during the development of the product. Consumer testing on availability, price, taste, appearance, and differentiation from the unfortified product is critical to ensure that the fortified food will not meet significant consumer opposition. The fact that some fortified products are slightly off colour has been a deterrent to consumer satisfaction and must be examined closely prior to launch of the product. Likewise, when fortified salt is marketed at the same time as the unfortified, “regular” product, consumers must be informed and motivated because the new product is in direct competition with the old.

Where nutrients are accessible from fortified foods, consumer education is needed to motivate the consumer to purchase these foods. While technical manipulations are supposed to minimize the detectable difference between fortified and unfortified foods, occasional resistance to fortification is encountered because the fortificant is unnatural or “chemical” – witness of the resistance to fluoridation of water in the US. Sometimes fortified foods cost more than unfortified ones so consumer demand needs to be generated for the fortified product (this problem can be overcome by restricting choice via mandatory fortification of the chosen food and/or by providing incentives targeted).

Like fortification, pharmaceutical *supplementation* is often thought of as an easy “solution” since the product has already been developed. However, pill–taking or receipt of an injection often requires complex behaviour

changes. Mothers in particular must make the effort to obtain and take or give supplements periodically or sometimes daily. Programmes need to communicate what the capsules, pills or injectables are, why they are important, who needs them (in what dosage and what frequency), when and where to get them, and what are their side effects. A common fear is that the iron pill or iodized oil injection is a contraceptive.

Supplementation with iron requires long–term, repeated behaviours. Evidence exists to show that even if pregnant women receive iron pills, they do not necessarily take them. Unpleasant side effects (dark stools, constipation, the “fishy” aftertaste of the pills), difficulty in maintaining a specific daily behaviour (pill–taking) over months, and rapid relief of symptoms (before anaemia is resolved) cause problems for compliance. A strong effort should focus on overcoming these problems.

Consumer demand for pharmaceutical sources of micronutrients (supplements) is important from two perspectives. First, if supplements are to be delivered through non–coercive means in the public health system, beneficiaries must present themselves at the appropriate time and place and accept the product offered. Where coverage of public health services is low it is particularly important to reach beyond the clinic with supplementation. This means generating a sense of entitlement to supplementation. If consumers do not demand the supplement, the health providers may forget to distribute it, the supplies are given to the non–needy or deteriorate in warehouses, and the programme is ineffective. Second, demand for supplements is subliminal because the intended beneficiaries either do not recognize deficiencies as diseases (fatigue is often a way of life – and not attributed to iron deficiency) or they may not know that their diet is the cause of the disease. Hence consumer information and motivation are both necessary.

Consumer demand for pharmaceutical sources of micronutrients can be high and expressed in private pharmaceutical markets. In developed countries, nutritional supplementation is a billion dollar industry. Even in traditional cultures and among low income groups, “vitamins” are sought out to cure diseases. These medications often in fact contain vitamins but they are sources of “pseudonutrients” as well: ineffective, falsely advertised, and potentially dangerous concoctions. Consumers, in addition, may take excessively high doses of nutrient supplements on the rationale that if a little bit is good, a lot is better. This overdosing may have toxic effects and most assuredly is a waste of money. Vitamin supplements of dubious value (especially injections of vitamin B complex) are over–prescribed by private and public providers and over–demanded by consumers while safe and efficacious (oral) micronutrient supplements that are needed for real nutritional deficiencies are often neglected. This is as much a problem of consumer education and physician self–regulation as it is of government regulation and the scruples of the pharmaceutical industry. The production, advertising and packaging of privately marketed micronutrient supplements needs to be tightly regulated and coupled with consumer education on the “right” pharmaceuticals (of the right potency with the proper frequency). An additional need is to train health care providers (public and private; traditional and modern) in proper diagnosis and treatment of micronutrient deficiencies.

Programme Evolution

Experience in Thailand provides useful guidance on programme evolution. Here, the general direction of the programme was established at the outset (addressing vitamin A deficiency through dietary means), but the means were developed as the programme developed and intended beneficiaries participated in it. In this iterative fashion, the beneficiaries and programme staff identified the focal food for promotion (ivy gourd), the means of promoting it, the most persuasive messages, and way of increasing availability of vitamin A foods. This last issue led them into agricultural promotion and extension.

One common characteristic of most successful programmes is the use of pilot projects and feasibility studies to try out delivery systems, communications concepts, and alternative sources of micronutrients. This experimentation, when combined with national advocacy and leadership, has led to revisions in programme design that were not anticipated initially, for example, the use of agricultural extension in Thailand. Information systems have facilitated further improvements as programmes have been implemented. In Ecuador, the process of development of the monitoring system identified both the highest risk groups and the roadblocks to achieving programme success. In fact it may not usually be possible (or desirable) to design a complete programme from the start. Flexible programme design is better complemented by experimentation, appropriate information systems, and consultation with intended beneficiaries helps generate effective and sustainable programmes. Equally clear is that national political support and long term donor commitment are required.

Targeting

Targeting is a key consideration in designing a micronutrient supplementation programme because the deficiencies affect only a small portion of the population. Even in countries considered to have endemic vitamin A deficiency (India, Bangladesh, Indonesia), the prevalence of frank deficiency signs rarely exceeds 5% (in Bangladesh 2.6% of preschoolers were night–blind in 1991). With respect to iodine deficiency, an incidence of visible goitre in 20% or more of the population is a sign of a serious public health problem. Iron deficiency commonly affects 30% of the general population though as much as 75% of pregnant women. Clearly targeting is desirable if it can be done at low cost but in the case of iron the deficiency may be so prevalent that presumptive treatment of all pregnant or reproductive aged women may be more cost–effective. To date, vitamin A and mineral supplements have been targeted largely on the basis of geography, season, age and physiology. The options for targeting are listed below:

1. *Universal targeting.* Targeting vitamin A to all preschool children; targeting iron–folate tablets to all pregnant women; targeting iodized oil to all women of reproductive age.

2. *Medical targeting.* This includes targeting vitamin A to children with xerophthalmia, chronic diarrhoea, severe acute respiratory infections, growth failure, tuberculosis or measles deficiency; and targeting iron to premature and low birth weight babies.

3. *Geographic or seasonal targeting.* Iodized oil is usually targeted to high altitude areas and places beyond the reach of commercial salt markets. Vitamin A supplements may need to be given during only one season. Iron may be targeted to malarious or hookworm infected regions.

The option chosen depends critically on the nutrient concerned, the nature and extent of the deficiency, the coverage of the health system, and available resources. Where the deficiency is widespread and severe, universal coverage may be more cost–effective than selective coverage based on screening and/or giving the nutrient only to symptomatic or high risk individuals. Ideally, the health care system would provide the supplement on a regular schedule, just like immunizations (except that vitamin A needs to be given every 4–6 months and iodine needs to be given yearly). But most health systems are far from ideal and have low coverage rates. In these cases, micronutrients should be given (or targeted) on an opportunistic basis – whenever the child is seen by a health worker and had not received the nutrient in the past 4 months (in the case of vitamin A) or the past year (in the case of iodine), or whenever a reproductive–aged woman uses a health centre. Health cards for both mothers and children are needed to prevent overdosing with vitamin A or iodine. In addition, outreach activities will be needed where health system coverage is low. These could take the form of free standing campaigns (done in Indonesia, India and Bangladesh for vitamin A; and in Indonesia, Myanmar, China, Nepal and Zaire for iodine), or they could be linked with EPI activities (national immunization days). EPI campaigns, as currently configured, are better suited to iodine (which needs only one annual dose) than vitamin A because national campaign days are usually 2 days 4–6 weeks apart. With some expansion of responsibilities and target groups, however, EPI workers could be used to deliver vitamin A every 4–6 months or during specific months. In countries with highly seasonal deficiencies (like Nepal, for instance) a single dose, if properly timed, could be adequate. But in many countries, vitamin A deficiency is a year round problem.

Where vitamin A and iodine deficiencies are geographically, ethnically, or socio–economically concentrated, targeted rather than national programmes may be preferable (although emerging evidence on the effects of subclinical deficiencies suggests that broader targeting rather than narrow targeting may be warranted). It is fairly easy to delineate high risk areas based on iodine content in soils and water or goitre incidence in school children. These high risk areas often coincide with high altitude or flood plains. Vitamin A clusters less well geographically than iodine. One might use the incidence of blindness or the existence of local words for “night blindness” or, measles mortality as an indicator of vitamin A deficiency. While vitamin A risk may correlate with season or rainfall levels, this indicator is not specific enough for general application. Epidemiological data on vitamin A deficiency is likely to be needed. Elevated rates of blindness (if trachoma and onchocerciasis are not prevalent) would also be a warning of severe vitamin A deficiency.

Geographic targeting is most frequently used with iodine supplementation programmes. In Bolivia, Ecuador, Nepal, and Pakistan, iodine supplements are distributed to isolated mountain villages where iodized salt is unavailable. Because iodine supplements need to be delivered every one to three years, the burden on the health system is much less than that of vitamin A distribution which must be delivered two or three times per year. It is feasible to use vertical delivery teams or to use existing health staff to deliver the iodine. At the district level, perhaps multipurpose mobile teams could be used to deliver a series of periodic treatments (micronutrients, anti–helminthics, tetanus) including possibly growth monitoring.

Targeting can also be done on the basis of biomedical screening. From a medical perspective, it is preferable to screen clients before prescribing therapeutic treatment. In large scale national micronutrient programmes, however, the cost of screening far exceeds the cost of treatment. Where the prevalence of a deficiency is high enough to be a public health problem by WHO criteria, then presumptive treatment may be preferred. This is particularly true of iron supplementation of pregnant women. Toxicity becomes a potential problem with supplements when the nutrients become more replete in the population. In that case, community screening may be adequate – a sub–sample of people are selected and if the prevalence of the deficiency is high, all target–age individuals are supplemented.

In general, fortification is thought of as a universal programme, but targeted fortification is sometimes preferred. In Guatemala, the school–feeding programme uses a biscuit fortified with a number of vitamins and minerals. The biscuits are baked by local bakeries and the vitamin–mineral premix is distributed to them by the government. Undoubtedly the children in schools are a self–selected relatively privileged group but they profit educationally from the added nutrition. In South Africa, the Asian community was found to be the only sub–population that was iron deficient, so curry powder was fortified with iron. This was a highly self–targeted food which incurred no administrative cost to reach the intended beneficiaries. In Chile, and the US, infant foods are fortified with iron because that is one of the most vulnerable groups. One could also target fortification by fortifying foods consumed primarily by the poor.

Dietary change efforts, designed for specific groups and agri–ecological zones, are targeted by dietary pattern. It is the diet of the weaning–aged child or pregnant women that is usually targeted. This requires sensitivity to traditional beliefs and resistance points in developing messages.

Goals for the Year 2000

In September 1990, the World Summit for Children endorsed some challenging goals for micronutrients for the year 2000: virtual elimination of vitamin A and iodine deficiencies and a one–third reduction in iron deficiency anaemia in women. These goals were subsequently reaffirmed at the “Ending Hidden Hunger” policy conference in October 1991 and at the International Conference on Nutrition in December 1992. To achieve these goals will not be easy. It will require the combined efforts of governments, international organizations, NGOs and private industry. The central focus of activity over the next decade should be on

1. Raising consumer demand for micronutrients from natural food, fortified food or pharmaceutical supplements. Policy advocacy, social marketing and commercial advertising are effective in this.

2. Improving the effectiveness and coverage of pharmaceutical delivery systems including exploitation of new outreach mechanisms, better logistics, and improved client counselling.

3. Maximizing industry compliance with fortification mandates through incentives to private industry and through building objective, competent and respected regulatory enforcement institutions.

Micronutrient Deficiency –The Global Situation

This article is adapted from Chapter 3 of the ACC/SCN Second Report on the World Nutrition Situation. Volume I. Global and Regional Results, published October 1992.

Deficiencies in the intake or absorption of vitamin A, iron, and iodine have serious consequences for health and mental and physical function. The clinical manifestations of these nutritional deficiencies – such as xerophthalmia, anaemia, and goitre – have been identified as major problems with increasing public health significance. This article summarizes what is known about trends in micronutrient malnutrition, focussing on these three most prevalent known deficiencies. Estimated prevalences and numbers affected by these three deficiencies are given, by region, in table 1. The distributions by countries are shown in the maps, discussed below.

Vitamin A Deficiency

The most obvious results of vitamin A deficiency are progressive damage to the eye, eventually leading to blindness. The general term for this is “xerophthalmia”, which ranges from the mildest form, night blindness,

through reversible signs in the eye, to ulceration and destruction of the cornea, thence blindness. The eye is the most observable tissue damaged by vitamin A deficiency, and progressive damage to other membranes probably occurs, unobserved, in parallel with the eye damage. Increased ill health and mortality have long been associated with vitamin A deficiency, and in recent years intervention trials have established with increasing certainty that providing vitamin A to young children in areas where the deficiency exists, has a significant effect on mortality, of around 25 percent reduction (see article starting on p17). Assessment of vitamin A deficiency is most commonly feasible from clinical signs of eye damage. Dietary surveys and food balance sheet data can also be used to assess the supply of vitamin A in the diet. Vitamin A itself may be preformed in the diet from animal sources, or obtained from carotenes from vegetable sources; the unit, allowing for differential conversion to vitamin A and absorption, is retinol equivalents in mcg.

Table 1. Prevalence of Vitamin A, Iodine and Iron Deficiencies by Region.

	Vitamin A Deficiency		*IDD*		*Anaemia*		
	Children 0–5 years with xerophthalmia (1991)		*All people with goitre (1991)*		*All women (15–49 years) with low Hb* (around 1988)*		
WHO Region	*No. (millions)*	*Prevalence*	*No. (millions)*	*Prevalence*	*Region*	*No. (millions)*	*Prevalence*
Africa	1.3	1.4%	39	8.2%	Africa (incl. N.)	59.4	44%
Eastern Mediterranean	1.0	2.8%	12	4.7%		–	–
Latin America	0.1	0.2%	30	7.0%	Latin America	32.7	31%
S.E. Asia (incl. India)	10.0	4.2%	100	5.9%	Asia (incl. India & China)	335.1	45%
W. Pacific (incl. China)	1.4	1.3%	30	2.3%		–	–
Total	13.8	2,8%	211	5.7%		427	44%

*** Pregnant <11g/dl; non–pregnant <12g.dl.**

(Sources: WHO (1992a) & WHO (1990) – quoted in ACC/SCN (1992), tables 3.1 and 3.4 respectively – and WHO (1992b).)

WHO reported that in 1991 nearly 14 million preschool children had eye damage due to vitamin A deficiency (WHO, 1992). Around 10 million of these children are located in Asia. The geographical distribution by WHO regional groupings is given in table 2, and mapped in figure 1. Each year it is estimated that between 250,000 to 500,000 preschool children go blind from vitamin A deficiency. About two–thirds of these children die within months of going blind.

Table 2 Populations at Risk of and Affected by Vitamin A Deficiency, by WHO Region, 1991

(Million pre–school children)

WHO region	*Vitamin A deficiency*	
	Total pre–school child population in countries where xerophthalmia exists	*Estimated number with xerophthalmia*
Africa	18	1.3
Americas	2	0.1
Southeast Asia	138	10.0

Europe	–	–
Eastern Mediterranean	13	1.0
Western Pacific	19	1.4
Total	190	13.8

(Source: WHO, (1992a) quoted in: ACC/SCN (1992) Table 3.1, p.40)

The total number of preschool children living in areas where they are at risk of vitamin A deficiency is estimated by WHO at around 190 million. This number increases greatly if other age groups in areas known to be vitamin A deficient are included, such as school age children and women of child–bearing age.

Vitamin A deficiency, defined by eye signs, has been identified as a widespread public health problem in 37 countries worldwide. In countries in which xerophthalmia is endemic, the dietary supply of retinol (mcg/caput/day) estimated from FAO data is often extremely low. Minimum average requirements are around 250 mcg retinol equivalents (RE)/caput/day. As examples, in Mozambique average availability is estimated as 200 mcg RE/caput/day; in Zambia, 290 mcg/caput/day; in Bangladesh, 240 mcg/caput/day. These average supplies are therefore probably below average requirement, making the existence of vitamin A deficiency inevitable in the population. Nonetheless, overall national retinol supply is not always the principal constraint. In 10 of the 37 countries, average supply was above 600 mcg RE/caput/day, and maldistribution of the available supplies is clearly involved. This is particularly the case in those countries – notably in West Africa – that appear to have ample vitamin A because of red palm oil, the production and consumption of which tends to be localized, and not reach deficient areas.

The supply of vitamin A estimated from FAO's food balance sheets indicates an improving trend for most developing countries in the last 20 years, with the notable exception of Sub–Saharan Africa. Countries in the Middle East and North Africa, Middle America and Caribbean, and South America, achieved levels likely to be substantially above average requirements, by the late 1980s. Vitamin A supply is increasing quite rapidly in South East Asia, to the point where it now exceeds average requirements. Vitamin A deficiency persists in this region, but the increase in supply should give potential for redistribution to begin to eliminate the deficiency. In South Asia overall supplies are particularly low, and not rising very fast. This is in line with the observation of quite extensive deficiency in this region, and the slow rate of improvement indicates particular urgency for dietary modification and promotion of consumption of higher retinol–containing diets.

The vitamin A situation in Africa requires closer examination. First, it is essential to distinguish between those countries where red palm oil is produced – in West Africa – and the other countries. East and Southern Africa have very low availabilities of vitamin A, in Southern Africa probably on average below requirement, so that here vitamin A deficiency is likely to be widespread. Added to this, there are some indications that the overall supply is actually decreasing in East Africa, which would exacerbate the problem. In West Africa and the Sahel the apparently high availability does not preclude the co–existence of deficiency. This is related to the fact that red palm oil is not marketed all that widely in a number of these countries.

Iron Deficiency

Iron deficiency is the commonest nutritional disorder in the world and affects over one billion people, particularly reproductive–aged women and preschool children in tropical and sub–tropical zones; it also has a serious impact on school children and working men. If uncorrected it leads to anaemia, reduced work capacity, diminished learning ability, increased susceptibility to infection and greater risk of death associated with pregnancy and childbirth. It results from consuming diets with insufficient bioavailable iron, reduced dietary iron availability, increased iron requirements to meet reproductive demands, and losses due to parasitic infections; these factors often operate concurrently.

Anaemia is thus a serious outcome of iron deficiency. Since there are multiple causes of anaemia, and since iron deficiency can exist without haemoglobin levels being lowered, there are potentially four different situations, or populations: those anaemic and iron deficient; those iron deficient but not (yet) anaemic; those anaemic not due to iron deficiency; and those iron replete and with normal haemoglobin. Causes of anaemia other than iron deficiency often include malaria, intestinal parasites, other nutrient deficiencies such as folate and vitamin B12, and genetically determined haemoglobinopathies such as thalassemia. It is generally held that at least half of the anaemia worldwide is directly due to dietary iron deficiency. On the other hand, there is

emerging evidence that low iron stores, even in the absence of anaemia, are also related to functional disadvantages, in cognitive development, learning and behaviour. The extent of this problem has not been widely determined. However, anaemia prevalences are reasonably well established, and can generally be taken as an indicator of the extent and trends of iron deficiency. Here anaemia is assessed by low haemoglobin, with cutoffs determined by WHO. The overall anaemia prevalence for women in developing countries is estimated at 42 percent, equivalent to just over 370 million women; in pregnant women (with a cut off of 11g/dl haemoglobin) the prevalence is estimated at 51 percent, and in non–pregnant women at 41 percent (cut off 12g/dl). While there is considerable variation in prevalence by region – from around 64 percent in South Asia to 23 percent in South America – it is striking that anaemia is prevalent throughout the developing world. The geographical distribution is shown in figure 2, from WHO data. Nearly half the total number of anaemic women are in South Asia.

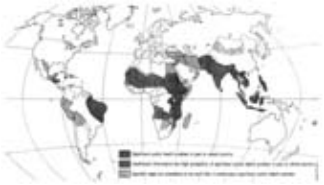


Figure 1. Geographical Distribution of Xerophthalmia, 1987

(*Source: WHO* (*1987*)*, reproduced in: ACC/SCN* (*1992*)*, Figure 3.1, p.41*)

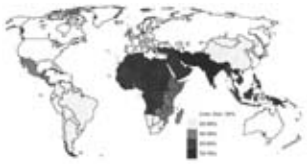


Figure 2. Prevalence of Anaemia in Pregnant Women, 1988

(*Source: WHO* (*1992b*)*, reproduced in: ACC/SCN* (*1992*). *Figure 3.3, p.44*)

In the two regions where survey results extend across the last 15 years, Sub–Saharan Africa and South Asia, there are some indications that the prevalence of anaemia is, if anything, increasing (see figure 3). The main types of iron available in foods are: haem iron which is present in meat and its products and is well–absorbed; and non–haem iron which is present from food of vegetable sources, generally of low bioavailability. Iron is also provided by other animal products, such as milk, with intermediate absorption. Isotopic methods of measuring iron absorption from complete meals have increased the knowledge of how these foods are absorbed by the body. Haem iron from meat is highly bioavailable – around 20 to 30 percent being absorbed; whereas non–haem iron from cereals, pulses, fruits, vegetables, etc. has much lower bioavailability – ranging from 1 to 8 percent. The absorption of non–haem iron is highly variable and depends on the nature of the meal. Vitamin C importantly enhances iron absorption. A large number of substances inhibit the absorption particularly of non–haem iron – for example tea, coffee, egg yolk, and bran. Hence it is difficult to interpret the actual availability of iron from overall dietary data. This depends not only on the dietary pattern itself, but also on food habits concerning composition of meals – for example drinking tea with a meal will inhibit iron absorption more than if tea follows the meal.

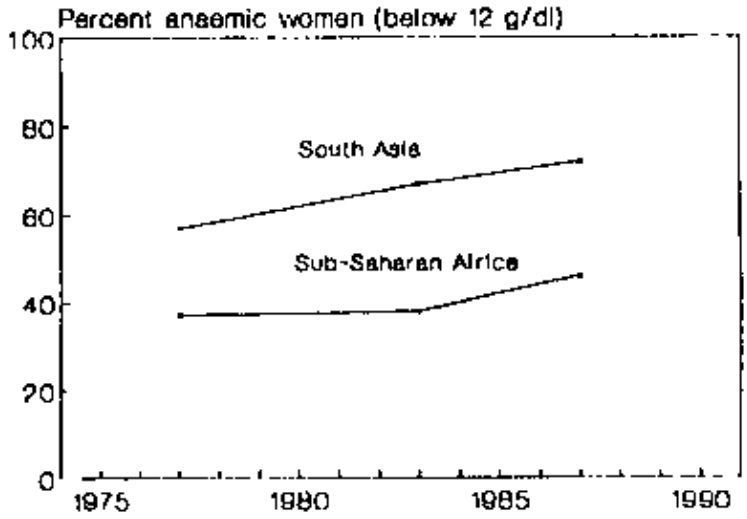


Figure 3. Trends in Anaemia, 1977–1987 (Nonpregnant adult women, 15–49 years old)

(*Source: ACC/SCN* (*1992*). *Figure 4.6, p.54*)

The overall iron supply is particularly limiting in Sub–Saharan Africa, South Asia, and South East Asia. In these three regions animal sources are low, the average diet is likely to be of low bioavailability, and for many people the supply probably does not reach even the minimum average requirement. This is in line with these regions having the highest estimated prevalence of anaemia. Results from China are inconsistent, and few anaemia estimates are available. In the other regions, the iron supply, particularly taking into account the higher level of animal iron sources, may on average be just adequate; this gives a potential for improvement with redistribution.

More important, perhaps, is the observation that the overall per caput supply of iron appears to be static or perhaps decreasing in all regions except Near East and North Africa. In South Asia this is at least partly due to a major decrease in the production and availability of pulses (lentils, beans, etc.), which have been squeezed out in many areas by the green revolution emphasis on cereal crops. In Sub–Saharan Africa, the decrease may be partly related to a shift away from millets and sorghums; in South East Asia these plus other factors may apply. The diet quality in terms of iron (e.g. as iron/1000kcals) seems to be deteriorating in all regions except Near East/North Africa.

Putting together the results on trends in anaemia (although these are based on rather scanty results) with the dietary iron supply from food balance sheet data, does give a consistent picture, as summarized in table 3. Dietary iron supply trends are deteriorating in most regions, although the average availability may be relatively good in South America because of higher levels of iron from animal sources. The exception, Near East/North Africa, is the one region where indications are that anaemia prevalences are not rising, or possibly even improving. In South America the prevalence of anaemia is probably fairly stable. However, in the other regions, and in particular in Sub–Saharan Africa and South Asia, there are signs that the prevalence of anaemia may be increasing, and this is consistent with the decline in the dietary supply of iron. For regions other than Sub–Saharan Africa this is the one nutrition problem that seems to be getting worse. These results, which no doubt require further investigation, should raise warning flags and shift attention further towards dealing with iron deficiency. At the same time, control of malaria and intestinal parasites must be stressed.

Average iron consumption based on national figures generally hide the distribution across various locations and socioeconomic groups. Recent research on micronutrients indicate that iron consumption behaves differently from other nutrients. It is more income elastic (perhaps the most of major nutrients), owing to the fact that as income increases consumers will purchase more meat and fish. In the Philippines for example, the highest income quintile consumed three to four times more meat and pulses than households in the lowest income quintile. This means that iron consumption overall is likely to be inadequate for poorer households.

Table 3. Regional Trends in Iron Availability and Anaemia (1970–1990)

Region	*Trends in Dietary Iron Supply*	*Trends in Anaemia* (*non–pregnant Women*)
Sub–Saharan Africa		Up

	Down slightly, especially from animal sources	
Near East/North Africa	Up, from both animal and vegetable sources	Probably down (est. 30% 1975/80. 28% 1985/90)
South Asia	Down, due to reduced pulse production (?)	1 High and increasing
South East Asia	Down slightly, especially vegetable sources from 1980	Probably up (est. 40% 1970–80, 57% 1980–90)
Middle America/Caribbean	Down vegetable sources, but animal sources up	Probably up (est. 20% 1970–80, 30% 1980–90)
South America	Down, but animal sources relatively high	Probably down (est. 24% 1970–80, 20% 1980–90)

(*Source: ACC/SCN* (*1992*). *Table 3.3, p.47*)

Within households, a number of studies show highly disproportionate distribution of iron relative to individual requirements. In the Philippines, adequacy ratios for mothers in three provinces was estimated at 0.65 compared to 1.05 percent for fathers, 0.77 for adolescent girls compared to 0.91 for adolescent boys. While a substantial part of iron adequacy reflects the higher dietary requirements for pregnant mothers and adolescent girls, it is evident that given similar intakes, these sub–groups are likely to suffer most from low availability of iron in the diet due to their different physiological needs. An NNMB 1979 study in India showed that average iron intakes of children 1 to 4 years was 10.2 mg per day, compared to 34.5 mg for adult men, although children have more than half the requirements of adults.

Iodine Deficiency Disorders

Iodine deficiency exists in most regions of the world, resulting from a low intake of iodine in the diet. The consequences of iodine deficiency include goitre, reduced mental function, increased rates of still births and abortions, and infant deaths. Severe mental and neurological impairment known as cretinism occurs in babies with severely iodine deficient mothers. Deficiencies in iodine later in infancy and childhood cause mental retardation, delayed motor development, growth failure and stunting, neuromuscular disorders and speech and hearing defects. Mild deficiency can cause lethargy, and this is reversible when iodine status improves, as is goitre.

The commonest measure of iodine deficiency is from observation of goitre, enlargement of the thyroid gland, usually obtained by specific surveys in iodine deficient regions. Since goitre tends to be localized in such regions, most data are not nationally representative, and thus prevalence estimates are somewhat tentative; trends have not yet been assessed.

WHO* estimates that in 1990 around 1,000 million people lived in iodine deficient environments around the world. These are often regions where the iodine, normally supplied from soil and water, has been leached from the topsoil by rain, flooding, glaciation, and snow. These regions tend therefore to be mountainous and remote, as well as flood plains. In figure 4, areas of iodine deficiency, and the extent of control measures, are shown.

* Very recently these figures were revised, see “News & Views” first article.

The extent of goitre has been estimated (by WHO and ICCIDD) as more than 200 million people, added to which should be around 6 million with overt cretinism. Around half of these are in South East Asia, including India. It is further estimated that some 20 million people worldwide are mentally defective as a result of the deficiency.

Growing international awareness of the problem has led to increased programme and surveillance activities. The problem is largely preventable, and cost–effective methods of eliminating the problem are well known. WHO/UNICEF has declared the goal of eliminating IDD by year 2000, and activities now on–going in collaboration with ICCIDD (International Council for the Control of Iodine Deficiency Disorders).

Control of IDD is mainly through fortification of salt with iodine (salt iodination), and/or periodic distribution of iodized oil, either administered orally or by injection (every three to six months orally, up to two year interval

by injection).

Figure 4. Iodine Deficiency Disorders: Areas Affected and Control Programmes, 1991

(*Source: WHO* (*1990*)*, reproduced in: ACC/SCN* (*1992*)*. Figure 3.6, p.49*)

The ICCIDD has summarized the increases in programmes to control IDD. As of 1991, 22 countries were implementing control programmes and another 40 countries were planning to implement action plans. Five years earlier only around six developing countries had IDD programmes in place. Intensified and accurate assessments of the problem, public awareness followed by monitoring and evaluation are essential for reaching the objective of complete elimination of the problem by the end of the century.

References

WHO (1992a). *National Strategies for Overcoming Micronutrient Malnutrition.* 45th World Health Assembly Provisional Agenda Item 21; doc A45/17. WHO, Geneva.

WHO (1992b). *The Prevalence of Anaemia in Women: A Tabulation of Available Information.* Second Edition WHO/MCH/MSM/92.2. WHO, Geneva.

WHO (1990). *Infant and Young Child Nutrition, Progress and Evaluation Report.* 43rd World Health Assembly document A43/4, agenda item 17, 1 March 1990, page 14.

WHO (1987). *The Geographical Distribution of Xerophthalmia in 1987* – Map. Dr E M DeMaeyer. NUT/WHO, Geneva.

JBM/MG

Effectiveness of Vitamin A Supplementation in the Control of Young Child Morbidity and Mortality in Developing Countries*

* A project of the International Nutrition Program, Department of Nutritional Sciences, Faculty of Medicine, University of Toronto, Toronto, Ontario, Canada M5S 1A8. Funded by the Canadian International Development Agency (CIDA)

A Summary Report of Research Findings Presented at the Micronutrient Forum held at the ACC/SCN 20th Session, 15–16 February 1993, at the World Health Organization, Geneva. The Full Report will be published as SCN State–of–the–Art Nutrition Policy Discussion Paper No. 13 (see inside front cover).

G.H. Beaton, R. Martorell, K.A. L'Abbé, B. Edmonston, G. McCabe, A.C. Ross and B. Harvey

This paper presents a summary of the main findings, and their interpretation, of a review of controlled studies on the effect of vitamin A supplementation on young child morbidity and mortality. In presenting interpretations, special emphasis has been placed on findings and interpretations that appear particularly relevant to policy development and programme design.

While most of the studies available for review involved vitamin A supplementation in the form of the periodic administration of high potency doses, the reviewers have interpreted the analyses and conclusions in terms of the effects of improvement in vitamin A status and suggest that such benefits are likely to be achieved in any programme approach that is as effective as, or more effective than, the reviewed studies in improving vitamin A status. This summary, then, should not be taken as an evaluation or endorsement of a particular approach to improvement of vitamin A status.

Specific Goals of the Review of Experience

Under the original contractual agreement, there were three goals specified. These are set forth below.

- to review and assess the available experience with regard to the effect of vitamin A supplementation on young child morbidity and mortality;

- to advise CIDA on the apparent effectiveness of vitamin A supplementation in young children in developing countries; and

- to estimate, to the extent possible, the range of effects for mortality and morbidity outcomes expected under various nutritional and ecological circumstances and for various subgroups of the population.

These goals were to be addressed in the connotation of informing policy decisions, but the review, assessment, and formulation of policy were not included in the assigned mandate. It is understood that another group, with different composition and with additional background documents, will address policy implications of the report. The following summary is presented under the headings of the three specific objectives, rephrased as questions that were addressed.

Identify and Review Controlled Trials.

We were able to identify and examine 10 mortality trials and 19 morbidity trials (including morbidity results from the 10 mortality trials). This included both published and unpublished studies for which we were able to obtain descriptions from the primary investigators. For published studies, we often obtained supplementary information from original investigators. We are aware of additional morbidity trials still under way, and of plans for further analyses of existing trials. However, we are unaware of any further mortality trials now under way or approved for implementation in the near future. Therefore, for the mortality outcome, we think we have captured the total experience and our only shortfall is with regard to two studies, one in Bombay, India and one in Haiti, for which we could not obtain the level of detailed information needed for inclusion in our formal analyses. In contrast, we expect that substantial additional information will be forthcoming in the next year or two and therefore urge that our morbidity conclusions be seen as a valid interpretation of experience to date but subject to possible modification when further information becomes available.

Did Vitamin A Supplementation Have an Effect on Young Child Morbidity and Mortality?

Mortality Effect

We have provided a definitive YES answer with regard to not mortality. Vitamin A supplementation resulted in an average reduction of 23% in mortality rates of infants and children between 6 months and five years (see figure 1). The effect was highly significant under the two conceptual models examined, a fixed effect and a random effect model, RR=0.77 for both, although the 95% confidence intervals were somewhat wider for the latter (0.68 to 0.88 vs 0.71 to 0.84). Also shown in that figure is the Prediction Interval relating to the effect to be expected in a future programme or study in a new setting. This is discussed later in this summary and is presented in figure 1 only to provide perspective.

For infants under the age of 6 months, the point estimate of effect was also a 23% reduction. However, because of an extremely small sample size, the confidence interval was very wide and statistical significance was achieved. Thus we were unable to answer the question clearly for infants under 6 months.

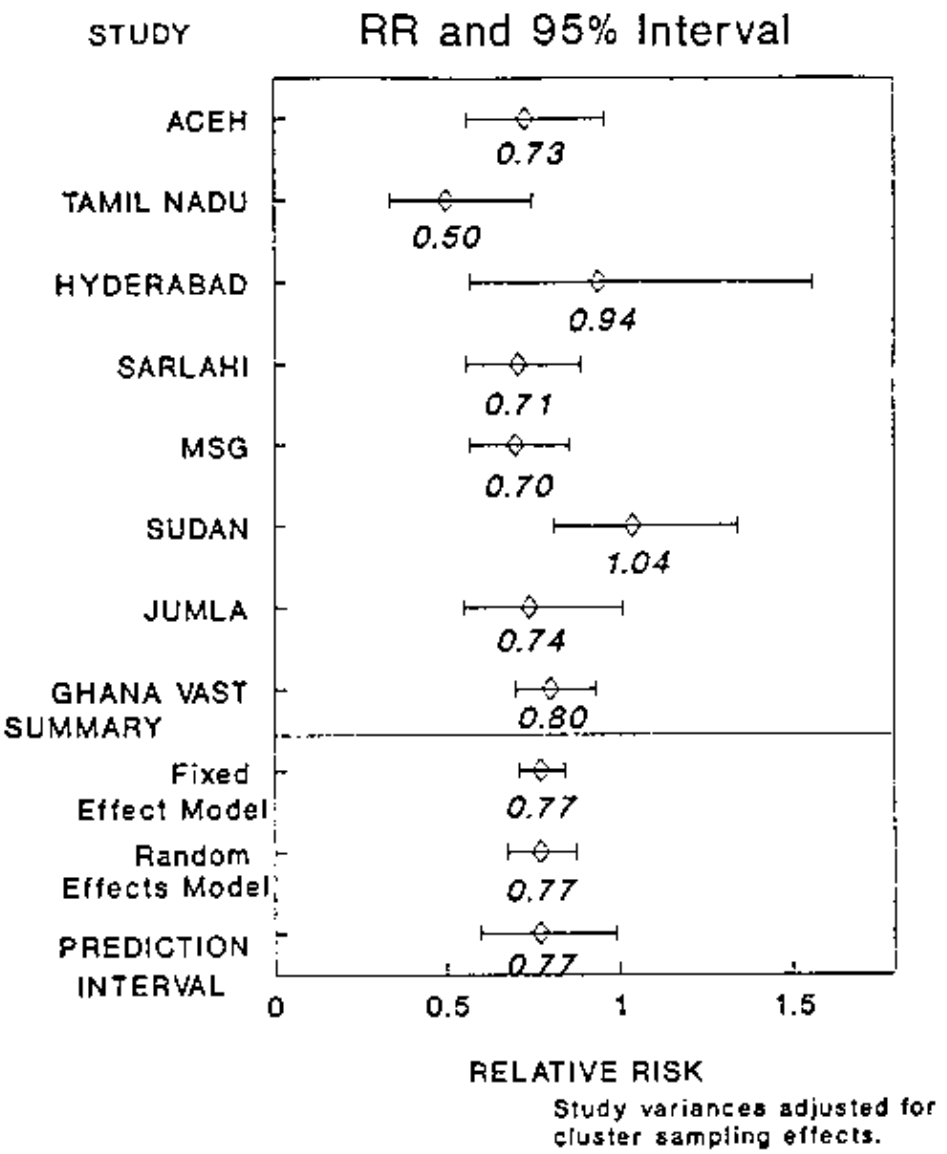


Figure 1 Impact of Vitamin A Supplementation on Mortality of Infants and Children 6 months to 5 years.

Shown are the point estimates and 95% Confidence Intervals for the eight original studies reviewed in detail. Also shown are two summary estimates for the relative effect, taking into account all 8 studies. These have the same point estimates, a 23% reduction in mortality, but differ in the estimated Confidence Intervals. The second estimate (SUMMARY 2) takes into account the between study variation that we believe exists. Technically it is derived from a random effects model. The Prediction Interval for a future programme or study is also presented. Again the predicted average effect is 23% but the interval describing possible actual effects is greatly expanded (see text for explanation).

Over 6 months of age, the relative effect of vitamin A (% reduction in mortality) was not influenced by age or gender. That is, one would expect to see comparable reductions in males and females and in infants over 6 months as well as children up to five years.

The mortality effect is pronounced for diarrhoeal disease, may be absent or very small for deaths attributed to respiratory disease, and is demonstrable for deaths attributed to measles even though the number of cases is much smaller.

A very important finding was that the effect on mortality was not dependent upon very high potency dosing. One trial was based on fortification of Monosodium Glutamate and another was based on the weekly administration of physiologic doses. This led us to the inference that it was improvement of vitamin A status rather than the method of improving it, that was the important determinant of effect.

Morbidity Effect

In contrast to the very clear effect of vitamin A on mortality, we were forced to conclude that improvement of vitamin A status cannot be expected to impact on incidence, duration or prevalence of diarrhoeal and respiratory infections. Conversely, we conclude that it is likely that improvement of vitamin A status impacts upon the progression of illness to its severe forms, and to its severest form, mortality. This important conclusion about an impact on severity is explicitly documented in only the very recent Ghana VAST morbidity trial where it can be seen as having impact on referrals and clinical admissions as well as on reported occurrence of severe morbidity per se. The phenomenon is seen also in studies of vitamin A administration in children presenting with measles; both severity of the illness and case fatality rates are reduced. Since we know that hospital admission and clinical referral data were collected, but not yet analyzed, by other projects, we expect that further information, likely confirmatory in nature, will be forthcoming.

The converse of these findings is that for the control of young child morbidity, vitamin A is *not* a panacea. The attack will have to focus upon the environment in which morbidity occurs. We can only suggest that vitamin A status appears to affect the child's ability to respond appropriately and adequately once infection has developed and hence appears to impact on the course of morbidity. As for mortality, there may well be differentials in the effect across different types of illness. Available evidence did not permit a conclusion in this on this matter.

One aspect of the morbidity analysis that has direct relevance to field programmes was the fact that vitamin A intervention after the onset of measles impacted favourably upon the development of severe complications and reduced the case fatality rate. In the main mortality trials reviewed, it was not possible to ascertain when the vitamin A had been administered in relation to measles onset. We infer that it is vitamin A status during infection that is important but infer also that this can be addressed before or after the onset of infection.

What Can be Expected in Future Programmes?

The third goal specified in the contract is perhaps the most important. It addresses the important planning question of what should we expect in a new programme in a new setting? Below we divide our response to the third goal into two sub–questions: Where (in what population setting(s)) can one expect vitamin A to be effective? and What is the range of effect to be expected?

Where is Improvement of Vitamin A Status Most Likely to Affect Morbidity and Mortality?

The obvious answer to this question is “Where vitamin A deficiency is now a serious problem.” For the mortality trials, all of which had been conducted in settings where it had been assumed vitamin A was a public health problem under the WHO definition, we attempted to ask about population–level predictors of the relative effect. For these analyses we had only 8 studies and with such a small sample, subtle effects might go undetected. However, any major effects should have been seen.

We found no relationship between the baseline prevalence of xerophthalmia and the relative effect of vitamin A. Thus we have to conclude that while the existence of clinically apparent deficiency was a marker for all programmes, the actual prevalence added very little additional information in predicting outcome. One very important question is unanswered. There were no studies conducted in populations with biochemical evidence of vitamin A depletion but without associated evidence of clinical manifestations of deficiency (Ghana came closest to this situation). Thus we can reach no firm conclusion about the impact of vitamin A to be expected in populations where there is evidence of depletion but not evidence that depletion is severe enough to produce clinical lesions in at least a small proportion of individuals. This, unfortunately leaves as judgemental the potential impact of programmes in a very substantial part of the developing world.

We found no impact of the prevalence of stunting or wasting or of the interaction with xerophthalmia prevalence on the prediction of the relative effect of vitamin A. We note however that all of the population groups studied exhibited a high prevalence of stunting and shared the common feature of representing the poorer segments of the population exhibiting the stigmata of early deprivations and undoubtedly also a common social/biological environment favouring high morbidity and mortality. Thus, stunting was seen more as a marker of the environment of early growth and development than as an index of current nutritional conditions.

We found no apparent association between the mortality rates of control groups and the relative effectiveness of vitamin A. The recorded mortality rates ranged between a low of about 5 per thousand to a high of 126 per thousand.

As mentioned earlier, neither gender nor age appeared to influence relative effectiveness.

The only factor we found that would serve to predict relative effectiveness of vitamin A was evidence that the effect depended on the attributed cause of mortality. From those analyses we conclude that a large relative effect is more likely to be seen where mortality attributed to diarrhoeal diseases or measles is predominant and that the relative effectiveness would be diminished where deaths attributed to respiratory infection became increasingly prevalent.

From these analyses we can add very little to the starting observations that in populations like those studied (with evidence of poverty, general social and biological deprivation marked by stunting, and with evidence of existing vitamin A deficiency marked by the presence of xerophthalmia), vitamin A can be expected to have an effect.

We can describe the apparent reason that two studies (Hyderabad and Sudan) failed to show an effect of vitamin A supplementation (Hyderabad reported a 6% reduction in mortality; Sudan reported a 4% increase in mortality,: neither was significant and the confidence bounds for both included the estimated average effect for all studies combined). In each case there was minimal difference in vitamin A status (marked by effect on xerophthalmia) generated between the treated and control groups. In the case of Sudan, it appears that the vitamin A administered was not biologically effective although its chemical stability was demonstrated. In the case of Hyderabad, the problem was an unexpected improvement in the vitamin A status of the control group. While these observations may explain why those trials failed to demonstrate effects, it is extremely important to recognize that in neither case could the outcomes have been *predicted* on the basis of information available to us for examination. We treat these two trials and their reported effects as a part of the collective experience and as contributors to our Summary Estimate of the effect of Vitamin A supplementation. However, from the experience in these two studies, we conclude that it is essential that any future programmes monitor the impact of the programme on vitamin A status (e.g. by repeated clinical surveys or by monitoring serum retinol levels), at least until it is established that the administered vitamin A is biologically active in the particular setting.

We suggest, in keeping with conclusions reported by the Sudan study, that it may be timely to review with care the evidence supporting the existing guidelines for high potency periodic dosing. It may be that the combination of dose (200,000 IU after one year) and frequency (6 months interval) was inadequate in the Sudan setting although apparently adequate in other studies following a similar dosing schedule.

What is the Range of Expected Effects for Future Programmes?

Given that we were unable to explain the variation in reported results among the 8 mortality trials, we must base any prediction on the total experience. In figure 1, we included a portrayal of the Prediction Interval applicable to a new study but based on the review of past experience. This interval includes the possibility that a new study will have no effect on mortality (such was a part of the experience). It includes also the possibility that a new study might have an effect much greater than the average 23% reduction expected. In the main report we developed this concept further and actually developed probabilities that could be attached to various levels of effect. These are portrayed in table 1.

Table 1. Probability That a Vitamin A Effect of Specified Magnitude Will be Present in a Future Study.

MORTALITY REDUCTION	*Probability*
Any effect	*0.98*
?10%	*0.89*
?20%	*0.62*
?30%	*0.23*
?40%	*0.03*

Estimates assume a cluster effect (DEFF = 1.3). No new study sampling variance included in this model of the expected true effect.

These might be interpreted in the following manner. If justification of a vitamin A control programme requires that there be a mortality reduction of at least 10%, then we suggest that there are about 9 chances in 10 (probability = 0.89) of an effect at least this large being present in a programme that does improve vitamin A status to a degree comparable to the reviewed programmes. If a 20% reduction is needed, then the probability

of achievement is 0.6 (3 chances in 5). However if reductions of 30% and 40% are sought, the probabilities fall to 0.2 and 0.03. All of these may be contrasted to the probability of better than 97% that *some* effect will be produced.

We also cautioned, in our main report, that because of the predictable effects of sampling error, in a study of finite size, particularly in a population with low mortality rates, the investigator would not necessarily *see* an effect even if it were present. Table 2 presents this warning in the form of probability that an effect will *not* be *seen* as a function of intervention group size and "baseline" mortality rate.

Table 2. Probability of Failing to *See* an Effect of Vitamin A as a Function of Group Size and Baseline Mortality Rate

GROUP SIZE	MORTALITY RATE/1000			
	5	15	25	45
5,000	***0.239***	0.135	***0.096***	0.064
10,000	***0.172***	***0.085***	***0.060***	0.042
50,000	***0.061***	***0.034***	***0.029***	0.025
100,000	***0.041***	***0.023***	***0.025***	0.023
250,000	***0.029***	***0.024***	***0.023***	0.022

All estimates assume a cluster effect (DEFF = 1.3) and provide for sampling variance as a function of group size and mortality rate. All estimates are based on average reduction of 23% (RR=0.77).

What this shows is that if one runs a pilot study in a population group of relatively small size (for mortality trials) and in the presence of a low mortality rate, there is a very high chance that one will fail to see any effect even though the probability that there is an effect remains high (see paragraph above). Interestingly the Hyderabad trial would fall into this category. The opposite also holds, there is a greater chance of seeing an effect as large as that reported for Tamil Nadu (50% reduction) even though it is unlikely that the real effect is that large. Care must be taken in interpreting any pilot studies that are run in the future.

We caution also that our estimation of future effects rests on comparison of control and treated groups. However, the mortality rates observed in the control groups was often much lower than expected (than previously believed to exist as a baseline mortality rate). There are several possible explanations for the discrepancy. These include at least: i) a possible non–specific effect of interventions (an effect operating in both control and treatment groups and unrelated to vitamin A); ii) an effect secondary to treatment of high risk xerophthalmic children with vitamin A (in both groups); iii) a phenomenon related to exclusion of high risk children (by design or by self selection); iv) the fact that the study population was actually different from the regional population for which mortality rates had been described (perhaps the result of selecting a study area that had somewhat better health services or other infrastructure); or v) simply inaccuracies in previously reported local mortality rates (where not directly estimated by the research project). We did not have opportunity to test these hypotheses and warn only that we do not *know* whether vitamin A treatment is equally effective in children that might have been excluded – hence we do not *know* whether the predicted effect of vitamin A (23% reduction in mortality) is applicable to true baseline mortality rates. From those studies in which the baseline and control group mortalities appeared comparable, the reported effect of vitamin A appeared comparable. Therefore we *think* the relative effect is applicable to true baseline mortality rates. It was also reported in the Tamil Nadu study that inclusion or exclusion of children treated for xerophthalmia (and then left in their original treatment group assignments) did not change the estimated relative effect of vitamin A. Thus, although that type of exclusion of a high risk group might alter apparent mortality rates (in both control and treated groups) without influencing the estimate of effect of vitamin A. What the planner must recognize is that in a programme setting, without a concurrent control group, reductions from baseline mortality attributable to any of these causes might *appear* to be results of the intervention. In this sense our estimates of the real effect could be smaller than the apparent effect seen in an operating programme. Offsetting this, of course, would be lower "compliance" rates expected in an operational programme as compared to a research study.

The Distinction Between Relative and Absolute Effects of Vitamin A on Mortality

All of the results described above refer to the *relative* effects of vitamin A, the proportional reduction in mortality. We have shown from those analyses that there was no apparent effect of gender, age or mortality rate. However, it is to be recognised that if the *relative* effect is unchanged, then the *absolute* effect (number of lives saved) must be directly proportional to the baseline mortality rate:

Lives saved per 1000 treated = RR x Baseline Mortality Rate per 1000

Since mortality rates generally fall with age in young children, and perhaps differ by gender, it follows that one would expect an impact of age and perhaps gender on the *absolute* effect of vitamin A. The possible effect of age is illustrated in figure 2. Here, for purpose of illustration, the median mortality rates of studies contributing age specific data have been used. Actual rates in a new programme might be quite different but the phenomenon should be similar.

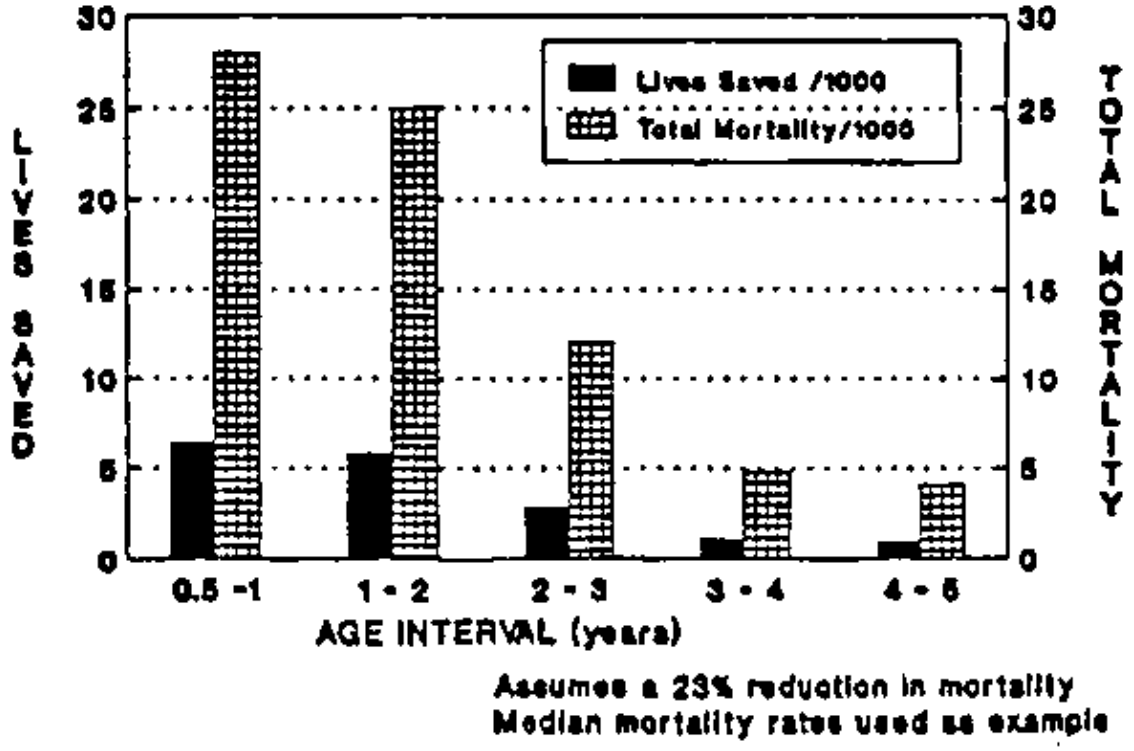


Figure 2. Absolute Impact of Vitamin A Expressed as Lives Saved per 1000 Subjects Covered.

Some Implications for Programme Targeting

Although the present analyses were not designed to address operational programs, there are some apparent implications for targeting programs. In terms of *relative* effects of vitamin A, the only targeting that we identified as potentially making a difference was with regard to cause–specific mortality. Populations in which deaths attributable to diarrhoeal disease or measles were much higher than deaths attributed to respiratory disease would be expected to show higher relative effects of vitamin A than would be seen under the reverse condition.

In keeping with earlier reviews, we demonstrated also that intervention after the onset of measles was effective in reducing severe morbidity and mortality. This has implications for the design of treatment protocols in primary and secondary health care. It also suggests the importance of determining whether a similar phenomenon holds for diarrhoeal disease and other types of infection. It might have implications for the design of population level control programmes but this would imply the need for infrastructures capable of detecting and treating potentially severe illnesses.

When one thinks of programmes in terms of their impact expressed as lives saved per 1000 infants/children covered, then it seems clear that the following baseline characteristics would increase the probably effect of the programme:

- *high baseline mortality rates, particularly for diarrhoeal disease or measles* (*the latter perhaps in conjunction with low measles immunization rates*)

• *young ages* (*under 1 year mortality rates are generally much higher than those in children over the age of 1*)

Of course, all of our analyses relate to populations determined in advance to likely benefit from vitamin A, thus our assessments apply to population groups characterised by:

• *generalized poverty*

• *high prevalence of stunting suggestive of disadvantageous social and biological environment and associated early growth failure*

• *presence of clinical manifestations of vitamin A deficiency at least sufficiently prevalent to meet the WHO criteria of a public health problem*

A very important unanswered question is whether such populations, lacking evidence of clinical manifestations of vitamin A deficiency, but presenting biochemical evidence of major vitamin A depletion, would also be responsive to improvement of vitamin A status.

Programme Approaches

This analysis of experience was not designed to compare programme approaches, nevertheless some interesting observations relevant to the topic can be offered. First, it was demonstrated, without doubt, that daily (through fortification of monosodium glutamate, MSG) and weekly intakes of physiological levels of vitamin A (Tamil Nadu) were just as effective as periodic high potency dosing. It follows, in the judgement of the reviewers, that any approach to improving vitamin A status that effectively controlled xerophthalmia would have beneficial impact on mortality comparable to that reported. We noted also a recent report from an Indonesian study that one time dosing of women shortly after birth was effective in raising breast milk vitamin A levels and improving the vitamin A status of the infant for at least 6 months. This might be a strategy worthy of exploration if the target group is young infants.

Finally it must always be remembered that vitamin A is potentially toxic and may be teratogenic during pregnancy. In the studies reviewed there was some evidence of transient side effects of high potency dosing (e.g. reports from Ghana VAST) but no evidence of actual toxicity. Conversely, there was some suggestion (Sudan, and perhaps also Hyderabad) that the 200,000 IU x 6 month interval for children over one year may have been inadequate to evoke a beneficial response. That would be in keeping with an earlier review of oral dosing with vitamin A in the control of xerophthalmia. That review suggested that while the suggested dose level appeared adequate to prevent xerophthalmia, it did not appear adequate to sustain blood and tissue levels over 6 months. It is suggested that there is need for continuing review of the norms for periodic high potency vitamin A dosing if that approach to intervention is chosen. Such review might focus upon the dose x frequency combination required to sustain blood levels (and presumably tissue stores) without necessarily having to document a mortality effect.

Authors of the Report

Dr George Beaton, special advisor to the SCN Chairman, is in the Department of Nutritional Sciences, Faculty of Medicine, University of Toronto, 150 College Street, Toronto, Ontario, Canada.

Dr Reynaldo Martorell is Chairman of the AGN –presently at the Center for International Health, Emory University School of Public Health, 1599 Clifton Road, N.E., Atlanta, GA 30329, USA – at the Division of Nutritional Sciences, Cornell University, Ithaca, New York at the time of this research.

Dr Beaton and Dr Martorell were co–chairmen of the project.

Dr Kristan L'Abbe is at the Department of Preventive Medicine and Biostatistics, Faculty of Medicine, University of Toronto, Toronto, Ontario, Canada.

Dr Barry Edmonston, who also periodically advises the SCN on statistical methods, is at the Committee on National Statistics, National Research Council, Washington, D.C., USA.

Dr George McCabe is at the Department of Statistics, Purdue University, West Lafayette, Indiana, USA.

Dr Bart Harvey is at the Department of Preventive Medicine and Biostatistics, University of Toronto, Toronto, Ontario, Canada.

The project, funded by CIDA, was the first phase of an “Assessment of the Research and Policy Implications of Recent Studies of Vitamin A and Morbidity and Mortality”, initiated following the recommendation of the SCN's Advisory Group on Nutrition in 1990. The second phase led to a meeting on policy implications, organized by the SCN in Ottawa in July 1993 – see “News and Views”.

Zinc Deficiency – Is It Widespread but Under–Recognized?

Roger Shrimpton, Senior Programme Coordinator, UNICEF, Jakarta, Indonesia

While more attention presently is on three micronutrients, many others may be important. Among the likely candidates in zinc. We invited the following article from Dr R Shrimpton, who has been involved in research on this topic for many years.

There are forty or more substances known to be essential in the human diet, but of these only three micronutrients, vitamin A, iron and iodine are thought to be commonly deficient. There is a growing suspicion however that zinc might also be included in this category. This is based on two separate considerations. On the one hand the pervasive nature of zinc dependent enzymes in metabolic processes. On the other that zinc supplementation is beneficial in many disease states. In malnourished children vitamin A status has been improved and immune response corrected, and even the duration of diarrhoeal disease seems to be reduced by zinc supplements. Could it not be therefore that zinc deficiency is associated with the aetiology of protein energy malnutrition?

Human zinc deficiency was first reported in the Middle East in the early sixties. There was much speculation then that deficiency might be widespread among children in developing countries. Although much more has been learned about the vital importance of zinc in human nutrition in the last thirty years, there is still no reliable indicator of zinc deficiency. Proof of deficiency still depends on getting a response to supplementation. Many zinc supplementation trials have been carried out in children and pregnant and lactating women during the last thirty years. What new perspective have these studies brought to our knowledge on zinc? Is it really something that we only need a trace of and get easily from any common diet? What evidence is there today that deficiency is a public health problem? This article tries to answer some of these questions.

How Essential is Zinc?

Calling zinc a “trace” element is perhaps a misnomer left over from the days it was hard to detect. It is certainly present in more than a trace in all tissues. In the late forties McCance and Widdowson showed that the adult human body contains about two grams of zinc. Sixty percent of body zinc is in muscle, 20% in bone, 5% in blood and liver and 3% in skin and the gastrointestinal tract. Scoular and Macy did balance studies in preschool children in the early forties showing that five milligrams were retained out of an intake of 16 mg a day. Such a retention, five times greater than iron for example, seemed to speak against the classification of zinc as a “trace” element. With the development of atomic absorption spectrophotometry in the late fifties, investigation of the importance of zinc in human nutrition was made much easier.

Zinc is the most abundant trace metal inside most cells. The exception is red blood cells where iron has its special oxygen–carrying function. Even the macro element calcium is less abundant than zinc in all other cells except bone cells. Zinc is not limited, as are calcium and iron, to a few functional roles. Zinc is a functionally essential component of more than 200 enzymes, pervading all metabolic pathways. The role of zinc in such enzymes can be either structural and/or catalytical. Zinc also helps to stabilize membrane structures. It protects their integrity by the reduction of free radical formation, thus preventing lipid peroxidation.

The paramount importance of zinc to an organism is in multiplicative cell growth. Zinc has a fundamental role in gene replication, activation and repression, is critical for transcription and translation, and affects nucleic acid metabolism. Growth of young rats on a zinc deficient diet stops within twenty–four hours, probably due to the lack of gene regulatory proteins. These contain a common structure – the “zinc finger”, which are loops of chains of amino acids, held together at the base by a zinc atom. Gene regulatory proteins may contain eleven such “fingers,” which reach down into the grooves of the DNA helix and promote transcription. Zinc also mediates the activity of growth hormone. When growth hormone attaches to its specific receptor sites on a cell membrane, it needs a zinc atom to make the connection. The resulting complex has been called a “zinc

sandwich."

Symptoms of severe deficiency in rats include loss of hair and gross skin lesions. In older rats there are testicular atrophy and failure of spermatogenesis, congenital malformations and difficult births with excessive bleeding in pregnant females. These symptoms have been found in humans with acrodermatitis entropathica, a genetic defect in zinc absorption mechanisms. Before it was discovered that zinc supplements resolved the problem, children with the defect died of lung and intestinal infections before they reached two years of age.

We can conclude that zinc is not only essential, but because it is involved in so many important process may even be "first" limiting. This means it is the critical limiting factor in the diet. Zinc is especially needed in times of rapid growth. This is due not only to effects on gene replication and nucleic acid metabolism but also as a mediator of growth hormone action. The consequences of zinc deficiency are likely therefore to be extensive, if not catastrophic for the organism.

Why Is It So Difficult To Diagnose Zinc Deficiency?

The very essentiality of zinc makes it difficult to detect deficiency. Most zinc in cells is tied up in a very functional way, such that zinc concentrations vary little in the same sort of cells. When there is enough zinc to form a new cell then it will be formed with a normal zinc content. When there is not enough zinc then no new cell is formed. Except in a few types of cells in the intestine and the liver, zinc is not stored nor does it accumulate. Although there is no store for zinc, it can be mobilized by catabolizing cells. Cells cannot become depleted of zinc without losing functionality.

While severe zinc deficiency is easily recognized, detecting sub clinical zinc deficiency states in humans continues to be a challenge for nutritional science. In rats there is a spectrum of clinical signs from the severest to the mildest levels of deficiency. On a purified animal protein diet skin and hair signs of severe deficiency are produced by diets containing less than 2ppm. Growth is affected at 8ppm, and zinc repletion occurs with maximal concentrations in hair, serum, bone and liver at 15ppm. Attempts to use any of these indicators in humans to define mild deficiency have not been successful.

Zinc intake tells us little about zinc status. A large amount of zinc in the diet is not a guarantee of sufficiency. The first evidence of zinc deficiency in humans appeared in Egyptian and Iranian populations subsisting on bread made from unleavened whole wheat flour. The zinc intake from these diets is high at 15mg a day, but it is not available because of a high phytate content. Phytate, the phosphorus storage compound of plant seeds, binds zinc and other bivalent ions in insoluble complexes, making them unavailable to human and other monogastric species. Iron, when present in large amounts in the diet, also inhibits zinc absorption.

Circulating and tissue levels of zinc do not necessarily reflect zinc status. Low hair zinc suggests mild zinc deficiency, but high hair zinc is found in both replete and severe deficiency states. Low levels of zinc in blood also do not give conclusive evidence of zinc deficiency. In the acute phase response to injury and infection, plasma zinc levels fall to less than 50% of premorbid levels. During pregnancy zinc is also redistributed and circulating levels reduced. Many zinc–containing enzymes in blood have been shown to be reduced in simple zinc deficiency. However, all studies so far have failed to show the sensitivity and specificity necessary for definitive diagnosis of deficiency in the various physiological states of infection and pregnancy.

Circulating zinc levels also do not reflect zinc balance status. It is possible to have normal circulating zinc levels in the face of a heavy negative zinc balance. When there is catabolism of muscle cells or haemolysis of blood cells, for example, large amounts of zinc are released into the circulation and lost through the urine. Over time the body can become very depleted of its zinc content by such mechanisms. Patients with sickle cell anaemia have signs of deficiency, including reduced immune response and decreased fragility of red blood cell membranes that respond to zinc supplementation.

Proof of zinc deficiency status *depends* on observing a beneficial effect of zinc supplements. If a sub optimal zinc status exists, then zinc supplements should improve some body function. Since it is very sensitive to zinc deficiency, growth is the outcome that is most expected to benefit from zinc supplementation. Zinc supplementation benefits children being rehabilitated from severe malnutrition. Does that mean zinc deficiency is involved in the aetiology of protein energy malnutrition?

What is the Evidence that Zinc Supplements Benefit Children?

Zinc supplementation studies on the growth of children have produced mixed results. Eight controlled supplementation trials provide useful information, as summarized here. In the early studies in the Middle East

three attempts were necessary before a growth effect was produced. The first attempt in Egypt failed because they did not correct for the simultaneous deficiencies of other nutrients. The first Iranian experiment corrected for this midway and eventually managed to influence sexual maturation but not growth. The second Iranian study produced a growth effect by restricting the subjects to thirteen years–old boys going through their adolescent growth spun. Small growth effects have also been shown in growth–retarded American and Canadian children with low hair zinc levels. Interpretation of these results is difficult as the children have similar zinc intakes to those with no growth retardation and normal hair zinc levels.

More recently studies have been carried out in apparently healthy but growth–retarded children in developing countries outside the Middle East. These studies in Thailand, Guatemala and the Gambia found no growth response to zinc supplements.

There were other non–growth effects of zinc supplementation. In the Gambian and Guatemalan studies zinc supplementation affected body composition. In Guatemala there was an increase in arm skin fold thickness. Arm circumference decreased during the study, but this decrease was smaller in the zinc supplemented group. The Gambian study found a positive effect on arm circumference, and found less malarial infection in the zinc supplemented group. In Thailand, supplementation with zinc improved dark adaption times and the integrity of conjunctival epithelia, even though Vitamin A status was not improved. Serum alkaline phosphatase activity also increased in Thailand, but not in Guatemala, Egypt or Iran.

Comparison between these studies and extrapolation of the results to other populations is very difficult due to lack of information and differing methodologies. The level of supplementation, the type of placebo and the method of administration of the supplement varied greatly. An increase in plasma zinc levels in the zinc supplemented but not the placebo control group was found only in Egypt, Thailand, and Guatemala. The effects were not consistent in Iran. In USA there was no increase in either group. In the Gambia there was no information on zinc levels before supplementation, so we don't know whether levels rose in either group. Initial plasma zinc levels in children were lowest in the Middle East and USA studies. Few authors reported the results of analysis of standard reference materials in their laboratories. Dietary zinc intakes are hard to compare due to the differing age groups and/or lack of information, and differing availabilities.

It is perhaps not surprising that zinc did not affect growth in most of the studies, as they were done at the wrong time, i.e. too late. Except for the second Iranian study the children were not going through their peak growth spurts. Most growth retardation in developing countries occurs before twelve to eighteen months of age. Zinc needs during this period are high on a body weight or energy basis, since this is the age when growth is mostly by cell multiplication. Growth velocities plateau at eighteen months, and multiplicative growth becomes less important. The children studied, although growth–retarded, had normal growth rates for their age. What the studies so far have been trying to test is whether zinc can trigger catch up growth, or make children grow at a rate faster than expected for their age. Unfortunately there are no reports of zinc supplementation studies in children between the ages of six and eighteen months, when growth faltering occurs in developing countries. Equally important perhaps would be to understand the influence of maternal zinc status on child growth during these early formative years.

What is the Evidence that Zinc Supplementation Benefits Women and their Offspring?

Studies of the effects of maternal zinc supplementation on growth of offspring are few and have shown mixed results. Seven controlled studies were reviewed for this article. Three studies of zinc supplementation during pregnancy sought an effect on foetal growth, but found none. These studies were carried out in developed countries. Cross sectional studies have suggested a relationship between birth weight and plasma zinc levels, but only in women with low plasma zinc levels. Studies of zinc supplementation during pregnancy in tropical countries have not been reported. In the tropics zinc requirements are likely to be higher and intakes lower. Circumstantial evidence suggests linkages between the high rates of foetal malformation and maternal zinc deficiency in the Middle East.

A growth effect was found in Amazonian mothers who were zinc supplemented during lactation. Boys of zinc supplemented mothers gained half a kilogram more than those of non zinc supplemented mothers during five months of exclusive breast feeding. Other studies of zinc supplementation in lactating mothers have not studied growth of the infants.

Zinc supplementation studies in women have mostly investigated the effect on breast milk zinc levels and not growth. The results have been mixed. A supplement of 15 mg a day in the Amazon and in the USA produced the same milk zinc levels. In both studies the fall in milk zinc over time was less, suggesting that beyond six months of lactation supplementation would produce a difference in breast milk zinc levels. A study in Indiana,

using a higher zinc dose of 25mg a day, did increase milk zinc levels. The trial was neither blinded nor randomized however. A randomized and blinded study in Maryland USA with a similar zinc supplementation level found no effect. In the Amazonian mothers, supplementation with zinc improved maternal vitamin A status and doubled milk vitamin A levels. The infants being solely breast fed by zinc supplemented mothers had less diarrhoeal episodes. The possible link of zinc deficiency and toxaemia of pregnancy has been suggested by cross sectional studies, but not yet confirmed by supplementation trials.

Few studies considered why zinc supplementation in women had no effect, and possible reasons for geographical differences. Many studies did not even report dietary or circulating zinc levels. None have considered the influence of recent sexual practices on the zinc status of the women. This is relevant because men can transfer one milligram of zinc to women by sexual intercourse. The common practice of restricting food intake in the last weeks of pregnancy will mobilize zinc from muscle and guarantee that zinc is available for the birthing process.

It is difficult to understand why variability in milk zinc values is large, both within and between populations, yet supplements have no effect. Milk zinc concentrations are highest soon after birth and decrease with time. Geographical differences in early lactational milk zinc levels may be related to differences in maternal weight gain during pregnancy. Weight gain during pregnancy is on average 13 kg in women from developed countries and seven kg in poor women from developing countries. Most of this difference is in the maternal tissues, not the foetus. After birth the catabolism of uterine tissue could contribute to circulating zinc levels and perhaps influence milk zinc levels. In the face of high free circulating zinc levels supplementary zinc may not be absorbed.

Conclusions, and Research Needs

There is still no evidence that zinc deficiency is widespread but under recognized. We know that it is critically essential for multiplicative cell growth, but we still don't know how to detect deficiency other than by doing supplementation trials.

The zinc supplementation trials in children reported to date have not looked at age groups when multiplicative cell growth is greatest. The zinc supplementation in children aged two to twelve years of age in developing countries did not improve growth. Other effects were observed, suggesting that appetite may be improved, contributing to increased fat accretion. Further studies are required during the first eighteen month period of life, when growth failure occurs in developing countries.

More supplementation studies are required in women tropical countries, especially in Asia. Lowenstein commented fifty years ago that the zinc intakes of Asian rice and fish eating populations were low at six milligrams a day. These intakes are the same as those of Amazon women already shown to be deficient during lactation. Breastmilk vitamin A levels are commonly low in poor women from tropical countries. There is a need to investigate whether zinc supplementation would raise vitamin A levels in breast milk outside the Amazon. There is no evidence that zinc supplementation benefits birth weight in humans, but studies are still needed in tropical countries.

Zinc deficiency studies in monkeys have produced effects on birth weight but only in male infants. The greatest effects of deficiency in young monkeys born to mildly zinc deficient mothers only appeared in the second year of life. Then the offspring were smaller, had smaller appetites and grew slower even though eating a normal diet. Zinc supplementation studies are needed in tropical populations, starting in pregnancy and continuing into infancy. The relationship between maternal zinc deficiency and maternal mortality should be investigated. The causes of maternal mortality include excessive bleeding and hypertension, both of which are known to be associated with zinc deficiency.

Studies to date have not really looked at the risks associated with not being zinc replete. These considerations are more relevant now that the importance of zinc as an antioxidant has been realized. It is likely that cancer is more common in non zinc replete people. From animal studies we know that the teratogenic effects of lead for example are only found in non zinc replete sheep. The toxic effects of cadmium, such as high blood pressure, can also be reduced by zinc supplementation. In many tropical countries the combination of a chronic sub clinical zinc deficiency and an environmental toxin could combine to produce cleft palate and still births for example.

When developing future study protocols, supplementation trials should lake a broad ecological view of possible zinc sources. The practice of earth eating is common in pregnant women. The betel nut chewing by Asian women, and the special clays sold all over Africa for women to eat should be contemplated. In the

Amazon it was customary for indigenous tribes to cremate their family members and put the ashes into a pot. Every day they would put a little of the ashes into their drinks to remember their ancestors. Many of these practices undoubtedly contribute to maintaining fragile mineral balances, who knows maybe even for zinc. As time goes by modern wisdom tends to erode such primitive practices.

THE MICRONUTRIENT FORUM

A symposium to promote exchange of information on policies and programmes for micronutrient deficiency control –known as the "Micronutrient Forum" – was held during the ACC/SCN Annual Session, at WHO Headquarters, Geneva, on 15–16 February 1993. The proceedings of the symposium, chaired by Dr B Underwood (WHO), which included five papers with eight discussants, were summarized by Drs Bouis and Trowbridge; the text of their summary presentation is given here.

The Micronutrient Forum also provided an opportunity for participating organizations to describe their activities, as summarized in the "Programme News" section starting on page 36.

Summary

Howarth Bouis and Frederick Trowbridge

• A unifying theme of the discussion was to identify how to support national programs to reduce micronutrient malnutrition.

*• **There are an array of alternative interventions**. No one type of intervention by itself will solve all micronutrient deficiencies. We need to identify the optimal combination of interventions to fit specific circumstances in a particular country or population. The primary strategies discussed were supplementation, fortification, dietary diversity* (*sometimes referred to as a food–based strategy*)*, and nutrition education. It is important to identify factors which promote or constrain dietary diversity. Cultural values and nutrition education are important factors along with income and food prices. How income is increased* (*e.g. government investment and macro–economic policies*) *will affect greatly the dietary diversity of specific socio–economic populations.*

*• **There are important complementarities in treating iodine, vitamin A, and iron deficiencies simultaneously.** Populations at risk overlap, functions of organisations involved in implementation overlap, and populations that lack access to health care overlap. There are substantial complementarities in consuming adequate levels of a number of micronutrients concurrently* (*for example, vitamin C in the diet promotes the absorption of iron*)*. The targeting of pregnant and lactating women and infants is particularly important in this regard. Nevertheless, some interventions are highly effective when implemented as free–standing efforts targeted towards a specific micronutrient problem. Examples include salt iodisation, vitamin A treatment in acute infection and iron supplementation in high risk groups.*

*• **Any optimal strategy will be multi–sectoral** involving several government ministries* (*e.g. health/nutrition, agriculture, trade*) *and private sector groups* (*farmers, food processing and marketing concerns, educators, and the medical and legal sectors*)*.*

*• **Short and long–term interventions.** Interventions that are viewed as "short–term" approaches should be implemented with a clear view of criteria for phasing out or reinstituting measures as needed, based on ongoing monitoring. Some "short–term" strategies, such as supplementation of micronutrients in primary health care settings, may be effective on an ongoing basis when integrated permanently into primary health care services. Short and longer term approaches should be balanced such that short term strategies do not disproportionately draw on resources or inhibit later initiation of longer term strategies. Many countries have or are developing a National Plan of Action for nutrition that includes specific attention to micronutrients, as recommended by the participants in the ICN.*

*• **There is an overriding need to find sustainable solutions.** New interventions should be linked, as far as possible, with existing structures and programs promoting health and nutrition such as breastfeeding promotion, primary health care services, water and sanitation services, educational and agricultural programs. Communities need to be involved in the design of the intervention so as to gain support for and improve*

participation in the intervention and to provide "bottom–up" information for improving the intervention design even after it has been initiated. It is useful to make "hidden hunger" as overt as possible to individuals so that they fully appreciate benefits of the intervention and to reinforce positive behaviour through a monitoring program.

One focus, to unify all the comments is the question –how can we best support national programmes to reduce micronutrient malnutrition? Given that unifying theme, we suggest four categories of support for reducing micronutrient malnutrition. The first is *technologies and methods,* which we have divided into two categories: (A) applying *existing* technologies and methods, and (B) developing *new* technologies and methods. The second topic is *training.* The third category – *monitoring and evaluation* – also involves methods in the sense of advising on their use. The fourth category is in the realm of offering advice, watching out for certain things, and advocacy.

Before we get into discussing the details of those four categories, we want to present some common themes that ran through the various presentations. The first is that there are an *array of alternative interventions*; no one type of intervention would solve the problem by itself in any one country, and we need to identify the optimal combination of interventions to fit specific circumstances. The interventions that were mentioned most often were supplementation, fortification, dietary diversity which is related to a food based strategy, and nutrition education.

There was perhaps a gap here – there was not much discussion of the factors that promote or constrain dietary diversity. To develop that a bit, we could take the question that was often raised – why don't people eat green leafy vegetables when they are available? Often it was mentioned that there were cultural beliefs and attitudes that prevented the consumption of these foods and the need for nutrition education. This needs to be better understood, and taken account of, in designing interventions.

Two other factors may warrant more attention. The first is food prices; for example, the prices of green leafy vegetables. Economists have found that people have a habit all over the world that when the price goes up their consumption goes down. Two specific studies are relevant. A well known one, in the economics literature from an Indonesian national sample household survey, showed that when the price of vegetables went up, the intake of vitamin A went down, *and* the incidence of morbidity went up. There is a much less well known study that I (Bouis) did in the Philippines that basically showed the same relationship. So prices are a very important factor in constraining or promoting the consumption of micronutrients.

But if one was going to put one factor at the top of the list, that factor would be income. Looking at households, with (say) $500 per capita per year, their diets are much more diverse than households at $100 per capita per year. Once income is considered, you introduce a whole myriad of possible interventions. It matters *how* household incomes increase – there is an array of policy interventions that governments have. They can introduce irrigation systems, they can build infrastructure, they can do research on developing new agricultural technologies. The effects of structural adjustments discussed this morning are very relevant here.

The second common theme is that there are important *complementarities* in treating iodine, vitamin A and iron deficiencies simultaneously. The populations at risk overlap; as do the functions of organisations involved in the implementation of interventions. Similarly, there is an overlap in the lack of access to health facilities of populations at risk. And there are complementarities in the intakes of the various micronutrients – for example, higher vitamin C intake promotes the absorbability of iron.

The third common theme was that an optimal strategy would be *multi–sectoral.* Within governments those responsible for health and nutrition need to cooperate with the agricultural ministries and also trade ministries. In the private sector, it is important what farmers do, what food processing and marketing companies do, and also what the medical profession does.

And finally, the fourth theme was that we need to find *sustainable* solutions. It does not do any good to do something that lasts for a couple of years and then disappears.

Now we turn to the four categories of support to programmes, summarised in table 1.

The first area concerns sharing of technology and methods. Here, as elsewhere, we are looking for multiple solutions and options, rather than single approaches; looking for multi–sectoral interventions rather than single–sector interventions; and looking for sustainability. One area for support is in assessment methods. These include epidemiological methods, such as sampling and survey designs, data management, and data interpretation. They also include reaching agreement on core indicators, on the criteria by which those

indicators would be evaluated, and on the cut–offs used, so that we can speak a common language on the prevalence and the trends in micronutrient status. There is also a need for sharing information, supporting countries, and developing laboratory methods that are useful and practical. That means the methods themselves; laboratory management; and, very importantly, quality control. We need comparability of results hence a lot of attention to quality control. This is a role for technical support to countries.

Table 1. Components of Support to Countries

1. Sharing of Technologies and Methods

    A. Application of Existing Methods

        1. Assessment Methods:

            Epidemiologic methods: sampling; survey design; data management; data interpretation.

            Laboratory methods: analysis methods; laboratory management; quality control.

            Programme evaluation methods: formative and process evaluation; focus on problem solving(cost/effectiveness) more than on optimisation; link measures of program implementation (process) with measures of outcome.

            Qualitative evaluation methods: attitudes; participation of community in interventions; changes in dietary practices, etc.

        2. Intervention Methods:

            Dietary diversification strategies: modify food choices; increase availability; improve storage/preparation; utilise multisectoral resources e.g. extention workers, health workers, teachers.

            Supplementation: community–based; targeting to risk groups; treatment e.g. vitamin A in acute infection.

            Fortification methods/technologies: salt; grains; sugar; condiments, etc; linkage with industry.

            Public health measures/environmental health; immunisation; ORT; anti–parasitic measures.

    B. Research and Development of New methods/technologies

        1. Emphasis on applied research and development needs
        2. Investigate what works, what doesn't

2. Human Resource Development

    A. Provide Training in:

        1. Assessment/Information systems
        2. Laboratory management
        3. Program management
        4. Communications/social marketing
        5. Food technology/fortification

    B. Develop Curriculum/materials/guidelines

C. Community–level training/empowerment

D. train/utilise multisectoral human resources

3. Monitoring and Evaluation

A. Assess initial prevalence and progress toward goals. Subtopic: need to go beyond clinical indicators.

B. Helps to identify target population

C. Mid–course corrections in intervention design

D. What are consequences for household resource allocation?

4. Advocacy (linked to sustainability)

A. Momentum generated by initial success

B. Involving the community which then gives its support

C. Support of national government:

(i) are human resources available?;
(ii) will ministries cooperate?;
(iii) legislation, regulation, enforcement.

D. Multi–lateral and bi–lateral agencies – information.

Another important area concerns programme evaluation methods. Beyond assessing status, we need to evaluate what's happening to programmes – how are they functioning – both formative and process types of evaluation. We need economic evaluation to look at the cost implications of programmes. We also need to look at issues that are behavioural in nature. We need to understand the coverage of programmes, but also the factors that affect the participation of communities in these programmes, and why or why not there is participation and adapting or adopting of interventions at the community level. So there is a whole range of assessment methods that need to be shared and developed. Support needs to be provided in evolving these assessment methods.

There is a variety of methods required to carry out interventions. Dietary diversification strategies have a whole range of approaches that might be used to modify food choices, to increase the production and availability of food, or to improve storage and preparation. Thus there are technologies and methods that underlie the accomplishment of these intervention strategies, and information and technology that needs to be shared in this regard. Also, there is a need to look for diverse approaches to how these strategies are applied, with not just people from one sector (such as health workers), but calling on a variety of sectors such as agricultural extension workers, other community level workers, educators, school teachers, and others to help in the promotion of dietary diversification. In a given country, one or another of these infrastructures may be more widespread and viable, and we should look to utilize what is in place and what is practical.

Supplementation methodologies have also been mentioned on many occasions. The emphasis has been on some strategies which are community–based, although we have heard concerns about broad based community supplementation and how practical and feasible it may be. We need to share this kind of experience. It may be applicable in some places and not in others. Targeting of supplementation strategies to risk groups may work better, depending on the particular environment. Also, there may be situations where therapeutic supplementation (for example, vitamin A in measles) may be relevant. Rather than considering supplementation as a good strategy or a bad strategy in general terms, this should be seen to depend on the need and what you are trying to do.

Fortification is among the most striking of the areas where technology has a major role to play, and we have heard a number of comments in regard to the application of methods in this area. A lot of attention has been given to the use of salt as a vehicle. There are many technical problems involved in applying that intervention, but there have also been many practical solutions found to them. We need to share those solutions, and promote ways of communicating what is known about these technologies, so that we put in place what is

known, even as we develop new technologies.

Basic grains offer a variety of opportunities for fortification. Sugar is another vehicle for fortification, with different methodological problems. We have heard about the use of condiments like MSG. A very important point concerns the linkage with industry in regard to fortification. Industry's skill and expertise, experience, and there working in the market place in a sustainable way, are absolutely critical success factors for fortification to go forward. There is a tremendous amount of technical knowledge within industry with which we need to work constructively. A good example is the meeting on salt fortification in Africa that was held last year – this was extraordinarily useful in arriving at a good consensus for action based on salt fortification.

Communications is another area where the application of methodologies can be useful. First, at the global level, we have heard some discussion of a micronutrient information system, which should be practical and give basic information quickly on what is happening in micronutrient malnutrition.

There is also a vastly important area of social marketing, and how we communicate with the public and with consumers; there are methods to achieve this, and approaches that need to be shared and understood.

A particular point to stress, as we heard from Dr Scrimshaw this morning, concerns investigating weekly dosages of iron, and seeing whether this could improve iron status. That kind of practical applied research – to look at what works and what doesn't – is extraordinarily important.

Training is another broad area of need. Perhaps there are several functions within this context. Developing guidelines that can be broadly useful and are practical in terms of approaches and methodologies can be useful for countries, who look to groups such as this for guidance as to ways that can be considered. Providing courses and workshops can address a variety of needs, that include training and assessment information systems, laboratory management training, programme management, communications, and social marketing and food technology and fortification. All of these areas that correspond to interventions and supporting activities need corresponding course work, and they need curriculum developments and materials. We have heard comments this morning by Dr Masimba (OAU) in regard to the need to incorporate into training nutrition information and concepts, and a public health and socially conscious approach to understanding of problems – this is needed in technical training, medical training and training of health and other professionals.

There is an important role, of course, for information transfer and technology transfer, but the mode of that training should be more in the line of positive reinforcement of what is known, of sharing experiences, of bringing together people from different perspectives and different disciplines so they can look for the complementarities that exist and help to select among alternatives rather than giving the impression that 'we know what needs to be done and here it is'. With this way we can avoid the kind of fragmentation of knowledge that was mentioned by Dr Masimba this morning, and rather bring an integration of information and technology to solve practical problems.

Now to turn to monitoring and evaluation, and advocacy (sections 3 and 4 of table 1). The first purpose of monitoring and evaluation is to assess the initial prevalence of the malnutrition and then to monitor progress towards goals – how bad is the problem and what kind of progress are we making with the interventions. Data may need to go beyond clinical indicators and to use more biological indicators, which are becoming cheaper to use now that methodologies have been developed. The advantages are that these biological methodologies are more precise, which allows us to use a smaller sample size, and they can account for morbidity and mortality problems where there are no clinical signs or malnutrition. This helps to identify target populations.

It was mentioned that we can use households as the basis of surveys, or clinics or schools. Using clinics and schools leads to bias; higher income groups tend to have more access to clinics and to attend schools more. Household surveys are more representative, and better for targeting by socio–economic status.

Another value of monitoring and evaluation is for mid–course corrections in intervention design. This can apply to household resource allocation. It may be found that demands have been placed on the household, by the project design, that the household may not be able to or willing to provide. For example, clinic attendance may turn out impractical because of travel and time burdens on the mother. Another value of studying household resource allocation is to assess some second round effects. For example, if the intervention reduces morbidity, then the household may spend less on medical care, so what do they spend the money on? Do they then spend the extra money on more food, for more education? Do they invest it in their farms?

Similarly, time allocation patterns may be affected. Parents do not have to spend as much time caring for children; children may go to school more often; and so on. Showing such full economic benefits then gets us into the area of advocacy – the information can be used as part of an advocacy programme. Momentum is generated by demonstration of initial successes: a successful iodine programme can possibly generate support later on for iron and vitamin A programmes. Moreover, it is important to involve the community in the intervention, for them to give support to the programme.

In terms of support of the national government, we have to be careful that the human resources would be available. These are often already pretty much fully utilized. When we introduce new programmes – are the people there with the extra time and training to implement the programmes? We have to ask whether ministries can cooperate, and that cooperation has to be developed.

Finally, what is the role of multilateral and bilateral agencies? They can provide information, as discussed here. They provide resources and money, but we have to be careful – especially if the main impetus for intervention comes from the outside agencies – that when they withdraw their support the interventions continue. So, we have to be careful that the primary momentum for the interventions comes from within the countries themselves.

Howarth Bouis is at IFPRI, 1200 17th Street, N.W., Washington, D.C., USA

Frederick Trowbridge is at CDC, 1600 Clifton Road, N.E., Atlanta, Georgia, USA.

THE NEED FOR A "LIFE–STAGE" APPROACH TO MICRONUTRIENT INTERVENTIONS – A Comment on Micronutrient Intervention Strategies ACC/SCN Micronutrient Forum, Geneva, February 1993

Lindsay H. Allen, presently at the Department of Nutrition, University of California, Davis, CA 95616–8669, was formerly at the Department of Nutritional Sciences, University of Connecticut, Storrs, CT 06269–4017

A perspective on the question of which micronutrients are needed, and how to deliver them, is inherently accepted by many participants in this forum. I believe it needs stating overtly. I can best illustrate my point by using pregnant and lactating women, and their infants and young children, as an example. We are all agreed that these are important target groups.

In this view of the problem, individuals in poor regions of the world obtain most of their dietary energy and protein from a few "core", staple foods, which are usually cereals and legumes. Cereals and legumes have a low content of most vitamins, and while their mineral content may appear to be reasonable, bioavailability will be poor due to food constituents such as phytates and fiber. As households' resources improve, micronutrient–rich fruits and vegetables, and perhaps more importantly dairy and other animal products, are added to the staple. Thus, many households in poor areas are likely to be consuming adequate amounts of energy and protein from staple foods, but inadequate amounts of vitamins and bioavailable minerals. Micronutrient malnutrition, because of poor dietary quality, occurs even in the face of adequate energy and protein intakes. It will also, of course, occur where there is an inadequate quantity of food. It is much more widespread than protein–energy malnutrition.

When women subsist on such diets prior to pregnancy, they enter pregnancy with low stores and intakes of multiple micronutrients. Anemia develops frequently, but other nutrient deficiencies undoubtedly exist – it is just that we don't usually measure them. Fetal uptake and storage of many of those micronutrients will also be low so that the infant starts early life with low stores. To this is added the problem that the concentration of nutrients such as vitamin A, and water soluble vitamins, is likely to be suboptimal in breastmilk. There are good reasons for the present policy of advising breastfeeding for the first 6–12 months of life, but are we sure that infants so fed will receive adequate amounts of vitamins and minerals, if the diet of their mother is poor?

Within 3–4 months of birth, until about 21 months of age, growth–stunting is found almost universally in poor regions of the world. It is now recognised that, without doubt, children who are growth–stunted have functional impairments which are persistent, often to adulthood. Growth–stunting occurs even in infants who are completely breastfed. Some, but as presently understood, not all, of the stunting is often caused by diarrhea. The infant with diarrhea may have anorexia, with a negligible intake of both macro– and multiple micronutrients. It will also incur major fecal losses of zinc, copper, and fat soluble vitamins in severe cases, as well as other nutrients.

A recognised but as yet unquantified problem is that of undiagnosed, asymptomatic, subclinical infections by bacteria and parasites, often resulting in bacterial overgrowth. Micronutrients such as vitamin A, iron, carotene, vitamin B_{12} and others may be chronically malabsorbed for long periods of time starting within a few months of birth.

Then a suitable weaning food must be found. Frequently, home– or locally–prepared weaning foods are cereal–based and very low in micronutrients. Stunting continues, and anemia develops – along with further deficits in multiple micronutrients, most of which are not usually measured in prevalence studies. Programs that have focussed on the use of cereals during diarrhea at this age have undoubtedly saved many lives, but many probably don't replete micronutrient stores or improve longer–term growth.

Based on this scenario, how much will feeding more green leafy and yellow vegetables really help? Perhaps they will improve vitamin A status, if they are well–targeted (and in the case of leafy greens, well–disguised?). Will they improve iron status? There is little information on this; we may be adding oxalates and fiber as well as vitamin C. What about the other micronutrients likely to be deficient by this age?

In this Forum we have accepted that single or complementary (1–3 nutrient) supplements should be regarded as a short–term solution to severe deficiency situations. However, it is more than likely that a pregnant or lactating woman and her child will be deficient in more than 1–3 nutrients. “Food–based” strategies such as introducing green leafy vegetables and fruits will not fill the whold micronutrient gap. Moreover, such foods must be integrated into the usual diet, and intervention efforts must “fit” with what is normally available, consumed, and recommended.

It is important, therefore, to focus on “food–based” strategies that add as many micronutrients as possible to the diets of women and young children. This should be done as part of an overall plan that is integrated with: management of non–pregnant, and then pregnant and lactating women (who may benefit from most multi–vitamin mineral supplements as part of perinatal health care); breastfeeding policy vs the adequacy of micronutrients in breastmilk (how do lactating women and their infants benefit from micronutrient supplements?); the types of weaning foods that are available, used and recommended (can multiple micronutrients be added to local cereal–based gruels? Is powdered milk a possible medium?); and foods available to, and preferred and consumed by the young child.

The “life stage” approach to micronutrient interventions has the potential benefits of: i) targeting appropriate nutrients to individuals at nutritionally–vulnerable periods of their life; ii) complementing normal dietary practices; and iii) fitting into an integrated health care, nutrition delivery and education system. A similar approach can be used for other nutritionally–vulnerable population groups.

PROGRAMME NEWS – MICRONUTRIENTS

The information here, which is in the usual format of SCN's “Programme News”, focuses in this issue on agencies' and organizations' activities in micronutrient deficiency control. The material is edited largely from verbal presentations at the Micronutrient Forum, plus some distributed printed material. It aims to give a brief overview of agencies' interests – more detail can be obtained by contacting the sources directly.

CDC (Centers for Disease Control)

CDC is collaborating closely in training and applied research with the Program Against Micronutrient Malnutrition (PAMM) at the Centre for International Health, Emory University, Atlanta.

The Division of Nutrition of CDC is actively involved in developing an iron initiative that will be directed at the very serious and continuing iron deficiency problem that exists in the United States, illustrating that micronutrient deficiency problems should not be thought of as being confined exclusively to the developing world.

As part of this initiative CDC is supporting the production of a report by the National Academy of Sciences that will provide an overview of public health strategies to address iron deficiency. Attention will be paid to the interaction of iron deficiency with lead toxicity. Exposure to environmental lead is a greater problem when the exposed individuals are iron deficient, because the absorption of lead is facilitated by the iron deficiency (when iron deficiency occurs, absorption of other divalent ions is facilitated).

Research that is being done in conjunction with this programme will test the effects of intervention with a coated iron tablet – a technique initially developed and tested in Jamaica.

CDC will be both distributing the tablets and monitoring the progress of the project through the United States primary health care system. In this case, it will be through the maternal and child health clinics, and the W1C programme (Special Supplemental Food programme for Women, Infants, and Children) activities.

> (Source and contact for further information: Dr F Trowbridge, Director, Division of Nutrition. Centers for Disease Control, Mailstop #K–24, 1600 Clifton Road, N.E., Atlanta, Georgia 30329, USA. Tel: (404) 488 4721 Fax: (404) 488 4479)

FAO

FAO has been involved since 1986 in the control of micronutrients, especially through its vitamin A programme (see SCN News No.8, p.38), the main strategy of which is promotion of the food–based approach to the problem.

However, FAO is not limiting its projects only to activities aimed at increasing the production and the consumption of micronutrient rich foods, it is also running nutrition education projects – one is currently taking place in Sahel – aimed at increasing awareness of the micronutrient deficiency problem. In another project currently underway in Nepal, FAO is working with the Ministry of Agriculture, and also with the Ministry of Health, Ministry of Education and Ministry of Local Development, to increase awareness of and better inform people about the problem.

In the near future, FAO hopes to hold a meeting in Rome to prepare the guidelines for the implementation of food–based strategies at country level with a view to helping countries to implement the activities proposed in the ICN plan of action.

> (For further information please contact: Director, Food Policy and Nutrition Division, FAO, Via delle Terme di Caracalla, 0100 Rome, Italy. Tel: (396) 5797 3330 Fax: (396) 5797 3152)

HKI (Helen Keller International)

Helen Keller International (HKI) looks forward to continuing its twenty year effort in the control of micronutrient deficiency. Building on its pioneering work in the area of vitamin A deficiency and blinding xerophthalmia, HKI is anticipating increased programmatic activity with wider applications in iodine and iron deficiencies. The HKI micronutrient programme will include continued emphasis on technical assistance to governments and NGOs, advocacy for micronutrient issues, child survival programmes and operations research.

Recently, HKI, in cooperation with UNICEF and the Government of Yemen, assisted in an assessment of several thousand children, gathering information of the vitamin A, thyroid and iron status of this group. This successfully demonstrated the ability to expand the assessment methodology used for vitamin A status. In Bangladesh, HKI has organized a Nutritional Surveillance Programme which utilizes NGOs to gather data and has successfully proven its usefulness following recent flooding. In the past year, HKI has assisted a number of NGOs in assessment techniques through the VITAP programme. HKI is committed to continuing to assist an even larger number of NGOs (indigenous and international) and governments in performing assessments for micronutrient disorders. New techniques, like dietary recall are beginning to provide valid data at greatly reduced cost, and HKI will continue to test these techniques.

Just as importantly, HKI is anxious to expand its intervention strategies to include all micronutrients. There is no reason to assume that social marketing techniques, like those we have developed in Indonesia, or Burkina Faso, cannot be adapted to address iodine and iron deficiency. Training skills similarly can be used in a number of interventions. We are especially concerned with determining the impact and effectiveness of community health workers in delivering a more complicated nutritional message.

HKI's experience in capsule delivery systems, like those in Bangladesh and Indonesia, has application in a number of other areas. Fortification, when successful, offers a cost effective method of reaching those at high risk for micronutrient deficiencies. HKI is currently working to develop a number of foodstuffs fortified with vitamin A, and perhaps eventually the other micronutrients.

In summary, HKI is enthusiastically pursuing a number of strategies to combat micronutrient deficiencies. Two decades of experience with many assessment, monitoring and intervention strategies has taught us the need

to remain flexible and imaginative in creating programmatic solutions based on sound scientific research and public health principles.

(For further information please contact: HKI, 90, Washington St., New York, NY 10006, USA. Tel: (212) 943 0890 Fax: (212) 943 1220)

IAEA

The IAEA is supporting a number of research programmes in the area of human nutrition. All of these programmes involve some aspect of the use of isotopes or radiation (however, this component is sometimes only a relatively small one). The main mechanisms of support are:

(1) coordinated research;
(2) technical cooperation (including fellowship training and training courses); and
(3) analytical services (particularly relating to analytical quality control).

Current Activities Relating to Trace Element Nutrition

With respect to iron nutrition, a Coordinated Research Programme (CRP) is being supported in 11 countries on the bioavailability or iron and zinc from different diets. With respect to iodine nutrition, extensive activities are being supported in Asia and Latin America involving the use of radioimmunoassay for monitoring neonatal hypothyroidism.

With respect to trace elements in general, a study was conducted in collaboration with WHO on trace elements in human milk in 6 countries and the results were published in 1989. More recently, studies have been conducted in 16 countries on dietary intakes of a large number of essential and toxic trace elements. Some results have been published and a more detailed report is in preparation. Another current programme (in collaboration with WHO) is concerned with assessing nutritional and environmental exposure to mercury in selected human populations.

During the past year a global database on human daily dietary intakes of nutritionally important trace elements was completed and an evaluation of these results is due to appear in the report of the WHO/FAO/IAEA Expert Consultation on Trace Elements in Human Nutrition (in press).

Some of the above−mentioned programmes are supported by work in the IAEA's Analytical Laboratory in Seibersdorf, which also runs an extensive programme of analytical quality control services (AQCS). The current AQCS programme makes available a variety of food−based reference materials for trace elements, organic micro−contaminants, and radionuclides; many of these are relevant in different kinds of nutritionally−related research programmes. The IAEA also maintains a computerized database of such reference materials, which it is planning to update during 1993 in collaboration with UNEP.

Future Activities Relating to Trace Element Nutrition

Most of the above−mentioned programmes will continue during 1993−94. A new CRP is expected to start during 1993, in collaboration with WHO, on Comparative International Studies of Osteoporosis Using Isotope Techniques (details available on request). Trace element studies are included as one part of the protocol for this CRP. A Regional Training Course for English Speaking African Countries on Isotope Techniques in Human Nutrition Research is due to be organized during 1993, which is expected to deal extensively with iron nutrition.

(For further information please contact: R M Parr, Section of Nutritional and Health−Related Environmental Studies, International Atomic Energy Agency, PO Box 100, A−1400 Vienna, Austria. Tel: 43 1 2360 1657 Fax: 43 1 234564)

ICCIDD (International Council for Control of Iodine Deficiency Disorders)

Expansion is evident in national programmes throughout the world supported by regional and global activities. The momentum generated from the 1991 Montreal Conference “Ending Hidden Hunger” has been increased by the ICCIDD working closely with UNICEF and WHO and interested bilateral agencies (Holland, Sweden, Australia, Switzerland, Belgium). The World Bank is also now supporting IDD control programmes within its country nutrition programmes. Particular impact has been made in Indonesia and China.

Notable features of the past year have been –

• The increase in political support for national programmes by the 45th World Health Assembly (Geneva 1992) and the FAO/WHO International Conference on Nutrition (Rome 1992).

• The new emphasis on salt iodisation. This has included the new alliance between the ICCIDD and the major salt producers of the world (IAAIDD), and the two major regional salt iodisation workshops in Africa–Botswana (Anglophone) and Senegal (Francophone) supported by CIDA and UNICEF. These workshops had been very successful and rapid progress was being made by Southern African countries. In West Africa there had been substantial impact in Nigeria.

• In Europe, the Report on the 1992 ICCIDD/UNICEF/WHO Meeting on Iodine Deficiency in Europe is about to appear. It is now agreed that there are 200 million still at risk of IDD. What is needed is political will to overcome the problem. Ministries of Health and Industry and other decision makers need to be also aware of the great cost of IDD – recently estimated by insurance companies in Germany to be $800m per year for the investigation of iodine deficient goitre and its complications. The hazard of further catastrophies like the Chernobyl disaster of 1986 make correction of iodine deficiency urgent due to the increased radiation uptake associated with this condition.

• Middle East (Eastern Mediterranean) A WHO/UNICEF/ICCIDD Regional Meeting has just been held in Alexandria (25–29 April 1993). It was attended by representatives from 12 countries who reported good progress with national IDD control programmes. A Communication Workhop was held, led by Ms N Chawla (India), Mr R Tyabji (UNICEF Yemen) and Professor Ling (USA).

(For further information please contact: Dr Basil S Hetzel, Executive Director, ICCIDD, c/o Health Development Foundation, 8th Floor, Samuel Way Building, Women's and Children's Hospital, 72, King William Road, North Adelaide, 5006, Australia. Tel: 61 8 204 7021 Fax: 61 8 204 7221)

IFPRI

Food Policy and Agricultural Technology to Improve Diet Quality and Nutrition

Nutrition Research Within the CGIAR The International Food Policy Research Institute (IFPRI), one of eighteen international research organizations which comprise the Consultative Group on International Agricultural Research (CGIAR), undertakes research, primarily from an economics perspective, to assist policymakers in developing countries to increase food production and improve food consumption and nutrition among the poor. The main focus of research at most Centers in the CGIAR, however, is development of improved crop varieties, which increase the food supply and so lower food prices, and which raise farm profits and rural employment. Lower food prices and increased rural incomes are perceived as the major contributions of past CGIAR activities to improve nutrition in developing countries.

Recently IFPRI has been designated to take the lead in coordinating nutrition–related activities within the CGIAR. A large part of that effort will be organized around a new five–year project, Just initiated, funded by the Office of Nutrition of the United States Agency for International Development (USAID). The focus of the project will be to explore cost–effective alternatives within the CGIAR for increasing micronutrient intakes.

Strategies for Improving Micronutrient Intakes

There are two broad strategies which the CGIAR can pursue in the area of nutritional improvement. The first broad strategy might be characterized as a business–as–usual approach to nutrition in which social scientists and nutritionists focus on the interaction of the technologies provided by the Centers, household resource allocation, and health, nutrition, and other policies implemented by national governments. For example, adoption of *micronutrient–rich* food production technologies which are the focus of research at specific Centers (e.g., vegetables, livestock) will presumably raise some farm incomes, alter the way that these households organize their time, and modify food consumption patterns, among other changes, all of which will differentially impact the nutritional status of mothers, children, and other family members. At a regional level, employment patterns may be affected and the prices of micronutrient–rich foods will decline, affecting micronutrient intakes and nutrition even in non–adopting households.

Adoption of modern food staple crop technologies, which in general are not rich sources of micronutrients, will also impact household resource allocation and regional employment and food consumption patterns, but in a different way. Which specific production technologies will have the greatest impact in reducing micronutrient deficiencies? Among a host of other factors, the answer will depend on the extent to which mothers are involved in farm work to produce these crops, the extent to which households sell what they produce or consume their own production, and how food consumption patterns of non−producing households are affected by changes in food prices and incomes.

The second broad strategy is to enhance the micronutrient content of crops through plant breeding, agronomic practices, and food processing. Plant breeding, which may be viewed as a form of fortification, has tremendous potential for improving micronutrient intakes. There are, however, a daunting number of technical questions to be answered before investing substantial resources in such a strategy.

What is the probability of success of breeding for a nutrient−dense crop variety, for example an iron−dense wheat variety? How long will it take and how much will it cost? If breeding is successful, will the nutrient−dense genotype be low−yielding, or will it have unacceptable consumer characteristics, resulting in lower profits as compared with present varieties and thus reducing adoption by farmers? If the profitability and adoption barriers are overcome at the farm level, to what extent will the additional micronutrients in the seeds be bioavailable after being consumed? Assuming that bioavailability is enhanced, to what extent will micronutrient deficiencies be improved, given the variety of food consumption patterns and food demand behaviours of low income groups in poor countries? Finally, what are the functional consequences, in terms of human health and economic outcomes, of these improvements?

Before pursuing either or both strategies within the CGIAR to improve micronutrient deficiencies, it is essential to take into account alternative interventions, outside the purview of the CGIAR, which may be more cost−effective. If better solutions lie outside the scope of CGIAR activities, then the appropriate response would be for the CGIAR simply to continue with its traditional focus on raising farm incomes and lowering food prices. For example, iodization of salt appears to be a proven, low−cost intervention which is being implemented in developed as well as developing countries. Other major interventions apart from fortification outside of the purview of CGIAR activities are supplementation, disease reduction, and nutrition education. Rather than a single intervention precluding others, it may turn out that there are strong complementarities between these alternative interventions and CGIAR activities.

Identifying Specific Research Activities

The complexity of the issues raised above conditions how the project will be organized and implemented. The first two years will involve a process of identification and selection of specific research activities to be implemented in the final three years of the project. Five papers will be major inputs into that decision−making process. These papers not only will review the existing literature, but will also involve new analysis of existing data. To the extent that appropriate information is available, these papers will provide:

(i) an overview of the extent of micronutrient deficiencies in developing countries by geographic location, their functional consequences, and the socio−economic characteristics of populations suffering from these deficiencies;

(ii) information on the specific dietary sources of micronutrients by geographic location and by socio−economic group, and an analysis of the factors (e.g. income, food prices, education) that drive household−level demand for these foods;

(iii) information on the intra−household distribution of these foods and the factors (e.g. income−control, education, gender) that drive this distribution;

(iv) a review of the cost−effectiveness of past supplementation, fortification, disease reduction, nutrition education, and home gardening interventions in reducing micronutrient malnutrition, and prospects for the development of new low−cost technologies in these areas; and

(v) an evaluation of the probabilities of success of breeding for micronutrient−dense varieties by crop within the CGIAR, and recommendations for the sequence of specific steps that would need to be taken to develop such varieties; similar evaluations in the areas of farming systems, agronomic practices, and food processing technologies.

Our intention is that these papers will identify gaps in knowledge and areas of key concern, which in turn will point the way toward high pay off research projects. Separate funding has been designated for research under the two broad nutritional improvement strategies discussed above. The projects involving social scientists and nutritionists are envisioned as tri–lateral collaborative efforts between IFPRI, another CGIAR Center, and a national research institution. Typically, these projects would involve household surveys, with some households adopting a CGIAR technology and perhaps receiving a specific nutritional intervention, and other households serving as a control group. Data would be collected on a wide range of economic and nutrition variables. Projects on the breeding/agronomic practices/food technology side of the project would be bilateral collaborative efforts between a CGIAR Center and a national research institution.

Guidance for this project in its first two years will be provided by an advisory committee. The committee consists of persons who have been involved in solving food, nutrition, and agricultural problems in developing countries, and represents such disciplines as agronomy, plant breeding, nutrition, and economics.

An initial planning workshop will be held toward the end of this year or early next year to be attended by the advisory committee and an interdisciplinary group of scientists from IFPRI, other CGIAR Centers, and national research institutions. Initial work on the five papers outlined above will be presented. Preliminary proposals will be discussed, although new proposals may be developed after this first workshop. Finalized proposals will be reviewed by the advisory committee before a second workshop to be held in early–to–mid 1995. The five finalized papers will be presented at that second workshop and decisions will be made as to specific research activities to be undertaken in the final three years of the project.

Representatives from organisations involved in funding and implementing projects aimed at reducing micronutrient deficiencies also will be invited to participate in the workshops. In part, this is to ensure coordination of research under this project with work being undertaken by other organisations. However, the project has been structured administratively so as to allow expansion of the number of research activities during the final three years through direct participation of these donor and implementing organisations in the project.

> (IFPRI's intention is to seek advice as widely as possible during this planning phase. Those who have suggestions, who want to learn more about the project, or who would be interested in attending the workshops (some funding for this is available for persons from developing country institutions), can write to the project director, Howarth Bouis, at IFPRI, 1200 17th St. N.W., Washington D.C. 20036–3006. Tel: 202–862–5641; Fax: 202 467 4439)

The Micronutrients Initiative

The Micronutrients Initiative (MI) is a new organization. It emerged as various donors and governments and some other groups all saw the need over the past few years to accelerate, expand and strengthen programmes to overcome micronutrient malnutrition. The World Summit for Children in New York, 1990 and the Ending Hidden Hunger Conference in Montreal (1991) as well as the International Conference on Nutrition in Rome, 1992 all served to strengthen the realization that programmes to overcome micronutrient malnutrition really need to be catalyzed.

The objectives of MI are to assist countries to identify problems, analyze and articulate needs, formulate programme proposals and establish collaboration with the providers of the required support; to increase international awareness and commitment; and to act as a focal point for fund raising, information and international dialogue.

MI seeks to promote intersectoral collaboration in addressing the problem of micronutrient deficiencies. Emphasis is placed on facilitating dialogue between the policy, community and research sectors, and in promoting coordinated programme design at the country level. Whenever possible, it encourages linkages between programmes directed at vitamin A, iodine and iron deficiencies. The MI also facilitates the integration of work in regions and countries in the areas of supplementation, food fortification and consumption patterns.

At national and regional levels, the MI focuses its efforts on feasibility studies, operational research, programme design and evaluation, capacity–building, information systems, and communications.

At the international level, the MI works closely with FAO, UNICEF, WHO, bilateral agencies, NGOs, technical agencies and the multilateral banks to promote implementation at national levels of micronutrient

interventions. The MI works with the UN ACC Subcommittee on Nutrition (ACC/SCN), the International Council for the Control of Iodine Deficiency Disorders (ICCIDD), the International Vitamin A Consultative Group (IVACG), the International Nutritional Anaemia Consultative Group (INACG), and the Group for the Control of Iron Deficiency (GCID).

The MI is overseen by a Steering Committee and is guided by an External Technical Advisory Group. The Executive Director of the MI reports to donors through the Steering Committee which establishes guidelines and reviews progress of the MI. The External Technical Advisory Group validates the scientific, technical and economic appropriateness of activities, identifies and advises on new opportunities, and reviews research and development needs. The Advisory Group is interdisciplinary in nature with representation from the nutritional, health, agricultural, social and management sciences. The MI is housed in the headquarters of the International Development Research Centre (IDRC) in Ottawa, Canada, and is financed by CIDA, IDRC, UNDP, UNICEF and the World Bank.

> (For further information please contact: Executive Director, The Micronutrients Initiative, IDRC, PO Box 8500, 250 Albert Street, Ottawa, Canada, K1G 3H9. Tel: (613) 236 6163. Fax: (613) 238 7230)

The Nutrition Foundation

The Nutrition Foundation, Inc. is a division of the Human Nutrition Institute of the International Life Sciences Institute (ILSI). ILSI is a public non–profit scientific foundation established in 1978 to advance the understanding and resolution of scientific problems in nutrition, toxicology, and food and environmental safety. Headquartered in Washington, D.C., ILSI has branches in Argentina, Australia, Brazil, Europe, Japan, Mexico, North America and Southeast Asia.

Both the Human Nutrition Institute and its Nutrition Foundation division have been active in micronutrient malnutrition. The Nutrition Foundation serves as the secretariat for the International Nutritional Anaemia Consultative Group (INACG) and the International Vitamin A Consultative Group (IVACG) through a cooperative agreement with the US Agency for International Development. The most recent INACG publication is “Combatting Iron Deficiency Anaemia through Food Fortification Technology.” and the most recent vitamin A publication is “Nutrition Communications in Vitamin A Programmes, a Resource Book.”

Ongoing activities of INACG include the submission of a toxicology monograph on sodium iron EDTA to the Joint FAO/WHO Expert Committee on Food Additives (JECFA). Iron EDTA provides iron in a more bioavailable form for food fortification, thus requiring less iron to be added to the food.

The Nutrition Foundation and the Human Nutrition Institute have also been actively involved in promoting coordination of efforts among the three micronutrients. In late 1992, the Institute co–sponsored a workshop, “Coordinated Strategies for Controlling Micronutrient Malnutrition” with the Program Against Micronutrient Malnutrition and the US Centers for Disease Control. Through the Nutrition Foundation, representatives of INACG, IVACG, and ICCIDD have met to discuss ways programs at the developing country level might be more effectively coordinated. A joint mission is being planned to test whether or not such an approach is feasible and useful.

> (For further information please contact: Dr Suzanne Harris, Executive Director, The Nutrition Foundation, 1126 16th Street, N.W., Washington D.C. 20036. Tel: (202) 659 9024. Fax: (202) 659 3617)

PAMM (Program Against Micronutrient Malnutrition)

The Program Against Micronutrient Malnutrition (PAMM) is a network of collaborating groups that is working towards the elimination of micronutrient malnutrition. The groups include participant countries, Emory University, the Centers for Disease Control and Prevention (CDC), the Task Force for Child Survival and Development, and a variety of other groups with complementary technical and programmatic strengths. The strategic focus of PAMM is to assist national governments to develop the capability to achieve and sustain the elimination of micronutrient malnutrition.

The goal of PAMM is to support the global effort towards the elimination of micronutrient malnutrition by the year 2000. The strategic plan developed by PAMM includes the following key components:

• *Advocacy.* Advocacy is the dynamic process of developing consensus and a mandate for action. It is essential for control of micronutrient malnutrition; those who are in a position to take action must be convinced that control of micronutrient malnutrition has merit. The value of micronutrient malnutrition control has been recognized by most of the heads of state or government. This recognition should be translated into clear and decisive agendas for action by policy–makers, legislators, producers, and consumers. Mechanisms for various groups to work together towards common goals is needed to avoid duplication of effort, geographic and programmatic gaps, and excessive reliance on short–term solutions. PAMM cooperates with other groups to work with national governments, the private sector, and consumers in this global effort.

• *Interventions.* Similarly, micronutrient malnutrition can only be controlled if effective and feasible interventions are implemented. Dietary diversification, fortification and supplementation have been shown to be effective when appropriately tailored to the conditions where deficiencies exist. Cultural, economic, geographic, climatic, and political conditions can influence the suitability of particular interventions or combinations of interventions. Interventions can be implemented separately or in combination. Short–term interventions that are easy to initiate but difficult to sustain might be coupled with longer–term interventions that are harder to initiate but more sustainable.

• *Evaluation and Surveillance.* Evaluation to implement and surveillance to sustain effective interventions are also crucial to micronutrient malnutrition control. Formative evaluation can provide information to guide decisions on who, what, where, and how to implement interventions. For instance, quantitative information on how many are afflicted and where they are located can assist in targeting. Qualitative information on knowledge, attitudes and practices can assist in identifying and overcoming resistance to adopting new practices. Process evaluation can provide information on whether interventions are functioning as intended, and if not, how to fix them. Ongoing surveillance can be an effective means to systematically collect and disseminate such information. Summative or impact evaluation can provide information to guide new programs.

Training

PAMM offers training courses designed to assist national teams to acquire skills to work together to develop and maintain effective programs. These programs are interdisciplinary. Teamwork, collaboration, and integration are key elements of the training strategy. Participants from a variety of backgrounds work together through team–building exercises and technical training sessions to develop and plan programs that build linkages across disciplines. Three–month technical courses are offered simultaneously in:

• program management;
• information management;
• social marketing management;
• fortification management;
• information management; and
• laboratory management.

At the end of the three–month technical courses, senior level officials from the participant countries join the one week training course on:

• advocacy and policy

Ongoing Support

PAMM offers long–term technical assistance and collaboration with national programs. Training is only one component of a more comprehensive interrelationship between the PAMM participant countries, experts in specific micronutrients, and others working against micronutrient malnutrition. Key aspects of this ongoing support are:

• *Initial and Continuing Site Visits.* PAMM offers to visit countries interested in training to assess country–specific needs. PAMM also offers continued site visits after training to provide technical assistance to participant countries as needed. These visits are tailored to country–specific requests and needs.

• *Annual Workshops.* A two−week workshop is conducted each year for three years following the initial training. The workshop takes place in one or more of the countries in the PAMM network. For instance, the Indonesian Ministry of Health hosted the first PAMM workshop for all participants in the training courses. Just prior to the Indonesian workshop, Mahidol University, Iron and Iodine Projects, held a small workshop for program managers in Thailand. Annual workshops provide the opportunity to share program experiences, strengthen the international network, and refine technical skills. Participants identify topics for discussion, skills to improve with further training, problems encountered, new developments, and successful strategies. PAMM provides technical support to meet the needs expressed by the participants.

• *Micronutrient Information Network.* PAMM is developing a micronutrient information network (MIN). Its purpose is to facilitate communication between participant countries, PAMM, and other groups. The emphasis is on information to support micronutrient malnutrition control programs. AT&T has donated computer equipment for participant countries and PAMM.

• *Laboratory Support.* PAMM provides technical guidance to purchase the equipment necessary to establish a national laboratory similar to the laboratory used in the laboratory management training. Participants can elect to purchase this equipment at discount prices through PAMM, or choose an alternative better suited to their needs. Support will include purchase of the reagents needed for one year's work. The laboratory equipment is linked to a computer that rapidly analyzes data specific to micronutrient malnutrition. Ongoing quality assurance from a reference laboratory is also offered.

• *Applied Research and Development.* PAMM has already undertaken many activities to develop applied research and development to enhance micronutrient malnutrition control. The workshop on “Coordinated Strategies for Micronutrient Malnutrition Control” sponsored by the International Life Sciences Institute (ILSI) and PAMM in November 1991, identified technical gaps and research priorities for evaluation and surveillance, fortification, and dietary diversification. Furthermore, PAMM has:

a) developed a technical network of research groups;

b) defined issues needing research & development;

c) identified field sites for testing & development;

d) identified collaborating country participants to scale−up projects to nation−wide program; and

e) developed human resources to implement new techniques & methods through training.

Many of the groups in the technical network have long−standing applied research and development programs for micronutrient malnutrition control. Much of the research is proposed by institutions in countries where micronutrient malnutrition is a serious problem. This means that the research will be conducted in the most relevant settings. The link between regional research centers and national programs provides a direct mechanism to evaluate new developments in the conditions where the problems occur and interventions are implemented. The implementation and scaling−up experiences of these programs have potential for adaptation among similarly affected countries.

Furthermore, the training and ongoing support provide the means of developing human resources to take advantage of the latest most relevant developments.

(For further information please contact The Program Against Micronutrient Malnutrition (PAMM), Center for International Health, Emory University School of Public Health, 1599 Clifton Road, N.E., Atlanta, GA 30329, USA. Tel: (404) 727 5417. Fax: (404) 727 4590)

SIDA

About half of Swedish development assistance goes through the Swedish International Development Authority (SIDA). Most of SIDA's assistance is bilateral, direct to its 19 cooperating countries in the developing world. In the field of nutrition most of the support is of a capacity building or institution building nature, currently for Tanzania and Zimbabwe, In Zimbabwe, this had included support to the national IDD control program, including staff training.

In Tanzania, Swedish support laid the foundation for the national vitamin A deficiency and anemia control programs currently being funded by the World Bank. SIDA funds the short–term component of the IDD control program, distribution of iodized oil capsules to over 20 heavily affected districts.

In Bangladesh, SIDA has been funding 1/3 of the costs of the national universal vitamin A capsule distribution program via UNICEF since 1981 and has since 1989 supported a project in one district involving nutrition education and horticulture to improve vitamin A through the diet. A large quasi experimental evaluation of this approach has recently been completed. Small studies of constraints to the success of this program, including the role of dietary fat in carotene absorption and another of how to overcome practical constraints to home gardening are planned for later this year.

Small grants have been given as core support to ICCIDD and to WHO Africa for holding a workshop on iron deficiency in pregnancy. SIDA offered additional funds to ICCIDD earmarked for work on rehabilitation of those handicapped by IDD, however this was apparently not of interest to them. SIDA believes that there may be an ethical basis for asking those working on IDD surveys to also consider this aspect, since cretins and other may, as a result of such surveys, be subject to more discrimination from the community once outsiders have focused attention on these handicapped individuals.

Relevant training for several staff from both Tanzania and Zimbabwe at PAMM has been funded as well as research degrees for a few staff. At the Uppsala University International Child Health Unit, the Assistant Director of the MOH Nutrition Unit recently completed a Master of Medical Sciences degree on goiter palpation and urinary iodine excretion in a high prevalence region of the country. The Managing Director of the Tanzania Food and Nutrition Centre has been working on a PhD studying factors affecting the absorption of iodine from iodized oil capsules. Another Tanzanian is beginning a PhD on food fortification, probably vitamin A, but maybe also iron or vitamin C. Another is nearing completion of a PhD on IDD related to cyanide exposure from cassava. ICH is also studying methodological issues in iodized oil capsule distribution programs from epidemiological, economic and communication perspectives.

A major relevant interest to Sweden is breastfeeding. A large programme is being supported through INCAP for several years in Central America. SIDA has supported national breastfeeding promotion programs in Tanzania and Zimbabwe and provided minor assistance in Viet Nam. SIDA has been supporting protection of breastfeeding via the International Baby Food Action Network since 1980 and through various programs at WHO since the 1970s. Support has recently been provided to the World Alliance for Breastfeeding Action for a seed grant program to support grassroots groups in Africa and Asia who want to develop local approaches to provide support and assistance to working women to breastfeed more successfully.

The Natural Resources Division of SIDA has supported FAO and the Agricultural University in Uppsala for work on diet diversification through the promotion of local foods, often through the Forest, Trees and People programme. The role of diet diversification in household food security has received attention, mainly through farming systems research.

SAREC, the Swedish Agency for Research Cooperation with Developing Countries, has been one of the agencies supporting research on iron absorption. Many of you probably know of the research conducted over many years by the group including Hallberg, Rosander, Svanberg and others in Gothenburg. One Tanzanian has recently completed a PhD which included bioavailability of iron in fermented gruels. SAREC also funds a small project studying iodination of water. There are a number of Swedish agencies and businesses which have been working on iron fortification of cereals and weaning foods.

Another Swedish development assistance agency, BITS, supports technology transfer and training. It funded a scientific exchange program between ICH and Sudan for a decade and new programs of that type are now in operation with China and Pakistan. The program supported the PhD research of Mohammed El Tom on iodized oil capsules and his subsequent work on iodation of sugar.

(For further information please contact: Dr T Greiner, SIDA Nutrition Adviser, International Child Health Unit. Uppsala University, Entrance 11, 751 85 Uppsala, Sweden. Tel: 46 18 665937 Fax: 46 18 515380)

UNICEF

UNICEF is committed to working with all countries to achieve the three goals, for each of the micronutrients, by the year 2000. There is an agreement about to be launched to virtually eliminate iodine deficiency by the end of 1995. UNICEF will help to do this through its regular country programmes (in one hundred countries). The substantial resources required will come primarily from country programmes in some way. UNICEF is committed to developing national plans of action for the achievement of the goals of the World Summit for Children: it is anticipated in many respects that these plans of action will be closely linked to the plans of action for achieving the objectives of the International Conference on Nutrition.

The emphasis will be, as far as possible and in almost all respects, on developing a community based approach, working within the existing UNICEF programmes, strengthening present activities in community based health care for the support, protection and promotion of breastfeeding, the EPI programme and linking programmes to that as far as possible. UNICEF will not generally support separate vertical programmes.

At the international level, UNICEF will continue to support institutions which are developing approaches to training and improving monitoring and evaluation. UNICEF will continue to work closely with WHO in this respect. UNICEF will continue to support organizations such as PAMM and ICCIDD. UNICEF will also participate in the Micronutrient Initiative. UNICEF's work will continue in close collaboration with WHO (see WHO section below).

> (For further information please contact: Dr D Alnwick, Senior Adviser, Micronutrients, Nutrition Cluster, Programme Division, UNICEF, 3, UN Plaza, New York. NY 10017, USA. Tel: (212) 326 7057 Fax: (212) 326 7336)

UNU

Anaemias, the great majority of which are due to iron deficiency, constitute the most universal and prevalent nutritional problem in the world. WHO estimates that 56% of pregnant women in developing countries and one−third of women of child bearing age and preschool children are anaemic. Most of the remainder are iron deficient with consequences ranging from higher reproductive losses, impaired cognition, reduced physical capacity, increased susceptibility to infection and higher morbidity from infectious disease. UNU and WHO have developed a master protocol for comparing the effectiveness of a weekly versus a daily iron supplement in anaemic pregnant women, in adolescent girls and in preschool children.

Four proposals in each category have been approved and support from various sources is pending. It is anticipated that these studies will begin soon providing initial information for policy decisions by mid−1994. If the results of these studies are positive, adoption of community− or clinic−based weekly iron administration could be universally recommended rather than daily supplementation. This would result in great savings and consequently allow much wider coverage of communities than at present. Widespread adoption of this approach might render it feasible to attain the goal of the World Summit for Children and the International Conference of Nutrition of reducing the prevalence of anaemia in pregnant women by one−third of the 1990 levels by the year 2000. It is therefore an operational research of crucial importance and urgency for the health of women and children.

> (Source and contact for further information: Dr Nevin Scrimshaw, The United Nations University, Food and Nutrition Programme for Human and Social Development, Charles Street Station, PO Box 500, Boston, MA 02114−0500, USA. Tel: (617) 227 8747 Fax: (617) 227 9405.)

USAID

USAID supports activities addressing a broad range of nutrition concerns, focusing on diet quantity and quality. These include women's and infant nutrition, nutrition communications, and micronutrients. In the latter category, USAID has long standing programmes in vitamin A and iron; and, most recently, has begun activities in iodine in certain countries.

USAID has had a vitamin A programme and an iron programme in place since the mid−1970s − the vitamin A activities in fact began in 1965. Activities are carried out in USAID−supported countries, in collaboration with in−country counterparts, other donors or international organizations, and non−governmental organizations both US−based and indigenous. The programme supports applied research, including studies to increase the scientific basis for understanding the relationship between micronutrient deficiency and childhood morbidity

and mortality, refinement of assessment techniques, especially trying to find appropriate low–tech ones, and testing out and evaluating innovative interventions for sustainable control of micronutrient deficiency.

Technical assistance and training is provided to determine location and extent of micronutrient deficiency, at national and sub–national levels; to assist countries in development of institutional capacity for sustainable programmes, and to determine appropriate intervention strategies, evaluation of their effectiveness, and documenting lessons learned. Training is undertaken to develop a cadre of qualified individuals in host countries to ensure sustainability of programmes. In this regard USAID recently supported the development of country reports for the ICN, information collection and dissemination through support of consultative groups such as IVACG and INACG, and development and publication of state–of–the–art documents on micronutrients. Support is given to international meetings and publication and dissemination of reports on experiences of programme implementation – such as compilation of home and community gardening experiences – in newsletters, such as the Xerophthalmia Bulletin, Vital News, and other publications.

To reach the goal of the elimination of micronutrient malnutrition USAID supports integration of micronutrient delivery systems with other child survival activities; targeting interventions to areas, communities, age groups and seasons of highest risk; and selection of complementary interventions to enhance sustainability and impact based on conditions unique in each programme situation, or each country, rather than dependence on a single intervention. USAID engages in agricultural food processing and other relevant areas, including in the private sector, to ensure adequate micronutrients in food supplies, and access to food by needy segments of the population, as well as continued research in support of programme and policy decisions.

In our future is a new project called OMNI. This is based on experience in specific micronutrient activities and eventually will be all–encompassing, although initially dealing with the Big Three of vitamin A, iron and iodine, building up as new information becomes available about other micronutrients.

USAID carries out activities through projects in specific countries. USAID depends on individual missions located in specific countries, when these agree for us to do activities there, and identify host country counterparts.

(For further information please contact: Office of Nutrition, USAID, 320 21st Street, N.W., Washington, D.C., 20523, USA. Tel: 703 875 4074 Fax: 703 875 7483)

Wageningen Agricultural University

The major activities related to micronutrient malnutrition in Wageningen Agricultural University (WAU) are in the Department of Human Nutrition but other departments, such as Food Technology, Agronomy, Human and Animal Physiology, and Extension Science also contribute to the effort. The International Agricultural Centre (IAC) has developed a strong programme of international courses including those in food science and human nutrition (ICFSN), and in recent years, more attention has been developed to micronutrient malnutrition. The various activities are described below.

Training courses

- International Course on Food and Nutrition Programme Management (IAC) (6–weeks course since 1984 with participants from micronutrient programmes such as vitamin A programme in Vietnam)
- Management training in vitamin A programme in Vietnam (WAU/IAC)
- Food fortification module of PAMM training since 1992 (IAC)
- Extension module (provisional) of PAMM training (IAC)
- Proposed 4–week courses on micronutrient malnutrition in ECSA countries, Indonesia and Eastern Europe based on earlier experience
- MSc training (WAU) has emphasis on micronutrients with many students carrying out projects in this area.
- PhD training: 7 PhD fellows working on micronutrient problems including three from overseas

Research (WAU)

- Prevalence studies (Tanzania, Ethiopia, Malawi and Vietnam)
- Studies on mechanisms in humans (Ethiopia and Indonesia) and appropriate animal models
  - inter−relationships between vitamin A nutriture and infection/immunity
  - inter−relationships between vitamin A and iron nutriture
- Studies on developing and evaluating intervention strategies
  - effect of iron and/or iodine supplementation on increasing physical, mental and psychological performance of children in an iodine−deficient area (Malawi)
  - factors influencing the effectiveness of oral dosing with iodized oil in increasing iodine status (Malawi)
  - examining ways of increasing vitamin A and iron status using available and acceptable food sources (Indonesia and Vietnam)
- Work aimed at increasing the quality and compatibility of data on food composition
  - in Europe: FLAIR Eurofoods−Enfant Project
  - in ECSA countries and Vietnam: food tables produced
  - worldwide: through INFOODS and FAO initiatives

Missions

- Evaluating the prevalence and severity of micronutrient malnutrition
- Assisting in the establishment and maintenance of projects/programmes to combat micronutrient malnutrition
- Evaluating the effectiveness and performance of projects/programmes

Collaboration

- Institutes/agencies in Africa, Asia and Europe (West and East)
- International agencies including EEC
- Industry
- Program Against Micronutrient Malnutrition

(For further information please contact: Dr C West, Department of Human Nutrition, Wageningen Agricultural University, PO Box 8129, 6700 EV, Wageningen, The Netherlands. Tel: 31 8370 82589 Fax: 31 8370 83342)

World Food Programme

Four types of interventions were identified during the ACC/SCN Micronutrient Forum for improving micronutrient malnutrition: (1) Dietary diversification, (2) Food fortification, (3) Pharmaceutical supplementation, and (4) Public health measures.

Below is a description of WFP involvement in these types of interventions for both development and humanitarian assistance type projects.

Dietary Diversification

Food aid distributed to a household has an income transfer value, thus it increases the overall availability of resources to the household. While increased income is not necessarily a sufficient condition for improved micronutrient nutrition, the poorest populations, those served by WFP, have high income elasticities for micronutrient–rich foods.

Breastmilk is a good source of micronutrients and WFP promotes breastfeeding in all its projects. A circular was distributed to all staff in August, 1990, noting the different ways food aid projects are instrumental in promoting breastfeeding.

Food Fortification

There are a number of ways that WFP–supplied food commodities provide micronutrients through fortification. First, many WFP commodities are delivered fortified; for example, several donors fortify with Vitamin A, such as the US who fortifies processed cereals, some Scandinavian donors fortify vegetable oil, and most donors fortify dried skimmed milk. Salt is fortified with iodine and blended foods are usually fortified with a variety of vitamins and minerals. WFP has a policy regarding vitamin A fortification of dried skimmed milk and is currently instituting one on iodine fortification of salt.

Supplementation

WFP has a comparative advantage in the logistical system it developed to bring food commodities to very large numbers of people on a regular basis. This system could also be used to distribute micronutrient–rich foods and pharmaceutical agents. In Paraguay, for example, it is used to distribute LUGOL for combatting iodine deficiency.

Many supplementary and therapeutic feeding programmes against micronutrient malnutrition in refugee and displaced person feeding situations are administered by NGOs and use WFP food aid for this purpose.

Public Health Measures

WFP provides support to the health sector several ways. Food aid is used as an incentive for women to attend health facilities, to benefit from health education classes, for compensating people to build infrastructure for sanitation purposes (e.g. latrines, water storage containers, waste disposal), and can be monetized for essential non–food inputs.

WFP's arrangements for reaching large numbers of individuals on a regular basis can be used for additional public health benefits. On the island of Rodrigues in Mauritius, for example, this system is used for a parasite infection control programme in the primary schools.

> (For further information please contact: Ms Judit Katona–Apte, Senior Programme Advisor, World Food Programme, 426 via Cristoforo Colombo, I–00145, Rome, Italy. Tel: 396 5797 5804 Fax: 396 5797 5652)

WHO

All three deficiency disorders have been the subject of a number of resolutions of the World Health Assembly. At regional level, Member States in Africa, South–East Asia and other regions have already declared through several WHO regional committee resolutions their resolve to control or eliminate iodine deficiency disorders, vitamin A deficiency and nutritional anaemia.

WHO and UNICEF, having formulated and adopted the micronutrient goals for the 1990s then included these in the World Summit for Children convened in New York in September 1990 and attended by 71 Heads of State and senior policy–makers from 80 other countries. Then in October 1991, WHO and UNICEF convened the monumental Montreal conference “Ending Hidden Hunger”, a policy conference on micronutrient malnutrition. It brought together over 300 people – ministers, policy–leaders and scientists – from 55 countries, and representatives of over 50 intergovernmental organizations actively interested in collaborating to overcome micronutrient malnutrition. The momentum of these events were then fed into the International Conference of Nutrition convened by WHO and FAO in Rome, December 1992. The World Declaration and Plan of Action for Nutrition was adopted by acclamation on 11 December 1992 and all Member States participating at the Conference indicated their determination to work together to end the human tragedy of all

forms of malnutrition. Both the Declaration and the Plan of Action provide substantial commitment and guidance for national action on micronutrient malnutrition.

Global Micronutrient Monitoring – the WHO Micronutrient Deficiency Information System (*MDIS*) For all 3 micronutrients – iodine (IDD), vitamin A (VAD) and iron (IDA), 3 linked databases have been established and are under development: prevalence data of IDD, VAD, IDA for all countries; control programme information, giving the status and progress of national control programmes; bibliographic reference database containing all published and unpublished reports that WHO can get access to.

The publication “Global Prevalence of Iodine Deficiency Disorders” is the first major output from MDIS. Similar publications for the Vitamin A Deficiency Situation, and for Iron Deficiency Anaemia, are likely to be ready later this year.

Similarly the structure and indicators for reporting on national control programmes are well under development.

The ultimate aim of MDIS is not just reporting at world forums on the current prevalence of micronutrient malnutrition, or on progress in national control programmes. Even more important is assisting countries to establish and operate their own effective micronutrient surveillance systems – so that governments can watch their own progress towards the goals of elimination, can regularly report on the populations still affected, and can monitor their own efforts at establishing adequate control programmes.

Joint WHO/UNICEF/ICCIDD Global Verification Commission for Elimination of IDD. Closely linked to national and global IDD surveillance is the possible development of a Global Verification Commission for Elimination of IDD.

It is still only under discussion, but the concept is similar to that of the Global Smallpox Eradication Commission and would allow for global recognition that a country had formally succeeded in reaching the criteria for sustainable elimination of IDD, and for reporting this to the World Health Assembly.

WHO'S Normative Role. So far some of WHO'S policy surveillance activities with respect to micronutrients have been summarized. Other normative functions include ensuring that relevant critical research is carried out, the results published, and transferred in utilizable form to strengthen national programmes for tackling micronutrient malnutrition. Recent examples of this sort of work include:

- The Joint WHO/UNICEF/ICCIDD Consultation on Indicators for Assessing IDD;
- The Joint WHO/UNICEF Consultation on Indicators of Vitamin A Deficiency;
- The Joint WHO/USAID/NEI Consultation on Vitamin A Mortality and Morbidity Studies;
- National Strategies for Overcoming Micronutrient Malnutrition.

The next such event is a planned consultation: Joint WHO/UNICEF/UNU/USAID Consultation on Iron Deficiency Anaemia.

Regional Action. The strength of WHO'S outreach and support to countries lies in its Regional Office network where WHO Regional Nutrition Advisers – and their field staff in some countries – provide technical support to the countries in their regions. This involves Regional (inter–country) support, workshops, micronutrient task forces, and then financial and technical support.

Support for National Micronutrient Programmes. By far the main emphasis, thrust and action output of the WHO Nutrition Programme – through its combined strength of headquarters, Regional Office and field support – is to support the development of national nutrition capabilities – and hence for micronutrients, to ensure each government and country can adequately tackle, reduce and eliminate micronutrient malnutrition.

With the added momentum, generated by the International Conference on Nutrition, WHO has focussed its attention on providing essential technical and catalytic support to the World's Least Developed countries. Some 86 countries have been identified as needing support for developing their national nutrition programmes. Fifty of these countries are “Least Developed Countries” including 28 in the African Region, 3 in the Americas, 5 in the Eastern Mediterranean, 6 in South East Asia and 8 in the Western Pacific. The majority of these have some form of widespread micronutrient malnutrition of moderate/severe degree.

WHO has received requests from 42 countries so far – for help in developing the national nutrition plans of action – many including a substantial micronutrient component. WHO has been able to provide funds so far to support 19 of these countries, and technical support to some others.

(For further information please contact: Dr G Clugston, Chief, Nutrition Unit, World Health Organization, 20, Avenue Appia, CH–1211 Geneva 27, Switzerland. Tel: 41 22 791 0456 Fax: 41 22791 0746)

World Bank

The World Bank is keen to promote work in developing countries on micronutrient malnutrition. The “Best Practices” paper on micronutrient malnutrition has therefore been drafted to promote its importance and provide technical information. This provides the basis for the first article in this issue.

The World Bank approved a special grant on micronutrients two years ago, which so far has helped to inaugurate the Micronutrient Initiative at IDRC in Canada. The World Bank also plans to provide support to ICCIDD and the PAMM programme.

In addition, the World Bank has project preparation work continuing in about a dozen countries in micronutrient malnutrition.

(For further information please contact: Dr J McGuire, the World Bank, 1818 H Street, N.W., Washington DC 20433. Tel: 202 473 3452 Fax: 202 477 0643)

NEWS AND VIEWS

First Report of WHO'S Micronutrient Deficiency Information System (MDIS) – Goitre Rate Now Assessed at 655 Million Worldwide

WHO began to compile information on micronutrient deficiencies and on control programmes in 1991, in collaboration with the Community Systems Foundation in the USA. The System is also supported by UNICEF and ICCIDD. Now the first report, on iodine deficiency disorders (IDDs) has been issued. Further reports on vitamin A deficiency and iron are expected in due course, and in particular the tracking of control programmes worldwide will be an important feature of the system.

This first report starts with a major revision in the worldwide estimates of goitre – now given as 655 million people affected, based on a careful assessment country by country. This assessment triples the earlier estimates of WHO, which gave values of 211 million people with goitre[1].

1. WHO (1990). *Infant and Young Child Nutrition, Progress and Evaluation Report.* 43rd World Health Assembly document A43/4, agenda item 17, 1 March 1990, page 14.

The associated prevalence is now estimated as 12% worldwide, the highest being nearly 23% in the Eastern Mediterranean. The map shows WHO'S estimate of the distribution of goitre worldwide. The figures given earlier p. 11, table 1, already need revision.

At the same time, the estimated number of people at risk has also risen sharply, in this case in part due to a change in the threshold goitre rate used to define at risk populations – now set at 5% rather than the 10% used in the past. The total number of people worldwide considered to be at risk exceeds 1570 million people, 29% of the world's population.

As pointed out in the Executive Summary by Dr G Clugston, Chief of WHO'S Nutrition Unit, “In absolute terms, Southeast Asia (which includes India, Bangladesh and Indonesia) and the Western Pacific (which includes China) together account for more than 50% of the world's total population at risk of IDD. Moreover, there is still a non–negligible IDD problem in most countries in Europe (even Western Europe, including 10 million people at–risk in Germany), necessitating continuing control measures and vigilance... There are some increases in the numbers of persons at–risk and those affected by goitre in each of the WHO regions when compared with data presented to the World Health Assembly in 1992. The largest increases in populations–at–risk are in the American, Eastern Mediterranean, European and Southeast Asian Regions. The number of subjects affected by goitre is now estimated to be 655 million, and at least 110 countries are

known to have an IDD problem.

Prevalence of Iodine Deficiency Disorders – Global Distribution

(Source: WHO (1993) *Global Prevalence of Iodine Deficiency Disorders,* MDIS Working Paper #1, WHO, Geneva.)

The Micronutrient Deficiency Information System (MDIS) was established two years ago by the Nutrition Unit of the World Health Organization with one major goal being to provide updated estimates on the magnitude and distribution of micronutrient malnutrition, and the state and progress in development of national micronutrient control programmes. In addition, the MDIS aims to assist in the standardization of methodologies employed in the assessment of micronutrient deficiencies, as well as to provide direct support to countries in the implementation and monitoring of micronutrient deficiency control programme activities. This document represents the first publication of the MDIS, and will be followed by updates on the global distribution of Vitamin A Deficiency and Iron Deficiency Anaemia."

A flyer giving some details of the report is included with this issue of SCN News. The report can be ordered from the WHO Nutrition Unit, World Health Organization, 20, Avenue Appia, CH–1211, Geneva 27, Switzerland.

(Source: WHO (1993). *Global Prevalence of Iodine Deficiency Disorders.* MDIS Working Paper No.1, WHO, Geneva.

Anaemia in Women

According to a World Health Organisation report *"The Prevalence of Anaemia in Women",* which draws on evidence from more than 500 studies worldwide, over half of all pregnant women, and a third of all non–pregnant women of reproductive age suffer from anaemia.

Parts of the developing world, such as Southern Asia, have levels of anaemia in pregnant women as high as 75%, whilst levels in North America and Europe are around 17%. And in the worst affected parts of the world, 5% of women suffer from *severe* anaemia.

Most anaemia results from a lack in the body of one or more essential nutrients; iron, folic acid, vitamins, trace elements and protein. This can arise from low intake, poor absorption or chronic blood loss, and leads to lowered levels of haemoglobin, a component of blood which serves the vital function of transporting oxygen to body cells. Anaemia is diagnosed when the concentration of blood haemoglobin is less than 11g/dl. Anaemia is severe when the concentration is less than 7g/dl.

In the early stages of anaemia, there may be no symptoms, but as oxygen supply to vital organs declines, weakness, tiredness, dizziness and headaches occur. Many of those women who are severely anaemic die of heart failure.

Women, in particular, are vulnerable to anaemia because their needs for nutrients are greater. During reproductive years women require twice as much iron as men, even when they are not pregnant. When pregnant, the growth of the fetus and placenta, and the larger amount of circulating blood, means that there is an increased need for nutrients, especially iron and folic acid.

According to WHO "Anaemia is a contributory factor in many of the 500,000 deaths which occur each year due to complications of pregnancy and childbirth." A normal healthy woman can survive a blood loss of over a litre during childbirth, but for anaemic women, even the normal blood loss of 250cc can be fatal. Women who have many closely spaced pregnancies have little time to build up haemoglobin levels and are at particular risk.

The most immediate and cost–effective solution is to give all pregnant and lactating women oral iron supplements. The long–term solution, however, is to ensure that girls and young women have an adequate diet before becoming pregnant. Red meat or dark green leafy vegetables should be eaten regularly, or dried beans together with tubers or fresh fruits. Women should avoid drinking tea and coffee with a meal, which can hinder iron absorption. Fortification of foods is an alternative approach, and providing access to family planning methods can help avoid closely spaced pregnancies.

(Source: WHO Press Release, 5 March 1993)

Vitamin A Dispenser

Vitamin A used in oral, periodic dosing programmes is usually given in the form of gelatine coated capsules containing 100,000 IU or 200,000 IU vitamin A (retinyl palmitate or acetate) and vitamin E (d–1 alpha tocopherol) in purified peanut oil. India is the only country where vitamin A solution (100,000 IU per ml) is used, administered with a shared measuring spoon.

There is a potential need to provide an increased number of 100,000 IU doses, or even 25,000 IU doses, to infants. But in practice it is often impossible to accurately dose children with 100,000 IU vitamin A or less using the existing strength capsules available for country programmes. The main reason is wastage of vitamin A during the process of opening and delivery, especially at high ambient temperatures. One possible solution would be to manufacture vitamin A capsules of different strengths, colour coded for identification. However, it is widely agreed that, while technically feasible, it is undesirable to have several strengths of vitamin A capsules provided to health centres at the same time.

A pump dispenser for vitamin A solution has been developed delivering 0.5ml of solution via a trigger operated mechanism. The pump mechanism operates in a horizontal axe improving accuracy of delivery into the mouth of the infant, and is designed to fit comfortably into the palm of the hand. A nozzle closure device is attached incorporating a trigger closure guard for use during transport. The dispenser is used in the inverted position (see illustration) to reduce wastage. The vitamin A solution is in a 60 ml glass bottle and can be supplied at different concentrations, for example, 200,000 IU per ml (dose delivered with each push of the pump 100,000 IU) or 50,000 IU per ml (dose delivered 25,000 IU). The pump has been laboratory tested by the Consumer Research Laboratory (UK) and stroke volume is accurate within the range 0.43–0.53 ml over a wide range of temperatures. The pump can be reused with up to 5000 cycles in test situations and can be boiled at temperatures up to 121°C.

The vitamin a dispenser has been field tested in Bangladesh. Guatemala, India and Malawi. Reports emphasise acceptability for both mothers and health workers, as well as easier dosing of infants as compared with capsules. Leakage of the oily solution at high temperatures, and during transport, appears to be the main problem. Cost of the pump units is around $2, depending on the size of the order. For first orders, one pump is being supplied per four bottles of vitamin A solution. On this basis, the cost per dose delivered with the dispenser should work out slightly less than with the capsules, currently around US cents 1.6. If the pumps are reused many times, the cost per dose will obviously fall correspondingly. Orders should be placed through UNICEF country offices or through UNIPAK, Copenhagen.

(Source: Nicholas Cohen, Expanded Programme on Immunisation (EPI), WHO, Geneva)

Vitamin A, Zinc and Stomach Cancer

In the rural Linxian province of China the incidence of cancer of the upper stomach and oesophagus is one of the highest in the world. 760 of every 100,000 people in Linxian die from oesophageal cancer, a rate more than 150 times higher that that in white Americans.

Among the factors suspected of contributing to Linxian's high cancer rate is a chronic lack of several important nutrients, and a team of Chinese and American researchers has conducted a trial to find out the effects of supplements of different combinations of vitamins & minerals on incidence of these types of cancer.

Almost 30,000 people took part in the trial. Healthy adults aged between 40 and 69 took a daily dose of one of four combinations of vitamins and minerals, or a placebo. The four combinations were: vitamin A and zinc; the

B vitamins riboflavin and niacin; vitamin C and molybdenum; and an “antioxidant” cocktail of beta−carotene, vitamin E and selenium.

450 of the people from the trial as a whole, selected at random, were examined, and it was found that in those who had taken the vitamin A and zinc supplement, the expected number of cancers of the upper stomach was reduced by two−thirds. The other three nutrient combinations had no significant effect.

It is thought that vitamin A may prevent the cancers because it encourages cell differentiation, which may help curb the wild, undifferentiated growth seen in tumour cells. Zinc enhances the transport of vitamin A in and out of cells.

Presenting the team's results at the Fourth International Conference of Anticarcinogenesis and Radiation Protection in Baltimore in April 1993, Philip Taylor, Chief of Cancer Prevention Studies at the US National Cancer Institute emphasised that “the results do not mean people should rush out and start taking handfuls of vitamin A and zinc supplements. First, the stomach cancer seen in Linxian is a different type from that which usually strikes Westerners, affecting the upper part rather than the body of the stomach. Secondly, dietary supplements may work better in the undernourished Chinese population than in generally well−nourished Westerners.”

However, despite urging caution, he believes that the findings of this trial “confirm the broad hypothesis that diet really does have a legitimate relationship to cancer.”

(Source: *New Scientist,* 22 May 1993)

Doubly Fortified Salt Marketed for the First Time

Food Fortification Consultant, Venkatesh Mannar, has reported that salt fortified with iron and iodine is now being sold in Tamil Nadu along with iron−alone fortified salt − which is now being used in a large “Mid−Day Meals” programme in the State. A recent study in Tamil Nadu has revealed that intake of iron−fortified salt resulted in similar improvements in nutritional status as iron−tablets over a 100−day period.

(Source: World Bank Office Memorandum, April 26, 1993)

XV IVACG Meeting

The XV IVACG meeting was held in Arusha, Tanzania, in March of this year. The theme was “Toward Comprehensive Programmes in Reducing Vitamin A Deficiency.” The following is extracted from an IVACG Press Release issued after the meeting.

“Representatives from 51 countries were among the 294 policy makers, implementors, and scientists in health, nutrition, agriculture and development participating in the meeting. Throughout the five−day programme, numerous speakers presented research concerning progress in changing dietary behaviours related to vitamin A, newer methodologies for assessing subclinical vitamin A deficiency, consequences for human health and disease, and physiological functions of vitamin A.

“Several speakers presented evidence of substantial gains in meeting the goal of virtual eradication of vitamin A deficiency. A significant outcome is the reduction in childhood mortality from infections. The impact of vitamin A supplementation on mortality appears to be due to a reduction in the severity of infection rather than in the incidence of infection.

“Others referred to 'missed opportunities' in linking vitamin A with health care delivery systems such as immunization services and growth−monitoring programs. These are the 'windows of opportunity' for the future.

“A comprehensive approach to preventing vitamin A deficiency combines short−term strategies such as vitamin A capsule distribution with dietary diversification, a long−term strategy. Factors identified as essential for a successful vitamin a program include adequate political will; effective surveillance to guide policy formulation, program design, and implementation; and flexible training, supervision, and management systems.

“In closing the meeting, Dr Abraham Horwitz, Chairman of IVACG stated, 'The reduction of poverty, although essential, is not a prerequisite for the elimination of vitamin A deficiency. The process to reach this goal should start or be strengthened, and the sooner the better. The persistence of vitamin A deficiency anywhere in the world is cruel, because it exposes mothers and children to great risks. It is immoral, because it ignores basic human values. It is unacceptable, because it can be prevented.'”

For further information please contact: Laurie Lindsay Aomari, IVACG Secretariat, The Nutrition Foundation, Inc., 1126 16th Street, N.W., Washington, D.C. 20036, USA. Tel: (202) 659 9024 Fax: (202) 659 3617.

(Source: As quoted above)

Controlling Vitamin A Deficiency – Policy Implications of Mortality Impact

In 1986, the Advisory Group on Nutrition (AGN) of the ACC/SCN reviewed the study from Aceh, Indonesia (subsequently published as Sommer *et al.* 1986) in the impact of vitamin A supplementation on childhood mortality, and concluded “that a reduction of childhood mortality may reasonably be expected from high dose vitamin A programmes”. This was one of the earlier public statements on the major effect of vitamin A on mortality. It continued “...confirmatory trials are in process, the results of which should be closely monitored to find out whether significant effects of vitamin A are to be found in populations of different patterns of morbidity and other conditioning factors, and where less severe deficiency of vitamin A exists”.

By 1991, around ten such studies were nearing completion. The AGN in 1990 developed a proposal, approved by the SCN in 1991, for “Assessment of the Research and Policy Implications of Recent Studies of Vitamin A and Morbidity and Mortality”. This was done in two separate phases. In the first, a meta–analysis was done of the results of eight trials of effects of vitamin A supplementation on mortality, and 20 on morbidity; the best–known results are those on mortality, which are also the most conclusive, indicating a 23% reduction under the circumstances studied. These are described in the article on page 17.

The second phase included establishing criteria to be applied in deciding whether a vitamin A intervention is warranted as a means to reduce mortality; providing age–specific estimates of the magnitude of benefits expected when vitamin A status is improved; identifying and critiquing alternative strategies for improving vitamin A status, including considerations of their relative cost–effectiveness, acceptability, sustainability, and complementarities with other strategies; recommending which approaches may be favoured, under given circumstances, over other competing alternatives, and the means of sequencing and phasing appropriate strategies over time. An overview based on the findings of some 46 evaluations was put together of “what has worked, where?”, based on the lessons of past experience.

The mortality outcome itself was no longer the issue as the link between vitamin A status improvement among 6–59 month children and mortality reduction was already demonstrated in the first phase (although there is no conclusive evidence yet regarding the under six month age group, or with populations with sub–clinical deficiency but no clinical signs). The outcome of concern for the comparative evaluation is thus vitamin A status. Another major conclusion of the first phase was that the mortality–reducing effect of vitamin A is biological and not pharmacological – that is, it is a function of vitamin A status itself. It does not depend on the mode of administration of vitamin A. Low dose, frequent administration of vitamin A by capsule or via fortified foodstuffs was shown to be associated with mortality reduction among xerophthalmic child populations in the mortality trials.

Based on the review, the interventions most often likely to be effective, under suitable conditions, seemed to be:

– targeted capsule distribution, and their medical use, as a quick–acting intervention;

– promotion of breastfeeding if this is low or declining;

– fortification when feasible would be of high priority, however this as yet appears to apply primarily to middle–income countries with processed foods widely distributed;

– dietary modification would usually be a major long–run approach depending on factors such as availability of vitamin A in the food supply, literacy, access to mass media, etc. – approaches include behavioural change, horticulture, economic/food policies, technical

interventions including food preservation, plant breeding, etc.

A consultation group meeting was organized by the ACC/SCN, hosted by the Micronutrients Initiative in Ottawa, Canada on 28–30 July. The preparation and meeting were supported by CIDA (Canada) and the Micronutrients Initiative. The background review provided one basis for the discussion, among some 46 participants, with focus on the experience of 10 countries. The meeting agreed a statement on "Control of Vitamin A Deficiency", given in full in the box (p48–49). The meeting conclusions in detail and background material are to be published later this year.

Reference: Sommer, A. *et al.* (1986). Impact of Vitamin A Supplementation on Childhood Mortality: A Randomized Controlled Community Trial. *The Lancet,* **May 24**, 1169–1173.

(Source: ACC/SCN, September 1993)

Update on the UNICEF/WHO Baby–Friendly Hospital Initiative

Contributed by the Nutrition Cluster, Programme Division, UNICEF, New York

The UNICEF Executive Board adopted a resolution at its May 1993 meeting that strengthens and updates its 1991 resolution to support and promote breastfeeding through the Baby–Friendly Hospital Initiative (BFHI).

The new resolution acknowledged the progress of BFHI over the past two years towards the achievement of the targets of the Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding. It expressed appreciation for action taken by governments of developing countries to end the distribution of free and low–cost supplies of breastmilk substitutes. It called upon manufacturers and distributors to comply fully in countries that have acted to prohibit the distribution of free and low–cost supplies, setting a deadline of 1994 for industrialized countries to take such action.

BFHI, a joint WHO and UNICEF undertaking, began in 1991 with 12 "starter" countries, and was launched worldwide in 1992 to foster national action to meet the goals of the Innocenti Declaration by empowering women to breastfeed and by ending the supply of free and low–cost infant formula.

The basis of BFHI is the "Ten Steps to Successful Breastfeeding", a set of guidelines for hospitals that, when followed, ensure that all mothers have accurate information about the benefits and techniques of breastfeeding, and are given the guidance and encouragement they need to breastfeed exclusively from the baby's birth.

At the end of 1992, its first full year, BFHI achieved many gains:

- Seventy developing countries took action to eliminate free and low–cost supplies of breastmilk substitutes.

- More than 700 hospitals around the world were close to or had been designated "Baby–Friendly" on the basis of their practice of the "Ten Steps to Successful Breastfeeding."

- BFHI was the theme of the first ever "World Breastfeeding Week", 1–7 August 1992, a week of activities, programmes and celebrations to promote breastfeeding, sponsored by the World Alliance of Breastfeeding Action.

As a result of BFHI, countries around the world transformed hospitals by convincing them to practise the "Ten Steps", took action to control the free distribution of infant formula and promoted breastfeeding in homes, workplaces and the community.

Highlights include:

- In India, where more than 25 million babies are born every year. Parliament passed the Infant Milk Foods, Feeding Bottles and Infant Food Bill, in the works for more than 10 years. The law regulates the promotion and distribution practices of the country's $280 billion baby–food industry (see also "New Bill Restricts Marketing of Infant Foods in India, p.??).

• Asian countries have led the world in transforming hospitals to baby–friendliness, with recent counts including the Philippines at 102, Indonesia 97, Thailand 45 and China 21.

• Kenya, Cote D'Ivoire and Gabon, three of the “starter” countries, have taken strong action to eliminate free supplies of breastmilk substitutes; Kenya, has adopted a model law to protect breastfeeding and to control marketing practices.

• As a result of enacting decrees to end free supplies by Ministers of Health in Latin America, countries including the Dominican Republic, El Salvador, Ecuador and Panama are working on legislation that encompasses the entire International Code of Marketing of Breastmilk Substitutes; Brazil adopted such a law in 1992.

• Many industrialized countries are actively engaged in BFHI, and in partnership with non–governmental organizations, are working to realize the 1994 goal of ending free and low–cost distribution of infant formula.

(Source: UNICEF, June 1993)

THE CONTROL OF VITAMIN A DEFICIENCY

The following statement has been agreed upon by participants of the ACC/SCN Consultative Group Meeting on Strategies for the Control of Vitamin A Deficiency, supported by CIDA and the Micronutrient Initiative and held at the Micronutrient Initiative, Ottawa, 28–30 July 1993.

The elimination of vitamin A deficiency as a public health problem has been identified as a high priority in international nutrition and health by the International Conference on Nutrition, the World Summit for Children and the World Health Assembly. Control of vitamin A deficiency in many areas of the world will lead to substantial and lasting improvement in childhood survival as well as preventing the scandal of irreversible blindness due to malnutrition.

The cause of vitamin A deficiency is a lack of pre–formed vitamin A, carotene and sometimes fat and oil in the diet. The year–round availability and adequate consumption of vitamin A/carotene–rich foods and dietary fat will be required to eradicate the deficiency. Because prevention of vitamin A deficiency is an integral part of the overall strategy to improve nutritional well–being and child health, and to conserve limited resources, vitamin A programmes should be integrated with other programmes concerned with health and development. Efforts to identify, advocate, plan, implement, evaluate, and monitor the control of vitamin A deficiency should as far as possible be combined with the control of other co–existing nutritional deficiencies. The following specific points concerning vitamin A deficiency control were agreed:

1. A combination of interventions is usually needed to prevent vitamin A deficiency; these include dietary modification (including the production, processing, marketing and consumption of vitamin A/carotene–rich foods), breastfeeding promotion, food fortification, and supplementation. The appropriate combination of interventions may change over time, depending on trends in the level of deficiency, programme outreach to vulnerable population groups, availability of technical inputs, and administrative and political priorities.

2. Periodic situation analyses and the evaluation of programme cost–effectiveness provide a basis for adjusting strategies, especially in relation to population responses to intervention activities, and provide the opportunity for phasing out programme components, as appropriate.

3. In all circumstances, the promotion and protection of breastfeeding is a fundamental aspect of preventing deficiency of vitamin A. Promotion should include attention to initiation, optimal breastfeeding practices, and duration, as required by local situations. Enhancing the nutritional status of the mother is a valuable component of such breastfeeding promotion activities.

4. Nutrition education is an essential component of programmes aimed at preventing vitamin A deficiency. Dietary modification can also be supported by other means, such as social marketing and promotion of home production.

5. If dietary sources of vitamin A are not readily available to those at risk of deficiency, intervention activities should include improving their availability. Efforts may be needed to improve the production, processing, preservation, pricing and marketing of such foods. Bioavailability of the vitamin A should be increased by ensuring that diets contain sufficient fat and that intestinal parasites are controlled.

6. Dietary modifications that increase vitamin A intake will often improve the status of other micronutrients, particularly iron and vitamin C. For example, many foods that promote iron absorption (especially green leafy vegetables, animal products and some fruits) are also good sources of vitamin A. Furthermore, improving vitamin A status can also improve iron status through an interaction between these two nutrients. Therefore, a combined food–based approach to deficiencies of vitamin A and of iron should be pursued.

7. Where feasible, food fortification is a highly recommended intervention for the prevention of vitamin A deficiency. Consumption of processed foods by the target population, food technology expertise, and multisectoral commitment are requisites for successful food fortification programmes. Social marketing may also have an important role in increasing awareness of the problem and creating demand for action. Early participation of the food industry in this process, and an effective food control system, are essential.

8. In situations where vitamin A deficiency is endemic in the population, certain opportunities may be taken to provide high–dose preparations of vitamin A. The first of these is with immunization contacts from 6 months of age, especially the 9 months measles contact. Secondly, if the mother is in contact with health services (e.g. attended delivery or postnatal visit), provision of a single large dose of vitamin A within the first 4 weeks after birth can improve the vitamin A content of breast milk and hence offer protection of the breastfed infant. Thirdly, for children between 1–5 years, other contacts with health services may also be appropriate for providing supplements; in this case adequate record–keeping is necessary to reduce the dangers of excess supplementation and to ensure that potency of preparations is maintained by regular turnover of stocks.

9. Case management of measles and of severe protein–energy malnutrition requires the therapeutic use of high–dose preparations of vitamin A where there is a risk of sub–clinical deficiency; this use should not be limited to children with clinical vitamin A deficiency. The goal here is an immediate effect on the course of morbidity and on reduction of case fatality rates. Such case management is complementary and additional to approaches for controlling vitamin A deficiency at a population level.

10. Political support and sustained allocation of government resources are needed for the development, implementation and maintenance of vitamin A programmes. Support from international organizations (multilateral, bilateral, and non–governmental) is important in fostering political commitment, and often in providing financial support in line with local priorities.

11. Linking research and human resource development with intervention activities continues to be important in initiating, maintaining and building on vitamin A interventions.

12. Effective management is essential to the success of any type of vitamin A programme. Experience has shown that the success of vitamin A programmes is limited more by management problems than by lack of appropriate intervention technologies. Development of an effective management system will usually require as much attention as the choice of intervention. Similarly, evaluation of vitamin A programmes should involve management aspects as well as impact.

14 September 1993

Breastfeeding Trends in Cuba

Contributed by Professor Manuel Amador, Deputy Director, Institute of Nutrition and Food Hygiene, La Habana, Cuba.

In 1990, a National Survey on breastfeeding practices was carried out in Cuba by the Institute of Nutrition and Food Hygiene, the Mother and Child Department of the Ministry of Public Health, and the Higher Institute of Medical Sciences of Havana.

6688 mothers (4887 from urban areas and 1801 from rural areas) of infants (0 to 354 days of age) took part in the survey. The results showed that intital overall breastfeeding (OBF) prevalence (which comprises exclusive and mixed breastfeeding), was 84.2%, but that of exclusive breastfeeding (EBF) was only 62.7%. These show little differences with a nationwide cohort study of 4228 infants carried out in 1973, in which initial OBF prevalence (at 7 days) was 89.8%.

Prevalence of OBF remained high until 1 month of age, and then began a progressive decrease. Comparisons with 1973 can be made only for OBF, and they show higher prevalences in 1990 at all ages, except at six months (180 days).

For EBF, a rapid drop in prevalence started at 15 days of age and was especially pronounced after two months.

The data are summarized in table 1.

Differences among the provinces were found: prevalence and duration of EBF decreased from East to West. Eastern provinces, which are also the less developed and with a greater proportion of rural population, showed a pattern of high initial prevalence with a gradual descending slope and long duration: relative drops at three months exhibited a range between 43.8 and 61.2. Central provinces show a pattern of lower initial prevalence and rapid drop after three months with short duration – relative drops are similar to those of the Eastern ones. Western provinces, which include the city of Havana, showed diverse prevalences at birth, with a rapid drop at three months and short duration and great range in relative drops.

Prevalence and duration of EBF were higher in rural areas. Adolescent mothers (of less than 20 years), showed the highest initial prevalence of EBF.

No differences in prevalence and duration of EBF were found according to mother's parity.

Mothers with Elementary School level education (up to 6 years), breastfed more and for a longer time. They also showed higher initial prevalences.

Employed mothers showed slightly higher initial prevalences of EBF, but the slope immediately after discharge from Maternity Services was more pronounced: the drop after 3 months was significant, and there were no EBF infants after 240 days of age in this group. In non–employed mothers, the slope is softer and prevalence is significantly higher at three months, and there is a small number of infants who were breastfed beyond 240 days. Cumulative indices at 4 months were 31.7% for employees and 37.9% for non–employees.

Table 1. Prevalence of Overall Breastfeeding (OBF) in 1973 and 1990 and of Exclusive Breastfeeding (EBF) in 1990. Cuba.

Age (days)	Prevalence of OBF		Prevalence of EBF
	1973	1990	1990
Initial	89.8	84.2	62.7
15	–	81.4	56.1
30	57.0	78.2	49.3
60	45.2	67.5	39.0
90	39.9	62.5	24.5
120	35.7	52.4	15.7
180	32.3	33.4	5.9
364	–	4.2	0.2

The results of the National Survey have exposed the need for encouraging and increasing breastfeeding practice in Cuba. In December 1991, the National Program of Action for reaching the goals of the World Declaration on the Survival, Protection and Development of Children, approved at the World Summit for Children Conference in September 1990, was laid down. After a National Workshop carried out in February 1992, the strategies and main actions for achieving these goals were established and included in the document “Objectives, Design and Guidelines for the Population's Health Increase 1992–2000”, issued by the Cuban Ministry of Public Health.

In August 1992, a Workshop on “Baby Friendly Hospital Initiative” sponsored by UNICEF and the Ministry of Public Health, was held in Havana. The objectives of this workshop were: to analyze the WHO/UNICEF proposal of me initiative, to evaluate the possibility of establishment of the Program in Cuba, and to produce a working plan for its application. As a result of this meeting, it was decided to start a gradual incorporation of all the Maternity Services into the process of designation as a “Baby Friendly Hospital” starting in 1992 with six large hospitals from different regions, which account for 17% of all deliveries in the country. In 1993 the Program will be extended to another 10 Maternity Services. By the end of 1994, the Second National Survey on Breastfeeding will be carried out in order to make an initial evaluation of the impact of the interventions derived from the National Plan of Action.

(Source: Communication from the Institute of Nutrition and Food Hygiene, La Habana, Cuba, 1 December 1992)

Statement by the World Food Programme on Implementing the International Conference on Nutrition Plan of Action

Committee on Agriculture, 12th Session, 28 April 1993, Rome.

“Paragraph 19 of the World Declaration on Nutrition states:

“We pledge to make all efforts to eliminate before the end of this decade, famine and famine–related deaths”.

“Famine has been defined as “a condition of populations in which a substantial increase in deaths is associated with inadequate food consumption”. Famine does not necessarily arise solely from problems of food production. Natural disasters may act as triggers, but lack of sufficient food for consumption may be due to economic collapse and loss of purchasing power in some sections of the population.”

“This goal is clearly a priority objective for the international community. The World Food Programme is an appropriate UN Agency to be at the forefront in meeting the challenge of dealing with famine and famine–related deaths. If WFP is to make a contribution to such a goal, we need to know, first of all, is this possible? And second, what would it take?

“From our perspective, we believe that it is possible to improve the current situation. WFP is already making a considerable contribution to dealing with famine–related deaths through its numerous emergency operations and the many development projects that enable destitute people to improve their household food security. With regard to the second question, what it would take, the simple answer is that it will take a great deal of resources.

“In addition to seeking further pledges, WFP will also do better with the resources it now commands, in particular, improve its poverty targeting mechanisms to decrease the numbers of those at risk of danger of starvation. Simultaneously, WFP will also increase its capacity to react quickly to new emergency situations by ensuring that adequate stocks are continuously available to facilitate response.

“This will be done by:

- seeking ways to improve the speed with which WFP gets food to those in need;

- ensuring that WFP development project stocks are well supplied, especially at times of impending problems, so that borrowing can be arranged as needed; and

- being more involved in detailed risk mapping exercises that would permit both early response and advance planning of development projects in vulnerable areas for populations

at risk.

“WFP looks forward to working with others in dealing with hunger and hunger−related deaths.”

(Source: WFP 1993, presented at the Sixth Annual Hunger Research Briefing and Exchange, Brown University, 14−15 April, 1993)

Practical Household Food Security: An Approach from the Pacific

Contributed by Paul Sommers, previously UNICEF Project Officer responsible for the Pacific Regional Food and Nutrition Project

The once self reliant Pacific Island countries are undergoing major changes. Modernisation over the past few decades has brought about changes in where people live, how they use their land, and how they use their time. One of the most significant changes is in what Pacific islanders now eat.

Traditional food systems provided a generally abundant and varied diet of marine and land−based foods. These systems also provided food security for most households year−round. However, a dramatic transition is taking place, from a diet based on local food containing complex carbohydrates, low in fat, salt and sugar, to a diet of commercially processed, imported foods high in fat, salt, sugar, and refined carbohydrates.

This change in diet is affecting the health of both children and adults. Children in Melanesia and parts of Micronesia tend to be moderately undernourished, while adults in Polynesia, Micronesia, and the urban centres of Melanesia are increasingly overweight.

The immediate causes of underweight in children are inadequate dietary intake and infection. The main underlying causes are an unhealthy physical environment, inadequate maternal and child care and inadequate household food security.

Pacific island leaders were concerned about the erosion of their local self−sufficient food systems. They were disturbed by the economic implications of such a shift, especially in terms of food import bills and health care costs for preventable diet related illnesses. At a United Nations Pacific regional meeting in 1983, local leaders agreed to endorse a project that would promote home−based food production as a partial solution to their food security problems. The project, Family Food Production and Nutrition (FFPN), was originally financed by the Australian International Development Assistance Bureau and subcontracted by UNDP to UNICEF. The FFPN became the main activity of UNICEF's Pacific Regional Food and Nutrition Programme.

The project was designed to address household food security and nutrition by increasing food availability and improving food consumption especially amongst infants and mothers. The issue of infection was coordinated with other on−going health promotion activities in each country.

The FFPN project used a two−phased approach. The first phase entailed direct support to at−risk households. This strategy was based on the belief that household food security could be strengthened through more effective use of existing household knowledge, skills and resources.

Once an effective model was developed at community level, the second phase of the project focused on promoting institutional capacity building among field workers and policy makers at national and regional level. The strategy aimed to show what was possible and to help these key decision makers work out how best to incorporate household food security issues into their existing work programmes. Country specific strategies were developed within a broad regional framework. UNICEF provided technical and programming assistance to local project staff on a regular basis through its Regional Project Officer for Food and Nutrition. The field workers in turn implemented their own country programme work plan.

How effective was this strategy? A seven nation evaluation of the project was conducted by the New Zealand Department of Scientific and Industrial Research. The evaluation noted that the FFPN Project was effective in raising awareness of the current situation and its causes. In many cases the project also provided key assistance for increased food availability through home−based food production.

Some lessons can be drawn from the experience at both regional and national level. These lessons can be summarised as follows:

A Long Term Commitment is Required

Increasing food availability can be achieved using a combined strategy of meaningful nutrition information and increased production of home grown foods. In most cases, improvements can be realised by building on the existing knowledge, skills and resources of the household. An approach emphasising local problem assessment and analysis followed by identification of appropriate action (Triple A approach) is the most effective method for addressing household food security issues. This approach requires the commitment of all parties to ensure that the AAA cycle moves ahead toward improved assessment, analysis and more appropriate actions over time.

Do the "Do−able"

Start with those aspects of household food security that can be achieved by households themselves. Pacific households usually obtain their food in three ways: they buy it, grow it, or a combination of the two. Food exchanges do occur, but are generally in decline. The Triple A Approach will reveal opportunities to enhance food availability through improved food purchases, as well as possibilities for intensification and diversification of the household's food production. Households can identify and respond to these changes.

Start Small

The Pacific approach to household food security was designed to be implemented in two phases. The first phase was the development of a community level methodology which emphasised improved use of existing household resources. Once this methodology was worked out, a second phase of institutional capacity building was initiated. While there was demand for services both by communities and institutions, country staff resisted the temptation for rapid expansion until they were confident their methodology worked.

Women's Participation is a Key to Success

Household food security in the Pacific is mainly the responsibility of women. They are often judged by their society on their ability to provide their family with sufficient food on a regular basis. The FFPN project worked closely with women. The approach aimed to strengthen their existing food resource base by building on their skills and knowledge.

NGOs have been the Most Efficient and Effective Service Delivery Channel

Household food security involves a complex set of factors that are often specific to a particular community. NGOs are known for their involvement with community level activities. A number of Pacific governments agreed that for effective delivery of household food security services they would need to support NGOs for technical assistance. In turn, the NGOs adapted this assistance to specific community requirements.

Programming Practical Household Food Security is both an Art and a Science

A key success element of the project has been the personnel involved. Both regional and local personnel had experience in practical food production and nutrition promotion training. They also had field experience as well as the ability to adapt the household food security approach to various socio−economic, political, and climatic environments. The approach also required strong commitment to the fact that households have the ability to improve their situations through mobilisation of resources.

Household Food Security as an Entry Point

The approach used in the Pacific emphasised self−help to improve household food security. Once households could see genuine improvements stemming from their own resources, they wanted to learn more. There was great interest in what they could do to improve the survival, growth, and development of their children.

There was, for example, increased interest in child growth monitoring, and the activity took on a whole new meaning once women understood what the growth trends meant. Growth monitoring was transformed from a passive activity of recording information, the significance of which was usually not explained, to an action−oriented activity which demanded community attention. The promotion and use of immunisation, oral dehydration therapy, and clean water and sanitation, also took on a new meaning.

The World Summit for Children in September 1990 endorsed The World Declaration on the Survival, Protection, and Development of Children. A Plan of Action for the 1990s was also approved in which reducing severe and moderate malnutrition by one−half is a key goal. Achieving this goal will require addressing the underlying causes of malnutrition, one of which is inadequate household food security. The Summit Plan of

Action underlines that attainment of household food security for all will require the “dissemination of knowledge and supporting services to increase food production to enhance household food security.” The people of the Pacific have already moved towards this goal. They are meeting the challenge by focusing on practical household food security activities.

(Source: UNICEF, New York, 6 February 1992.)

Australia's Food and Nutrition Policy: Progress Report

Contributed by Paul van Belkom, Director, Nutrition Sector, Department of Health, Housing and Community Services, Commonwealth of Australia.

Background

In August 1991, the Australian Government approved a process to develop a proposal for food and nutrition in Australia, and directed a committee comprising government, industry and consumer representatives to oversee its development. The National Food and Nutrition Policy was subsequently announced by the former Minister for Aged, Family and Health Services the Hon. Peter Staples, in September 1992.

The Policy identifies priority objectives and strategies in the areas of education/information; targeted programs for vulnerable groups; changes in the food supply consistent with the Australian Dietary Guidelines; and monitoring and surveillance. Under this program joint activities with stale and local governments, primary producers, food processors and retailers and consumer groups, are being undertaken to reduce the preventable burden of diet related disease in Australia.

Priority implementation strategies are being implemented under the food and nutrition component of the National Health Advancement Program (NHAP). Building on the successes of the National better Health Program, the NHAP focuses on four priority areas of national health goals and targets; injury; environmental health; and food and nutrition.

Achievements

The National Food and Nutrition Policy has achieved wide ranging and positive intersectoral involvement in its development, including traditionally “non–health” areas: primary industries; food manufacturers, retailers and distributors; consumers and community groups; and the Commonwealth and State/Territory government bodies.

A number of projects, consistent with priority objectives and strategies, are now underway. Projects have been funded in a diverse range of localities around Australia and with a variety of groups. Food and nutrition objectives have been incorporated into a variety of policy areas and sectors. Policy implementation will be measured against the national food and nutrition goals and targets.

Projects underway include the development of national nutrition curriculum material for schools; the release of a resource kit for consumers to learn about the Australian Dietary guidelines; the development of a point of sale program to assist consumers make healthy food choices in the retail environment; collaborative projects with two local governments to identify barriers to access of healthy foods within the locality; and a national project to develop a resource to assist Aboriginal and Torres Strait Islander communities address food and nutrition concerns.

A small policy implementation advisory group has been formed with representation from the National Food Authority, the food industry, consumers and the National Health and Medical Research Council (NHMRC). The consultative group is currently developing strategies to ensure intersectoral contributions to policy implementation, and future directions.

All Principal Committees of the NHMRC have been formally presented with the Policy, and requested to consider food and nutrition issues as pan of their decision making and policy processes. The Medical Research and Public Health Research and Development committees have been specifically requested to consider nutrition as an identified area of need for research in the next triennium.

Tools and references to measure nutritional status and advice on appropriate approaches to special groups in the community, which are developed by the Food and Health Committee, provide the scientific basis for Policy implementation.

(Source: Commonwealth of Australia Communication, 26 May 1993)

Growth Patterns in Breastfed and Formula Fed Babies

Recent research has brought to attention a difference between the patterns of growth of breastfed and formula fed babies which may have important implications for the use of the World Health Organisation weight–for–age chart – a standard based on American growth rates and calculated in the 1970s when almost all infants in the USA were formula fed.

Whilst experience worldwide has shown that these standards are useful in the 1–5 year age group, the pattern in the 0–1 year age group is often *not* parallel to the standards, and this has been misinterpreted. Children in developing countries show a rapid weight gain during the first six months which then slows down considerably. The explanation for this difference has been that weight gain during weaning slows down due to inappropriate diet, malnutrition and/or disease, but research in Switzerland – where breastfeeding has become increasingly popular – has shown up a similarity between the growth patterns of Swiss breastfed babies and African breastfed babies.

The weight gain of 200 Swiss breastfed babies was assessed retrospectively. All babies had been exclusively breastfed for at least five months, and then breast milk had been supplemented with mixed feeds in increasing quantity.

It was found that both Swiss *and* African breastfed babies show a rapid weight gain up to 6 months of age, with considerable slowing down between 6 and 12 months. This result did not correspond to the weight gain of Swiss and American bottlefed babies, and Swiss breastfed babies gained less weight than bottlefed babies in the weaning period, despite low incidence of malnutrition or severe infections.

The logical conclusion reached by the author is that “growth patterns of American formula fed babies (WHO chart) should not be used to monitor the weight gain of breastfed babies, whether in America or in developing countries.”

(Source: Achard, T. (1992). Is the WHO Weight–for–Age Chart Appropriate for Infants of the Developing World? *Tropical Doctor,* October, 170–172)

Breastfeeding Protects Against Diarrhoea's Effect on Growth

Researchers have discovered a previously unrecognised role of breastfeeding in the relationship between energy intake and diarrhoea as they affect child growth, which may have important implications in the design of public health policies aimed at improving child growth, health and development.

As reported in an earlier issue of SCN News, results of supplementation studies on children aged 0–36 months (Colombia) and 3–36 months (Guatemala) have already provided evidence to support a biological model which predicts that “the effect on attained length of a given level of nutritional supplementation will depend on both the prevalence of diarrhoea *and* the energy content of the home diet. The relationship between inadequate energy intake and diarrhoea is synergistic, and affects growth in a manner far greater than the simple additive effects of diarrhoea or inadequate energy intake would predict.”

It is only recently, however, that researchers have found that the *source* of energy in the home diet appears to have an effect on the extent to which diarrhoea affects child growth. In a study in Peru, it was found that weight gain was not associated with prevalence of diarrhoea in babies aged 1–6 months of age where a high proportion of energy came from breastmilk. In older infants, however, who received less of their total energy from breastmilk in their home diets, there was a significant negative relationship. Why?

Nutritional status is compromised during diarrhoeal episodes partly because less energy is ingested. However, according to the authors of the Peruvian results, “numerous studies have confirmed the fact that

breastmilk consumption is unchanged (or may be increased) during diarrhoea" whereas in contrast "estimates of the reduction in energy intake from other food sources range from 15% to 20%". Moreover, they state that is thought that faecal losses may depend in part of the type of diet consumed. Breastfeeding may thus reduce energy deficit resulting from diarrhoea in two ways – by avoiding the reduction of energy intake that often occurs during diarrhoeal episodes, and by reducing faecal losses.

Thus, the authors conclude, "efforts to promote increased energy intake among infants and young children should be coupled with efforts to promote exclusive breastfeeding through at least the first four months of infancy and partial breastfeeding through 24 months when children are most at risk for diarrhoea."

(Sources: (i) ACC/SCN, (1990). Supplementary Feeding Counteracts Effects of Diarrhoea on Growth. *SCN News No. 5,* 35–36. (ii) Lutter, C.K., Habicht, J.P., Rivera, J. & Martorell, R. (1992). The Relationship between Energy Intake and Diarrhoeal Disease in their Effects on Child Growth: Biological Model, Evidence and Implications for Public Health Policy. *Food and Nutrition Bulletin,* **14** (1), 36–42.)

New Bill Restricts Marketing of Infant Foods in India

The Indian Parliament has passed an "Infant Milk Substitutes, Feeding Bottles & Infant Foods (Regulation of Production, Supply & Distribution) bill", a move which, if implemented successfully, will severely restrict the advertising and promotion of these baby products.

The bill essentially incorporates the recommendations laid out in the International Baby Food Code adopted by the World Health Assembly in 1981, but additionally it covers infant foods, defined as "foods provided as a complement to mother's milk to meet the growing nutritional needs of the infant after the age of four months".

When the bill comes into force, advertising of these products will be banned, as will promotional activities such as the distribution of free samples. Donations of infant–milk substitutes and bottles will only be allowed to orphanages.

The law also extends to the labelling of products. Words such as "humanised" or "maternalised" and pictures of mothers, infants or both will no longer be allowed – and all information material provided with the products will be required to promote breastfeeding and warn of the financial and social implications of using infant formulas and baby bottles.

The penalties for breaking this law may be imprisonment for up to 3 years or fines of up to Rs 5000 ($100).

Some doubt has been expressed, however, as to whether the government will be able to implement the bill successfully. It is feared that the food inspectors responsible for identifying offences – already overworked and sometimes corrupt – will not carry out the task adequately. In addition, while the bill bans use of the health system or its employees for promotion of advertising of baby products, no agency has been set up to monitor the functioning of the health system, and there is an expanding private health sector which is largely unregulated.

There are also fears about the effect of the legislation on poor working women. According to Padma Prakash, writing in *The Lancet,* "Restricting promotion of baby food must be accompanied by creation of conditions that enable the vast majority of poor women to breastfeed. Such a task in a country where most women are forced to work in the unorganised sector would be colossal."

(Source: Prakash, P. (1992). India: Advertising of Infant Foods to be Restricted. *Lancet,* 340, 962–963)

Urinary Tract Infection and Breastfeeding – Evidence of Link

A case–control study carried out in Italy appears to have found evidence of a protective effect of breastmilk against Urinary Tract Infection (UTI) in infants in their first six months of life.

Working at the Medical School of Naples Department of Paediatrics, researchers compared the feeding methods used for the 128 patients (aged 6 months or less) admitted to the hospital with UTI between the years 1976–1989, with 128 control patients – sampled from amongst those infants who had been admitted to hospital with acute illness between during the same time period but who did not have UTI. The control patients were matched to the case patients by gender, age (within 15 days), and year and month of admission.

The infants were categorised as either “never breastfed” or “ever breastfed” based on information derived from hospital records. Infants were additionally classifed according to the type of feeding the infant was receiving at the time of hospitalisation – but this method was treated with caution because it might have led to bias due to reverse causality – the illness itself affecting choice of feeding method. 64 of the case patients (50%) were found to have ever been breastfed compared to 93 of the control patients (73%), a significant difference ($p<0.001$).

The possibility that other factors could have been responsible for the differences in incidence of UTI between the case and control groups was also addressed by the researchers – the two groups are described as having been similar with regard to age, gender, birthweight, social class, birth order and maternal smoking.

The mechanism by which protection against UTI is afforded is not discussed in detail by the authors of the study, however they do report that some authors have found an oligosaccharide in the urine of breastfed infants that causes inhibition of *Escherichia coli* adhesion to uroepilhelial cells, and other researchers have shown an increased concentration of immunologic factors in the urine of breastfed infants.

> (Source: Pisacane, A., Graziano, L., Mazzarella, G., Scarpellino, B. & Zona, G. (1992). Breastfeeding and Urinary Tract Infection. *Journal of Pediatrics,* 120(1), 87–89)

Global Eradication of Polio by the Year 2000 – an Achievable Goal?

In 1988, the World Health Organization and its 182 Member States declared their commitment to the global eradication of poliomyelitis by the year 2000 – a goal endorsed in 1990 by UNICEF and more than 130 world leaders at the World Summit for Children. Five years on, how much have we progressed towards being free of poliomyelitis?

The following summary figures are taken from a recent report by Dr Nakajima, Director–General of the World Health Organization:

> • In 1991, 14,245 cases of poliomyelitis were reported to *WHO* – a 33% decrease compared to 1990 and a 60% decline since 1988.
>
> • The number of countries reporting zero cases has risen steadily, and the number of cases has diminished.
>
> • In the Region of the Americas, nine cases of poliomyelitis were reported from only two countries in 1991.
>
> • Despite intensive surveillance, no wild poliovirus has been detected in the western hemisphere since September 1991.
>
> • Small numbers of cases are being reported from Europe, North Africa, Southern Africa, the Middle East and several countries of the Western Pacific.
>
> • Bangladesh, China, India and Pakistan reported over 80% of the poliomyelitis cases in the world in 1992.
>
> • Surveillance in much of Africa is extremely limited and the situation with regard to poliomyelitis in most of Africa remains unclear.

In addition, it has been reported by WHO that 81% of the world's infants are being vaccinated against polio each year.

According to Dr Nakajima, “immunizing 80% of the world's children has been a tremendous achievement. Reaching the remaining 20%, many of whom live in hard–to–reach areas of the world will be no less of a challenge – a challenge that has to be faced and overcome each year as more children are born, each needing a full course of immunization. In addition, it is usually necessary to supplement routine immunisation with additional mass immunisation campaigns, if the virus itself is to be eradicated”

The basic WHO strategy is to improve disease surveillance, strengthen laboratory services and increase immunization coverage all over the world – including supplemental immunization activities designed to interrupt circulation of wild poliovirus – and the success of the poliomyelitis eradication initiative in the Region of the Americas demonstrates that the main technical issues have been solved. In many countries in Africa, however, the infrastructure is poor, there are surveillance and diagnostics problems, and social unrest and military conflicts make the situation more difficult. And according to the Director–General's report there are other constraints. Several countries, such as China, are committed to eradication, but are unable to conduct an effective programme because of insufficient funds to purchase vaccine. External Resource support is also lacking in some areas. Additional external support is required at global, regional and country levels for laboratories, logistics, personnel and research.

The report lists as an additional worry the lack of political commitment to poliomyelitis eradication by some donor agencies, industrialised countries, and polio–endemic countries. “Although significant progress has been made, the goal cannot be reached without additional political commitment at all levels.”

Rotary International was, however, commended for its advocacy efforts and in 1993 was the first nongovernmental organisation to receive WHO'S prestigious Health–for–All Gold Medal, in recognition of its outstanding contribution to the global fight against poliomyelitis.

Despite the constraints, Dr Ralph Henderson, Assistant Director–General of WHO has stated that, “WHO, UNICEF and Rotary International believe we have a recipe for success, provided there is a commitment and a will on the part of the international community to get rid of the disease once and for all.”

> (Source: WHO Features, May 1993 & Expanded Programme on Immunization: Eradication of Poliomyelitis. Report by the Director–General. Provisional Agenda item no.19, 46th World Health Assembly, 23 March 1993.)

Substance Abuse Amongst Street Children

Further to the article in SCN News No. 8 *“The Dangers Faced by Children in the Americas”* (an interview with Luis Rivera, Deputy Regional Director of UNICEF for Latin America and the Caribbean) which reported that at least 15 million children aged 10–14 are working on the streets of cities in Latin America – many exposed to criminal violence and accidents of all kinds – a recent WHO report “A One Way Street?” has revealed serious problems of substance abuse amongst the estimated 100 million children living on the streets of cities worldwide.

The report discusses the results of the first phase of a project undertaken by the WHO Programme on Substance Abuse investigating the use of alcohol and other drugs by street children in 10 cities around the world; Rio de Janeiro, Alexandria, Cairo, Tegucigalpa, Montreal, Toronto, Manila, Bombay, Mexico City and Lusaka.

Amongst the 550 children who participated in the study, the most widely used substances were those which were cheap and easily available, including alcohol, tobacco, cannabis, glue, solvents and pharmaceuticals – but the use of cocaine, heroin, amphetamines, combinations of drugs and drug injecting were also reported. Children were often found to be involved in the production and marketing of cocaine, and the trafficking of cannabis and heroin.

The use of drugs was often quoted as a means of coping with stress, pain and suffering – every day children face hunger, and many fear for their lives. Of those interviewed in Rio de Janeiro, 55% claimed to have attempted suicide.

The WHO reports that promising strategies have been identified by the project based on assisting and strengthening organisations which work with street children. It is hoped that community development, empowerment, education and activities offering children a healthier, safer and more constructive lifestyle will

protect them from drugs and alcohol.

It is proposed that in the next phase the project will be developed in association with the United Nations and other organisations including the Commonwealth Secretariat and Street Kids International.

Director of the WHO Programme on Substance Abuse, Dr Hans Emblad, has expressed his fears for the wellbeing of these children. “This is a global problem and it should be addressed globally. The future of millions of children is at stake. Unless we have a strong and influential network of individuals and agencies to work with street children firmly in place, the current tragic situation will continue, and drugs will go on damaging more and more young lives.”

(Source: WHO Press Release, 26 March 1993)

Mortality Assessment in Somalia

The results of two population–based surveys, published in *The Lancet,* have revealed extremely high mortality rates in urban populations in central Somalia during the 1992 famine, especially amongst displaced persons and children.

In Baidoa, 250km west of the Somali capital, Mogadishu, a sample of the population in camps for displaced persons were asked about living household members and deaths that had occurred in the household (i.e. parents, spouses, or children) between April 3 (Ramadan) and November 21 (date of interview), 1992. Of the 338 displaced persons reported to have been alive on April 3, 132 (39%) were reported to have died – an average daily crude mortality rate (CMR) of 16.8 deaths per 10,000 population. 62 of these 338 displaced persons were children under 5 years of age. 46 had died during the 232 days preceding the interview – a CMR of 32.0 deaths daily per 10,000 population aged <5 years. For all age groups, the most common reported causes of death were diarrhoea (56%) and measles (25%).

In Afgoi, a town lying 40km west of Mogadishu, mortality data were collected from 152 households for 1019 persons who were alive on April 3. Of the 763 long–term residents of Afgoi and 255 persons displaced from other areas who were included in the sample, 115(11%) died between April 3 and December 6, 1992 – a CMR of 4.7 deaths daily per 10,000 population. Most commonly reported causes of death were measles (34%) and Diarrhoea (19%). Displaced persons were more than 1.5 times as likely to die as residents during this period.

To set these figures in context, the authors report that “in most countries of Sub–Saharan Africa, reported national mortality rates are between 20 and 24 deaths per 1000 population per year, equivalent to 0.55 – 0.65 deaths per 10,000 per day. Although displaced persons commonly have higher mortality rates than non–displaced persons, the mortality rates found in our survey are among the highest recorded for civilian populations over a long period. Among displaced households surveyed in camps in Baidoa, mortality rates were about thirty times higher than expected in peacetime.” “Community–based public health interventions to prevent and control common infectious diseases are needed to reduce these exceptionally high mortality rates in Somalia.”

Source: Moore, P.S., Marfin, A.A., Quenemoen, L.E., Gessner, B.D., Ayub, Y.S, Miller, D.S., Sullivan, K.M. and Toole, M.J. (1993). Mortality Rates in Displaced and Resident Populations of Central Somalia during 1992 Famine. *The Lancet,* **341,** 935.938.

Is Lead Damage Reversible?

A new piece of research has found that the effects on intelligence of lead accumulation in childrens' blood may be partially reversible when blood lead content is reduced. 154 children from 1 –7 years of age took part in the study undertaken by a research team at Albert Einstein College in New York. All were diagnosed with moderate lead poisoning – defined as lead levels between 25 and 55 micrograms of lead per decilitre of blood.

Six months after having been treated to reduce the levels of lead in their blood, and their homes cleaned to reduce exposure to lead, the children showed significant improvement on standardised tests for cognitive

development. The improvement was in direct proportion to the drop in blood lead levels.

There is now evidence to suggest that levels of blood lead much lower than were present in these children can damage the developing brain and affect intelligence. The Centers for Disease Control in Atlanta now considers a level of 10 micrograms per decilitre of blood to be a matter of concern. According to US Federal Data, in 1990, eight million American children had lead levels of more than 10 micrograms.

Although the results of the research point to there being a need to increase efforts to reduce children's exposure to lead and to identify and treat children with dangerous lead levels in their blood, Dr Holly Ruff, leader of the research team is cautious. “Our study is only suggestive, not definitive, and should be followed with more work to determine specifically which kinds of interventions would be most helpful.”

(Source: *International Herald Tribune,* 8 April 1993)

Tropical Diseases – New WHO Research Targets

According to the World Health Organisation's Tropical Disease Research Programme (WHO/TDR), deaths from five major tropical diseases – Malaria, Leishmaniasis, African Sleeping Sickness, Lymphatic Filariasis, and Schistosomiasis – could double from two million a year to four million a year by 2010 unless immediate action is taken.

In response, TDR has set new research targets – some scheduled for completion as early as next year – aimed at identifying and making available means of attacking these diseases. Areas of research include new drugs, diagnostics and vaccines, and TDR is also examining the role of women in controlling these diseases.

Malaria is by far the most serious problem. 270 million people in the world are infected with the malaria parasite which is carried and passed on by infected female mosquitos. 90% of those infected are in sub–Saharan Africa, where malaria kills at least a million people annually (some estimates approach two million). The main victims are children under five years of age, and non–immune children entering endemic areas.

The World Declaration on Control of Malaria, adopted by over 100 Governments in Amsterdam in October 1992 identified four key objectives: (a) early diagnosis and treatment; (b) selective and sustainable mosquito control; (c) early detection and containment or prevention of epidemics; and (d) regular reassessment of each country's malaria situation.

TDR's research targets will support these goals. If adequate resources are available, as well as developing new more effective drugs for prevention and treatment of malaria including one which could be used in the 50% of all cases in which malaria is indistinguishable from acute respiratory infection – TDR hopes to know by 1996 whether insecticide–soaked bednets and curtains can save children's lives throughout much of Africa. Large–scale studies are now underway in parts of Burkina Faso, Ghana and Kenya in response to the discovery in a small study in the Gambia that home–soaked nets could reduce child deaths by more than half.

They also envisage that by 2002 human trials should be complete on most of the 15–20 current leading malaria vaccine antigen candidates and combinations. It should then be clear whether, in exactly what form, and at what cost, a malaria vaccine will work.

Genetic manipulation systems are also being developed for both the most dangerous form of the malaria parasite – *Plasmodium falciparum* – and for the mosquito. Genetic transformation of the parasite, which has already been achieved, should increase the speed at which drugs can be developed, and drug resistance understood and controlled. In the mosquito, the aim is to develop mobile, self–propagating genetic elements that will disable the insect from carrying the parasite at all.

Recognising that already four out of five malaria cases are treated in the home, TDR is investigating “how mothers diagnose and treat the disease, and how they may be aided to distinguish malaria from other, less serious illnesses, to save their children's lives.

The costs of reaching the targets laid out for malaria research and the other tropical diseases will be large, but as Dr Tore Godal, Director of TDR, points out “apart from the millions of lives lost and ruined, malaria alone causes over 200 million weeks of lost work a year. Even at developing country incomes – say US$5 a week –

that comes to a loss of US$ 1 billion a year, and for just one of the diseases."

"To spend a tiny fraction of that to save lives and hope is the only possible moral course of action, but it clearly makes good business sense too."

(Source: WHO Office of Information Background Document on Tropical Diseases, 29 March 1993)

Dr Fernando Antezana Appointed Assistant Director–General of World Health Organization

Dr Hiroshi Nakajima, Director–General of the World Health Organization, has announced the appointment of Dr Fernando Antezana Aranibar as Assistant Director–General with effect from 1 June 1993.

Dr Antezana will be responsible for the Division of Food and Nutrition, the Action Programme on Essential Drugs, and the Division of Drug Management and Politics.

Dr Antezana, born in Cochabamba, Bolivia, joined WHO in 1976. Since then he has held a number of positions, including Scientific Adviser in the Unit of Drug Policies and Management, and Senior Scientist in the Division of Prophylactics, Diagnostic and Therapeutic Substances. He served as WHO Representative in Guatemala from 1986 to 1989, and since 1992 has been Director of the WHO Action Programme on Essential Drugs.

(Source: WHO Press Release, 2 June 1993.)

Many Neighbours, One Earth – New Campaign to Transform US Foreign Aid

Bread for the World – an organisation which describes itself as "a Christian citizens' movement to end hunger" – is launching this year the *Many Neighbours, One Earth* campaign – an effort to make reducing hunger and poverty in environmentally sound ways the main focus of US foreign aid.

Findings by the Bread for the World Institute – which works closely with *Bread for the World* – have indicated that "of the $15 billion 1991 foreign aid budget, only about 20%, or $3 million was allocated to programs focussed on reducing poverty and hunger in environmentally sound ways" and that "At present about half of the foreign aid budget is set aside for military and security purposes" – an allocation which *Bread for the World* argue is inappropriate now that the Cold War is over.

The campaign seeks to provide grassroots support for a new foreign aid approach that supports *people–centred development;* the main principles of which are described by *Bread for the World* as the following:

• **Development must support people's efforts to meet their basic needs.** These include food, clean water, basic health care, shelter, and education. Meeting these needs allows people to enjoy a decent quality of life that is every person's right and ensures that people are healthier, more productive members of society.

• **Development must create opportunities for poor people to increase their incomes.** These opportunities include the creation of better paying jobs, strong markets for farm and other products, and access to resources that enhance earning capacity. The most important resource is land, but other productive resources include financial credit, technology, and training. Economic growth in poor countries can help raise incomes among poor people, but growth in GNP should not be seen as an end in itself. The benefits of growth must be fairly distributed to reach poor and hungry people.

• **Development must reinforce patterns of living that protect the environment.** Promoting poor people's access to land is also critical to environmental protection. Otherwise, they may be forced to overgraze, cultivate marginal lands, or cut forests in order to meet daily needs for food, water, fuelwood, timber and income. Agricultural and industrial production methods must also protect the soil, water, and other resources, and rely on renewable sources of

energy.

• **Development must promote the full participation of men and women in social and economic decision−making at the local and national level.** Democratic participation is an end in itself, and also tends to protect poor people and the environment. Strengthening the capacity of grassroots organizations, respecting human rights, with special attention to the rights of women and minorities are key elements of equitable, sustainable development.

Bread for the World state that their goal is to “direct aid to countries that demonstrate commitment to these objectives, with priority given to the poorest countries. In all selected countries, aid should target the poorest people”, and believe that “by reordering foreign assistance to reflect new priorities, the United States can help set the global standard for post−Cold War development assistance, give a major boost to poor people worldwide, and improve US prospects for security and lasting wellbeing. Appropriate foreign aid can help break the cycle of hunger and poverty one step at a time.'

For further information on the *Many Neighbours, One Earth: Transforming Foreign Aid* campaign, please contact: Bread for the World, 802 Rhode Island Avenue, N.E., Washington, D.C. 20018, USA. Tel: 202 269 0200.

(Source: Selvaggio, K. (1993). *Many Neighbours, One Earth: Transforming Foreign Aid.* Bread for the World Background Paper No. 128.)

Co−financing Opportunities with the Asian Development Bank

According to Alan Berg, Senior Nutrition Adviser at the World Bank “Task Managers for South Asia and East Asia Nutrition projects should be alert to co−financing possibilities with the Asian Development Bank, which for the first time is expressing interest in nutrition. Its initial investment in this field could be as co−financer of the Bangladesh Nutrition Project, based on recent participation in the pre−appraisal mission.”

(Source: World Bank Office Memorandum “New and Noteworthy in Nutrition”, April 26, 1993)

WHO Division of Food and Nutrition

Following the International Conference on Nutrition (ICN) held in Rome from 5−11 December, 1992, and in response to a request by Member States that the WHO strengthen its capacity for action in the field of Food and Nutrition, the Director−General of the WHO has established a WHO Division of Food and Nutrition with effect from 1 May 1993.

The new division comprises three units, Food Aid Programmes (FAP), Food Safety (FOS) and Nutrition (NUT). Its function will be in particular to support Member States in the implementation of recommendations contained in the World Declaration and Plan of Action for Nutrition, laid down at the ICN. It will help Member States to develop and implement their National Plans of Action for nutritional improvement, giving priority to the countries that are least developed, have low income or are affected by disasters.

Other priority activities of the new division will include: micronutrient control programmes; training in preparedness for nutritional emergencies; control of diet−related chronic diseases; maternal, infant and young child nutrition; monitoring nutritional status; and prevention of food−borne diseases.

Dr Georg Quincke has been appointed Director of the new division. Dr Quincke joined WHO in 1969 as Medical Officer at headquarters. In 1970 he was appointed Regional Adviser for Health Laboratory Services for the African Region of WHO, and he subsequently became WHO Representative, first for Botswana, Lesotho & Swaziland, then Cameroon. Since 1985 he has been Chief of the Food Aid Programmes Unit, WHO.

(Source: WHO Press Release, 27 May 1993)

20 Years of Tanzania Food and Nutrition Centre 1973–1993

The Tanzania Food and Nutrition Centre celebrates this year 20 years of Nutrition work in Tanzania.

Its major achievements have been:

- development of a food and nutrition policy for Tanzania;
- development of a conceptual framework for the analysis of malnutrition problems;
- the creation of awareness on nutrition for nutrition decision makers and the public at large;
- collaboration with various international agencies and ministries in the development and implementation of community based nutrition programmes related to child survival and development; and
- development of national programmes for the control of iodine deficiency disorders (IDD), vitamin A deficiency, nutritional anaemia and breastfeeding.

The anniversary celebration activities will be running from January – Early December 1993 throughout Tanzania.

For further information contact: The Chairperson, 20 Years of TFNC, PO Box 977, Dar es Salaam, Tanzania. Tel: 29621–3. Fax: (255) 51 28951 Telex 41280 LISHE, TZ

(Source: TFNC, 18 May 1993)

World Breastfeeding Week 1993 – Mother Friendly Workplace Initiative

On 1–7 August, 1993, the second annual World Breastfeeding Week (WBW), organised by the World Alliance for Breastfeeding Action (WABA), took the theme of the Mother–Friendly Workplace Initiative (MFWI). Last year's theme, the Baby–Friendly Hospital Initiative, has to date encouraged over 70 countries take action to initiate activities and programmes in support of breastfeeding – and a growing number of hospitals are “now converting their institutions into baby–friendly facilities.”

UNICEF, the WABA's main partner in World Breastfeeding Week, has stated that “although important progress has been made in many countries through the BFHI, the goal of enabling all women to breastfeed optimally will only be achieved when there are more supportive environments both at work and in the community.”

The challenge, then, for the WABA is to “take baby–friendliness outside the hospitals into other parts of society.” The WABA hopes that “through the Mother–Friendly Workplace Initiative, the home, streets, farms, offices and other workplaces – both formal and informal – will become more mother friendly work environments.”

The goals of WBW 1993 are:

- To create public awareness of the rights of working women to breastfeed;
- To facilitate and protect cultural/traditional practices which are supportive to the breastfeeding mother working at or away from home;
- To involve community leaders and other popular groups (ecological, women & development groups) to develop the social support needed for women in the informal & agrarian sectors to combine breastfeeding & work;
- To have more trade unions demand maternity rights & provide a supportive work environment for all women workers who choose to breastfeed (e.g. a creche, better transport, etc.);

• To ensure that national legislation to protect the breastfeeding rights of working women is implemented in as many countries as possible; and

• To make as many workplaces as possible become Mother–Friendly.

For more information contact any one of the following: Sarah Amin, WABA Secretariat, PO Box 1200, 10850 Penang, Malaysia. Tel: 60 4 884 816 Fax: 60 4 872 655; Penny Van Esterik, Coordinator, Women & Work Task Force, Dept of Anthropology, Vari Hall, York University, North York, Ontario M3J 1P3, Canada. Tel: 1 416 7365261 Fax: 1 416 7365768; or Marta Trejos, Coordinator, Social Mobilisation Task Force, CEFEMINA, Apartado 5355, 1000 San Jose, Costa Rica. Tel: 506 244 620 Fax: 506 346875.

(Source: *WABA leaflet & WABA Link* Nos 5 & 6, February 1993)

Studies in Nutrition at the University of Queensland

The following is extracted from an announcement provided by the University of Queensland

"Established in 1979, the Nutrition Program of the University of Queensland offers postgraduate training in nutrition for professionals coming from health, agriculture, economics and other backgrounds. Over 200 students have graduated through the Nutrition Program, with more than 70 per cent being drawn from Asia, 15 per cent from Africa and the remainder primarily from Australia and the Pacific."

Master of Community Nutrition (MCN)

"The MCN is aimed at professionals involved in the formulation and implementation of nutrition policy and programs and those who train other professionals to work in the area of nutrition.

"An interdisciplinary approach to nutrition problems is stressed in this one year course. Six months of coursework in Brisbane covers the analysis of food and nutrition systems, nutrition policy and planning, social change and development, management, statistics and epidemiology. This is followed by six months of supervised fieldwork at one of the collaborating universities, the Institute of Nutrition at Mahidol University or Khon Kaen University in Thailand, or the University Kebangsaan Malaysia in Malaysia. The course commences in June each year.

Research training (MMedSc and PhD)

The Nutrition Program also provides research training at the masters and PhD levels for students from Australia and overseas. The masters degree is normally completed in two years of full–time study, while the doctorate is normally completed in three years.

"The scope of student research is broad, with a primary focus on public health nutrition, but increasingly with emphasis on issues of relevance to clinical nutrition and dietetics.

"Current areas of research among the Nutrition Program staff include: food and nutrition policy studies; nutritional surveillance; health promotion; evaluation of programs; agriculture and nutrition; iodine deficiency disorders; recommended dietary intakes; beta–carotene and skin cancer; nutrition and development of non–communicable diseases; and nutrition and child morbidity."

For further information contact: The Director, Nutrition Program, University of Queensland, Royal Brisbane Hospital, Queensland 4029, Australia. Tel: 61 7 365 5400 Fax: 61 7 257 1253.

(Source: University of Queensland Nutrition Program leaflet)

Dr J E Dutra de Oliveira Selected Fellow of the Third World Academy of Sciences

Professor Abdus Salam from Pakistan, President of the Third World Academy of Sciences, has communicated that Professor Dutra de Oliveira from the Medical School of Ribeirao Preto, University of Sao Paulo, Brazil, and President of the International Union of Nutritional Sciences, has been elected as a Member of the Academy. The Fellows of the Academy are elected among Scientists of the Developing Countries who have reached the highest international scientific standards in their areas of work. The Academy is the first international forum to unite distinguished men and women of science with the objective of enhancing the promotion of basic and applied sciences in the Third World. The Membership Committees of the TWAS include those for Agriculture, Biology, Engineering, Biochemistry & Biophysics, Chemistry, Geological and Earth Sciences, Mathematics, Physics & Astronomy and Medical Sciences. It is presently located at the International Centre for Theoretical Physics at Miramare, Trieste, Italy and run by the International Atomic Energy Agency and the United Nations Educational, Scientific and Cultural Organisation (UNESCO).

(Source: IUNS, 11 April 1993)

World Conference on Natural Disaster Reduction

The World Conference on Natural Disaster Reduction, organised by the United Nations Department of Humanitarian Affairs (UNDHA)/International Decade for Natural Disaster Reduction (IDNDR), in cooperation with the Government of Japan, will be held in Yokohama from 23 to 27 May, 1994.

The aims of the Conference will be to:

- review IDNDR accomplishments at national, regional, and international levels;
- chart an action program for the future;
- exchange information on the implementation of IDNDR programs and policies; and
- increase awareness of the importance of the progress of disaster reduction policies.

The results of the Conference will contribute to the midterm review of the IDNDR, which was launched with the objective of reducing the loss of life, property damage and economic and social disruption caused by natural disasters, especially in developing countries.

Participation is anticipated to include government ministers and high–level officials, representatives of the over 100 National Commitees and Focal Points for the Decade, representatives of regional and international organisations concerned with natural disasters, both governmental and non–governmental and other interested persons.

Potential participants are invited to write to the IDNDR Secretariat in Geneva as soon as possible for further conference information at the following address:

IDNDR Secretariat, Palais des Nations, CH–1211 Geneva 10, Switzerland. Fax: (41 22 733 8695)

(Source: IDNDR Special Announcement)

Oxfam Launches New Campaign for Africa

“Africa Make or Break” is the name given to Oxfam's new campaign to curb the current trend of increasing poverty in Sub–Saharan Africa. The campaign will press northern industrial governments to agree to a plan of action to help underpin African recovery. According to David Bryer, Director of Oxfam, launching the campaign in the Observer newspaper:

“Such a plan would need to start by removing what UN Secretary–General Boutros Boutros–Ghali has described as 'the millstone around the neck of Africa' – an external debt of over US$ 130 billion... Africa transfers to the north $10 billion annually in debt repayments, draining the region of its limited capital

resources."

"Alongside debt relief, increased aid is vital. In real terms, development assistance to Africa has stagnated since 1989."

"In addition to increased aid and debt relief, there is an urgent need for reform of World Bank and IMF structural adjustment programmes, which have dominated economic policy in Africa for over a decade. These programmes have conspicuously failed to create a platform for economic recovery, and they have marginalised poor people."

"In Africa, as in other parts of the world, peace, stability and democracy do not come cheap. However, failure to act will carry a price – a price which will not only be borne by Africans, but by us in the north too."

> For a copy of the Oxfam "Africa Make or Break" report and further information on the campaign contact: OXFAM, 274 Banbury Road, Oxford OX2 7DZ, United Kingdom. Tel. 0865 312253.
>
> (Source: *Observer,* 21 May 1993)

Second Asian Conference on Food Safety

The Second Asian Conference on Food Safety will take place in Bangkok, Thailand, on September 19–23, 1994. It is hoped that the conference will attract national and regional health policy planners, as well as scientists and other professionals from industry, government, academia and others concerned with food safety – over 400 scientists and policy makers representing Asia, South America, Europe, and North America were present at the First Conference, held in 1990 in Malaysia.

The specific objectives of the conference will be to:

1. Focus attention on new challenges of food safety in the Asian region.

2. Promote the harmonisation of sound food protection regulations.

3. Provide a forum for discussing current and future issues in food safety; and

4. Promote the safety of food products and increased trade within the region.

The conference is being organised by the International Life Sciences Institute South East Asia, Thailand, in association with the International Life Sciences Institute, the Food & Drug Administration, Thailand, the International Union of Food Science & Technology, the Food and Agricultural Organisation, and the World Health Organization. Topics will cover the areas of Food Safety, Microbiology, Water, Nutrition and Emerging Issues.

For further information please contact: *In Asia:* Dr Saipin Maneepun, Secretariat, 2nd Asian Conference on Food Safety, c/o ILSI Southeast Asia, Thailand Office, P.O. Box 170, Bangkok 10400, Thailand. Tel: 662 579555–1, 5790572. Fax: 662 561 1970. *All others:* Ms Lili C Merritt, ILSI, 1126 16th St., N.W. Washington, D.C. 20036, USA. Tel. 202 659 0074. Fax: 202 659 3859.

> (Source: ILSI Leaflet, June 1993)

ECSA Micronutrient Symposium

The East, Central and Southern Africa Food and Nutrition Cooperation (ECSA), whose membership consists of Directors and Heads of Food & Nutrition Institutes and units in the region, is organizing a two day Micronutrient Symposium scheduled for 28–29 October, 1993, in Windhoek, Namibia.

The meeting is also open to International Organizations interested in assisting ECSA in developing a feasible Micronutrient Programme.

The aims of the Symposium are to

– increase awareness of the problem of micronutrient deficiencies in ECSA;

– facilitate development of strategies for cooperation between countries in the region on activities to combat micronutrient malnutrition; and

– plan a series of regional training activities.

There will be presentations on country initiatives on micronutrients from which country, inter–country and regional level follow–up strategies will be drawn.

For further information please contact: Catherine Siandwazi, Coordinator, Food & Nutrition, The Commonwealth Regional Health Community Secretariat for East, Central & Southern Africa, PO Box 1009, ARUSHA, Tanzania. Tel: 255 57 8362/3 Fax: 255 57 8292.

(Source: CRHCS Communication, 25th May 1993)

Training Materials in Basic and Applied Nutrition

Recognising that most nutrition workers need training in the basic techniques of assessing the state of nutrition in the field, the Centre for Human Nutrition of the London School of Hygiene and Tropical Medicine, in association with the Save the Children Fund (UK), has produced a set of training materials which introduce the basic concepts of human nutrition, show in detail how anthropometric data can be collected and interpreted, and give some practice in the statistical work associated with surveys.

Originally produced as tape–slide sets and workbooks, the training packages are now available at lower cost on video, still accompanied by the workbooks.

For further information contact: Centre for Human Nutrition, London School of Hygiene & Tropical Medicine, 2, Taviton Street, London WC1H OBT, United Kingdom. Tel: 071 380 0599 Fax: 071 383 5859.

(Source: LSH&TM leaflet)

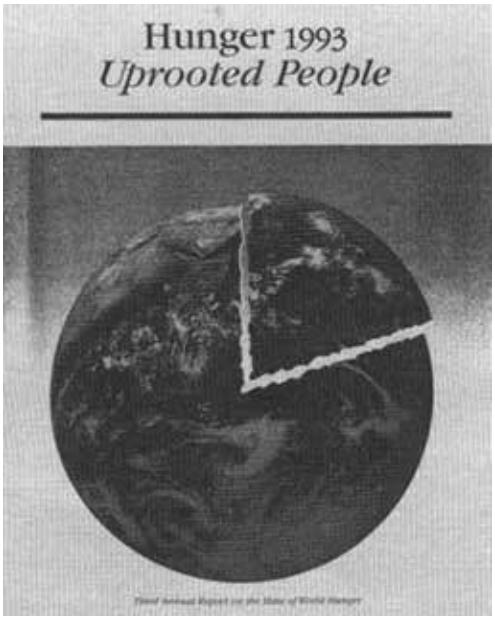
IUNS Awards – Correction

It has been brought to the attention of the SCN that an error was made in the reporting of awards given to Dr Barbara Underwood (SCN News No. 8, p.28). The awards were given by the American Institute of Nutrition (AIN) and *not* by the International Union of Nutritional Sciences. We apologise for any confusion this may have caused.

PUBLICATIONS

"Hunger 1993: Uprooted People"

(1992) Bread for the World Institute on Hunger and Development, Washington, D.C. 204 pages.



This is the third annual report on the state of world hunger compiled and published by the *Bread for the World Institute on Hunger and Development* – an organization involved in research and education about hunger working closely with *Bread for the World,* described in this book as "a Christian citizens movement of 45,000 members who advocate specific policy changes to help over come hunger in the United States and overseas".

It consists of a series of essays focussing on the problems of those who face hunger as a result of being forced against their will to leave their home communities, and addressing what has and can be done to alleviate the suffering. The subject matter "uprooted people" covers not only refugees in the traditional sense – defined in the report as "people who have crossed international boundaries to escape persecution based on race, religion, national origin, political opinion, or membership in a social group, or to escape war, civil strife, or political chaos", but also internally displaced people, uprooted indigenous peoples, and the growing number of environmental refugees, those "forced to abandon their homes or homelands as a result of human–induced environmental conditions that threaten their livelihoods." The report also contains chapters on "Hunger Among Uprooted People in the United States", "Reforming the International Refugee Aid and Protection System" and "Regional Hunger Updates", covering Africa, Asia and the Pacific, Latin America and the Caribbean, Middle East, North America, and the Former Soviet Union and Central and Eastern Europe. Additional features are updated and expanded tables of country–level indicators, state–level indicators of poverty in the United States, a glossary and an extensive bibliography.

> To obtain a copy of *Hunger 1993: Uprooted People,* please contact: Bread for the World Institute on Hunger & Development. Attn: Publications Order, 802 Rhode Island Avenue, N.E., Washington D.C. 20018. Tel (202) 269 0200, Fax: (202) 529 8546.

V.E.

"Child Malnutrition: Progress Toward the World Summit for Children Goal"

(1992) UNICEF Statistics and Monitoring Section, New York. 31 pages.

One of the goals of the World Summit for Children for the year 2000 is to reduce the level of underweight prevalence amongst children by one–half of the levels in 1990. This recent publication of UNICEF is one of the significant contributions towards a reliable assessment of the progress made to date. Significant increases in availability of reliable national data have improved the process of assessing the performance of countries in terms of the goals set forth in the Child Summit. Since 1985, the number of national anthropometric surveys, either as modules of national health surveys such as those done by the Demographic and Health Surveys, or by national household budget surveys done for example in the World Bank, and by national governments, have doubled to around 75 countries. At least 28 countries now have at least two data points with which to determine trends in nutrition. The acceptance of malnutrition data as indicators of social well–being has provided much of the impetus towards the increasing number of national data sets that encompass anthropometric measurements.

The standardization of anthropometric data (with respect to growth standards, cut–off points, and age), has considerably improved the interpretation of underweight data being reported by many United Nations agencies. Thus, this UNICEF publication reports information that are in accord with the data compiled by WHO and the ACC/SCN, and which were also reported in the ACC/SCN Second Report on the World Nutrition Situation (1993).

The data tables presented in the report are very clearly laid out, differentiating three alternative measurements: prevalence of underweight children; stunted children; and children with low weight for height (or wasted). This is important since many users are interested in distinguishing between long term nutrition (stunting) and short term nutrition (underweight). An important feature of this report is also the breakdown of data by three important characteristics, namely: by prevalence by age group; by gender; and by urban–rural residence.

Several countries reported at least two data points, which could potentially assess changes over time. One potential problem in such comparisons is the reliability of data on the age of children. Since indicators such as weight for age are dependent on age, the misreporting of age could confound the interpretation. This was the case for example in at least one country reviewed by the ACC/SCN.

For further information please contact: UNICEF, 3 UN Plaza, New York, NY 10017, USA.

M.G.

“Investing in Nutrition with World Bank Assistance”

(1992) by Joy Miller Del Rosso, World Bank, Washington, D.C. 23 pages.

This booklet – targeted at government managers and staff responsible for, and interested in, addressing malnutrition – describes how and why the World Bank is involved in nutrition programmes. It is split into four sections. The first “Why Invest in Nutrition” discusses the returns gained from investing resources directly in alleviating malnutrition, emphasizing the important contribution of such investment to poverty alleviation in general and economic growth, “Improving nutrition directly addresses some of the worst consequences of being poor. It concretely improves the well–being of populations even when incomes remain low, and it offers the promise of increasing future incomes by boosting productivity. Investment in nutrition can help workers produce more and children learn more in school. Such investment in people is the firmest foundation for economic and social development.” (p.1)

The second section “How Countries are Confronting Malnutrition” gives examples of recent World Bank involvement in projects aimed at improving nutrition directly and immediately through several strategies:

- targeting food transfer programs;
- providing essential nutrition services to those at risk;
- supplying critical micronutrients;
- using a multifaceted approach; and
- building capacity in nutrition programming.

The next section “How the World Bank can Help” describes and explains the resources the World Bank is able to make available – substantially strengthened in recent years – for helping governments interested in strengthening or expanding nutrition activities.

Finally, the last section “What Lessons for the Future” draws on past experience of the World Bank and other donors, host governments, NGOs and communities involved in nutrition projects to provide a set of guidelines on how governments can address malnutrition.

To obtain a copy of the publication or find out more about how World Bank can assist in addressing malnutrition problems please contact: The World Bank, Director, Population, Health & Nutrition Department, 1818 H Street, N.W., Washington, D.C., 20433, USA.

"Understanding Intrahousehold Resource Allocation"

(1992) IFPRI Policy Brief. IFPRI, Washington, D.C. 52 pages.

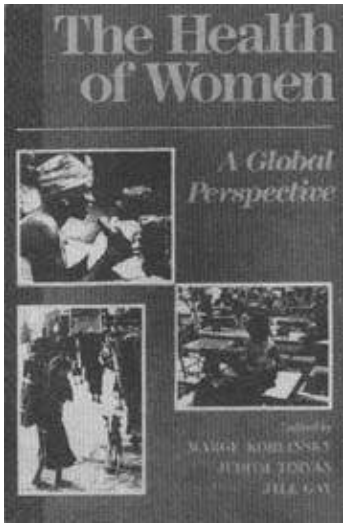
A growing body of empirical and theoretical literature from various disciplines has pointed out that the costs and benefits of different policies are borne disproportionately by some individuals within households, according to their gender, age, and relationship to the household. These argued that the very success of development policy is likely to be undermined by a failure to view the household and the family in a holistic manner. This IFPRI policy brief emanated from a conference on intrahousehold issues hosted by IFPRI in Washington, D.C. in February 1992. More than 40 economists, nutritionists, anthropologists, sociologists, demographers, and political scientists participated in this conference, half of whom presented papers which are summarized in this policy brief. This IFPRI policy brief documents numerous examples of costly, unintended policy effects due to the neglect of intrahousehold decision making processes. For instance, since patterns of food consumption within households differ, programmes targeted to certain household members may be wide of the mark, with heavy leakages. Or programs that are intended to increase employment may reduce school enrollment because adolescents may be required to stay at home to care for infants while their mothers are at work. Most analysis of programmes stop at the door of the household. The results from studies presented indicate that the outcome of policies may change due to the differences in the understanding of intrahousehold allocation behavior.

> For further information please contact: IFPRI, 1200 Seventeenth Street, N.W., Washington, D.C., 20036–3006, USA. Tel: (202) 862 5600. Fax: (202) 467 4439.

M.G.

"The Health of Women: A Global Perspective"

(1993) Edited by Marge Koblinsky, Judith Timyan and Jill Gay, published by Westview Press. 291 pages.



The Health of Women: A Global Perspective is essential reading for topics to include in a women's health agenda in developing countries. The strength of this book is the depth of its perspective. Much more is included than the medical aspects of maternal morbidity and mortality. As the titles of the chapters indicate, the health of women in developing countries is placed in a comprehensive context:

1. Women's Health: The Price of Poverty.

2. Mother and More: A Broader Perspective on Women's Health.

3. Women's Nutrition through the Life Cycle: Social and Biological Vulnerabilities.

4. Infection: Social and Medical Realities.

5. Family Planning: A Base to Build on for Women's Reproductive Health Services.

6. Abortion.

7. Women's Mortality: A Legacy of Neglect.

8. Violence against Women: The Missing Agenda.

9. Women's Mental Health: A Global Perspective.

10. Access to Care: More than a Problem of Distance.

11. Quality of Care: A Neglected Dimension.

12. Health Women's Way: Learning to Listen.

Each chapter justifies inclusion of its topic in a women's health agenda for developing countries. The reasons for each topic's inclusion are clearly and strongly presented, supported by relevant statistics. Each chapter provides a fresh perspective. Either the topic of the chapter itself is fresh (e.g., violence, mental health) or the approach towards it is fresh (infection, family planning). Each chapter also includes thoughtful and practical recommendations, often categorized for policy, program, and research.

The audience for this book is broad. It includes people who have not yet considered women's health in developing countries, and would benefit from seeing a comprehensive agenda; people who are convinced of the need to address women's health concerns, but need information and new approaches with which to convince others; and people who need suggestions on how to design health services to better meet women's needs.

Chapter 1 makes the case that poverty is a major factor in women's poor health. Poverty limits women's access to health care and reduces women's decisions to seek care, yet increases women's chances of suffering ill health. Chapter 2, “Mother and More” reviews existing information on the levels of morbidity for those conditions that most frequently cause maternal mortality: ill health consequences of hemorrhage, obstructed labor, infection, gestational hypertension, and septic abortion. Other topics reviewed are what is known about the menstrual cycle, ill health consequences of women's work, and the health 'isues of aging women.

Chapter 3 discusses women's nutrition, first in terms of social vulnerability, due to women's low status, in each of four life cycle stages (preference for males in infancy/childhood, early reproductive role in adolescence, multiple roles in the reproductive years, and marginalization in the later years), and second in terms of biological vulnerability, due to women's reproductive role. Chapter 4 on infections (reproductive tract infections, sexually transmitted diseases, and HIV) has useful sections on existing interventions and considerations for designing them.

Chapter 5 presents family planning as one of the basic and most important preventative health care services for women. To play this role effectively, family planning “services must be available to women in a way that incorporates and satisfies their other primary of reproductive health care needs and is simultaneously responsive to the various stages of their reproductive lives,” and the chapter outlines ways in which this can be done. Chapter 6 on abortion addresses ways to reduce the poor health outcomes of unsafely performed abortions, chief among which is promotion of family planning services to prevent unwanted pregnancies. Other strategies for tackling the problem of ill health effects of unsafe abortions are safe technologies and access to safe care.

Chapter 7 on women's mortality discusses both mortality due to the low status of women, and maternal mortality (deaths due to complications of pregnancy, childbirth, and the early postpartum months). Specific priorities are outlined for reducing maternal mortality. Chapter 8 on violence presents a compilation of available statistics on domestic violence, dowry deaths, rape and sexual assault, violence against refugee women, female circumcision, and discrimination against girl children. Following the grim statistics, the author gives examples of ways women are fighting against violence in their lives, and makes action–oriented recommendations for reducing this problem.

In Chapter 9 on mental health, the author starts by challenging the myth that mental health is a luxury item. She then describes the most prevalent types of mental illness in women of different age groups, and ends by outlining an effective mental health policy. Chapter 10 on access to care discusses thoroughly the many factors that constrain women's access to health care services. On the service side are factors such as service organisation, service location, characteristics of personnel, structural adjustment, cost and quality of services. On the user side are factors such as informational barriers, decision–making dynamics, and cultural barriers. Specific recommendations are made to reduce each of these constraints to women's access to health care.

Chapter 11 on quality of care outlines characteristics of the delivery of health services to ensure quality, and thus use, of services. The original audience for the quality–of–care arguments was the family planning community, but applies to a variety of health services that could be serving women's health concerns. Chapter 12 describes the importance of listening to women in order to design health services to meet their needs. Programs that meet women's needs are more likely to be sustained and to be more effective. Perhaps more importantly, the authors describe eloquently effective methods for listening to women to discern these needs.

The Safe Motherhood Initiative was launched six years ago after the high rates of maternal mortality became apparent. It focused on mortality of women during pregnancy, childbirth, and the early postpartum months. While the Initiative has brought long overdue attention and programmatic action to a problem of enormous proportion, it is gratifying to see that the specific focus of the Initiative is now being complemented by a broader focus of women's health in developing countries.

> For order and other information, please write to: Westview Press, 5500 Central Avenue, Boulder, Colorado 80301–2877 or 36 Lonsdale Road, Summertown, Oxford OX2 7EW.

Kathleen Kurz International
Center for Research on Women

“The Incidence of Poverty in Developing Countries: A Compendium of ILO Data”

(1993) by Hamid Tabatabai and Manal Fouad. International Labour Office, Geneva. 105 pages.

The renewed interest in poverty alleviation requires a deeper understanding of the problem. This suggests the need for strengthening the data base on poverty and its changes. This publication of ILO is a significant step towards filling this need. The search for relevant data on incidence of poverty is a time consuming process, and at times impossible due to lack of access to the original sources. Estimates of incidence of poverty are scattered in thousands of different articles, unpublished documents, reports, and books. The compilation presented in this publication serves the purpose as a single source document of most of the estimates of incidence of poverty of the last 20 years.

This report, which is in two parts, lists and summarizes a large number of recent (usually post 1970) studies on the incidence of “absolute” poverty in developing countries. The studies listed are all based on household income and expenditure surveys whose coverage is reasonably comprehensive, usually distinguishing between rural and urban poverty. For some large countries, e.g. India, there is also a regional breakdown of poverty. The poverty lines are usually derived from calorie requirements. The major world regions covered are Africa, Asia and the Pacific, Latin America and the Caribbean, and some developing countries in Europe. Part I lists the regions and countries and, for each country, presents in chronological order the main surveys, the incidence of poverty, the poverty line and the data source. Part II has background notes on the studies reviewed.

The survey will be useful in facilitating comparisons of poverty across countries, across regions in the same country or over time, because this can only be done with an absolute measure of poverty. There will also be less of an excuse for sticking with the rather crude measures based on per–capita GNP (whether adjusted or not for purchasing power) which are so popular today.

> ILO publications can be obtained through major booksellers or ILO local offices in many countries, or direct from ILO Publications, International Labour Office, CH–1211 Geneva 22, Switzerland. A catalogue or list of new publications can be obtained free of charge from the above address.

"Food, Health and Care: The UNICEF Vision and Strategy for a World Free from Hunger and Malnutrition"

(1993). UNICEF, New York. 40 pages.

In the words of James Grant, Executive Director of UNICEF in the foreword to this 40 page booklet "this publication offers the UNICEF perspective – from the point of view of the children of the developing world, in particular – on the critical problem of nutrition: the dimensions of the problem and doable goals and strategies for combating it, at surprisingly low cost, during the 1990s"

The first part of the booklet – after reminding us of the 1948 Universal Declaration on Human Rights' affirmation of the fundamental right or us all to adequate food, health and medical care – outlines succinctly the severity of the problems of hunger and malnutrition that still exist in the 1990s, including the combined effects of malnutrition and infection, and how these are seriously affecting the lives of many people in developing countries.

In a section called "the ethical imperative", the booklet goes on to point out that knowledge is available to alleviate the problems – nutritional goals such as those laid down at the 1990 World Summit for Children are not simply ethical goals but are, UNICEF believes, achievable. This section also describes the newly recognized role of the poor in poverty alleviation – particularly women, whose participation, it states "will lead to empowerment, mobilization of local resources, and sustainability."

The causes and effects of the four major forms of malnutrition existing in the developing world – protein–energy malnutrition, iron deficiency anaemia, vitamin A deficiency, and iodine deficiency – are discussed in the booklet together with strategies for achieving the conditions believed to be necessary for adequate nutrition: access to food (household food security); access to basic health services, together with a healthy environment; and care of children and women. Strategies discussed include:

- control of major micronutrient deficiencies (iodine, vitamin A and iron);
- protection, promotion and support of breastfeeding and improved child feeding practices;
- improved nutrition through community participation and empowerment, reflected in improved assessment, analysis and action (the triple–A approach), including support to community organizations and the use of community–based nutrition information systems; and
- improved national nutrition policies and strategies through dialogue, training and the refining of information systems (nutrition surveillance).

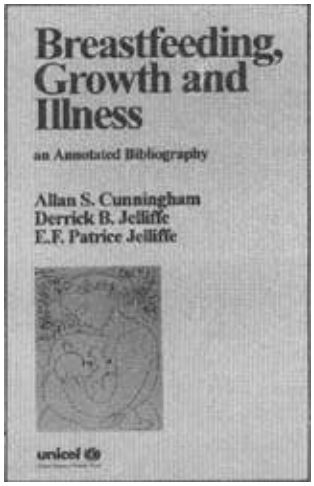
Interspersed with many photographs, the text of this booklet is highly readable and accessible to those interested in, but with perhaps a limited technical knowledge of, the global problems of malnutrition and hunger. The realities of the problem are shocking, but the booklet offers some optimism that, with adoption and implementation of the correct strategies "the world can be free from hunger and malnutrition."

For further information please contact: UNICEF, 3, UN Plaza, New York, NY 10017, USA.

V.E.

"Breastfeeding, Growth & Illness: An Annotated Bibliography"

(1992) by Allan S. Cunningham, Derrick B. Jelliffe, and E.F. Patrice Jelliffe. UNICEF, New York. 157 pages.



Prepared as a contribution to information dissemination by the World Alliance for Breastfeeding Action (WABA), this book lists the details of where to find over 500 articles on the subject of breastfeeding, growth and illness. The focus of the bibliography is on recent epidemiological research, but as the authors explain in the introduction to the book, some of the laboratory studies of human milk and proprietary formula are also included "which emphasize the biological plausibility of the epidemiology." In addition, although it is the belief of the authors that breastfeeding is "one of the most important things a mother can do for her child, anywhere in the world" they acknowledge that it may occasionally be hazardous to an infant. Thus, whilst rare, articles that report such circumstances are also included.

The articles are grouped by chapter under the following 14 broad headings: A. Less Technically Developed Communities; B. Mortality, Nutrition and Growth in Industrial Nations; C. Review Articles and Miscellaneous Infectious Morbidity; D. Gastrointestinal Infections; E. Respiratory Disease; F. Non–infectious Morbidity; G. Neonates, Prematures, Necrotizing Enterocolitis; H. Allergy, Feeding Method, Maternal Diet; I. Long–term Effects and Chronic Disease; J. Maternal (Disease) Benefits, Contraception; K. Microbes in Human Milk and Vertical Transmission; L. Untoward Effects of Breastfeeding; M. How Does Breast Milk Work? and N. Programmatic Considerations. Each chapter has a short introduction summarizing current knowledge on the topic, and a sentence or two with each article describes its main findings or significance.

The authors describe the purpose of the bibliography as being twofold: "to give health workers an efficient overview of a broad subject, and to provide an entree to recent research."

> For further information please contact: UNICEF, Programme Publications, 3 UN Plaza, New York, NY 10017, USA.

V.E.

"The State of Breastfeeding in Ghana: Practices and Promotion"

(1993) by Adwoa Steel, Mary Ruth Homer, Charlotte Acquah and Comfort Agyekumwaa,

This well presented report (just over 100 pages) was commissioned by USAID to examine the state of art of breastfeeding in Ghana in order to identify those factors which support optimal breastfeeding practices as well as those which obstruct such practices. Drawing on existing studies and research the report is an excellent synthesis of young child health and nutrition in Ghana and as such serves as a valuable reference document.

The authors show that alarming problems exist in Ghana with current breastfeeding practices. Like many African countries the initiation of breastfeeding is near to universal (mean duration 20.4 months), however, at delivery it is rare for a baby to be put to the breast immediately. Colostrum is often discarded and breastfeeding may be delayed for days until a mother is sure that her milk has arrived. Based on an analysis of the 1988 Ghana Demographic Health Survey one striking finding was that only 2 percent of mothers exclusively breastfeed during the first 4 months because of the widespread belief amongst mothers and health workers that babies need to be given water for thirst. In this respect Ghana ranks one of the two lowest of 25 developing countries in which practices in exclusive breastfeeding have been examined. Another alarming finding was that nationally 52 percent of infants 0–3 months were bottlefed, with this figure being 46 percent in

rural areas.

The report concludes correctly that serious problems exist in Ghana with current breastfeeding knowledge, attitudes and practices. The authors present a well articulated social mobilisation and IEC strategy which is aimed at training health care providers to better support mothers to breastfeed successfully and motivate them to change inappropriate young child feeding practices. Some of the findings will be immediately incorporated into the USAID funded Ghana Family Planning and Health Project, whilst others will no doubt have wider application in regards to nutrition related policy and programme development.

(This publication is available from: MotherCare, John Snow Inc., 1616 North Fort Myer Drive, Arlington, Virginia, 22209, USA)

Victoria Quinn

"The Economic Rationale for Investing in Nutrition in Developing Countries"

(1992) by Jere Behrman, USAID, Washington, D.C.

Jere Behrman has been one of the most active scholars in the field of economics of nutrition and human capital in developing countries. This publication, which summarizes what is known about the economic contribution of good nutrition, is another of his important contributions to the understanding of this complex topic. Whenever governments invest in programs such as nutrition, the most commonly used rationale is that it is part of the effort to meet the basic needs of the population, or generally the equity considerations. However, there is an economic argument, though less understood, for investing in nutrition, as Behrman points out. That is, that better nutrition increases the productivity of populations.

The publication is devoted to the review of evidence of the direct and indirect productivity effects of good nutrition. He has divided the evidence between the experimental surveys – using carefully designed controls – and the socio–economic surveys.

Behrman concludes that these studies tend to show that the returns to nutrition are even higher than the returns to education, although most education programs tend to have been much more emphasized in the literature. For example, studies in control of iron deficiency anemia have shown extremely high benefit–cost ratios, although he questions the assumptions related to the benefit side of the calculations. Nonetheless, the question is the order of magnitude of the benefits.

The available evidence, although hardly perfect, suggests that in terms of growth and productivity as well as equity concerns, there maybe payoffs to better nutrition in poorer areas of the developing world.

If the economic productivity gains to households from better nutrition are extremely high, as the studies would argue, why aren't households investing in these foods? Is it due to lack of specific nutrition knowledge? Behrman concludes that governments have the likely comparative advantage in assuring adequate information about nutrition, its nature, and its effects, given the public goods aspect of the information.

This publication is an important contribution to the state of knowledge of the relationship between nutrition and productivity in developing countries.

(For further information please contact: Office of Nutrition, USAID, 320 21st Street, N.W., Washington, D.C., 20523, USA. Tel: 703 875 4074 Fax: 703 875 7483)

M.G.

Urban Nutrition in Developing Countries

The readership of the ACC/SCN Newsletter interested in either the investigative aspects of urban nutrition in developing countries, or in the programmatic and policy applications, may be interested in the recent publication of two compendiums on the topic that have resulted from a series of regional workshops sponsored over the past three years under the auspices of the IUNS Committee 1/3 on Urbanization and

Nutrition.

From September 11 to 14, 1991 at the Pertanian Malaysia University near Kuala Lumpur, the *First Asian Workshop on Nutrition in Metropolitan Areas* took place, with the participation of 60 professionals from throughout the Asian region. The December 1992 issue of the *South East Asian Journal of Tropical Medicine and Public Health,* Vol 23, Supplement 3, contains the 172 page proceedings of this event.

In Mexico City, the *Second Latin American Workshop on Nutrition in Urban Areas* was held from March 2 to 6, 1993 (see SCN News No.8). A 260−page Spanish/Portuguese−language compendium of the proceedings has been published as a supplement to the December 1993 issue of the *Latin American Archives of Nutrition* (Archivos Latinoamericanos de Nutricion), vol 42, No.4, Supplement. It is expected that an English version will shortly appear, as well.

From June 12−19, 1993, the *First Seminar−Workshop on Nutrition in Metropolitan Areas of Africa* with the participation of professionals from 24 francophone African countries was held in Cotonou, Benin. It is expected that the proceedings of this event will be published shortly in both French and English.

A number of academic and service entities − local and international − collaborated in the organization of these events. Funding for the publications came from donations from the German Agency for International Cooperation (GTZ) and the International Union of Nutritional Sciences (IUNS). Larger medical and scientific libraries should have the issues available shortly for reference. Both journals, moreover, are indexed by Index Medicus and individual citations may be accessed on Medline.

> If you would like to have a personal or institutional copy of the Proceedings, the supplement issue for the Asian Workshop can be ordered for the price of US$15, including mailing and handling, by writing to the Southeast Asian Journal of Tropical Medicine and Public Health, SEAMEO−TROPMED Network, 420/6 Rajvithi Road, Bangkok 10400, Thailand (tel +66 2 2457193; fax +66 2 2468340). The supplement issue for the Latin American Workshop can be ordered for a price of US$35, including mailing and handling, by writing to Dra. Claudia P. Sanchez−Castillo, Institute Nacional de la Nutricion Salvador Zubiran, Vasco de Quiroga 15, Tlalpan CP 14000, Mexico (tel +52 5 5731200; fax +525 6551076).

Contributed by Dr Rainer Gross,
SEAMEO−TROPMED − GTZ,
Community Nutrition Training Program,
University of Indonesia, 6,
Salemba Raya, PO Box 3852, Jakarta
10038, Indonesia.

NEVER EVER GIVE UP

Source: Department of Animal Husbandry, University of Sydney

Back Cover

UNITED NATIONS

ADMINISTRATIVE COMMITTEE ON COORDINATION – SUBCOMMITTEE ON NUTRITION (ACC/SCN)

The ACC/SCN is the focal point for harmonizing the policies and activities in nutrition of the United Nations system. The Administrative Committee on Coordination (ACC), which is comprised of the heads of the UN Agencies, recommended the establishment of the Subcommittee on Nutrition in 1977, following the World Food Conference (with particular reference to Resolution V on food and nutrition). This was approved by the Economic and Social Council of the UN (ECOSOC). The role of the SCN is to serve as a coordinating mechanism, for exchange of information and technical guidance, and to act dynamically to help the UN respond to nutritional problems.

The UN members of the SCN are FAO, IAEA, IFAD, ILO, UN, UNDP, UNEP, UNESCO, UNFPA, UNHCR, UNICEF, UNRISD, UNU, WFC, WFP, WHO and the World Bank. From the outset, representatives of bilateral donor agencies have participated actively in SCN activities. The SCN is assisted by the Advisory Group on Nutrition (AGN), with six to eight experienced individuals drawn from relevant disciplines and with wide geographical representation.

The Secretariat is hosted by WHO in Geneva.

The SCN undertakes a range of activities to meets its mandate. Annual meetings have representation from the concerned UN Agencies, from 10 to 20 donor agencies, the AGN, as well as invitees on specific topics;

these meetings begin with symposia on subjects of current importance for policy. The SCN brings certain such matters to the attention of the ACC. The SCN sponsors working groups on inter–sectoral and sector–specific topics.

The SCN compiles and disseminates information on nutrition, reflecting the shared views of the agencies concerned. Regular reports on the world nutrition situation are issued, and flows of external resources to address nutrition problems are assessed. State–of–the–Art papers are produced to summarize current knowledge on selected topics. SCN News is normally published twice a year. As decided by the Sub–Committee, initiatives are taken to promote coordinated activities – inter–agency programmes, meetings, publications – aimed at reducing malnutrition, primarily in developing countries.

Printed by The Lavenham Press Ltd., Lavenham, Suffolk, England.