

Micronutrients, Macro Impact: The story of vitamins and a hungry world





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Preface

**We cannot be successful,
nor can we even call ourselves successful,
if we live in a society that fails.**



Feike Sijbesma

This year marks the 25th anniversary of DSM's humanitarian initiative *Sight and Life* and also the 50th anniversary of the founding of the United Nations World Food Programme (WFP). Yet today, we are faced with the scourge of hunger and the prevalence of malnutrition. The number of people going to bed hungry every night has reached almost one billion people and maternal and child undernutrition is the underlying cause of 3.5 million deaths in children under five each year.

These are astonishing statistics by any stretch of the imagination. And we know that many people are suffering from hidden hunger when the food they eat does not have sufficient nutritional value. That is why filling empty bellies is no longer enough. We must ensure that we provide the right food at the right time to protect the minds and bodies of the most vulnerable.



Josette Sheeran

Micronutrients: Macro impact: the story of vitamins and a hungry world is being published at a time when no fewer than 2 billion people worldwide suffer from micronutrient malnutrition and face the physical and social – and therefore also the economic – consequences of that deprivation. This burden of knowledge compels us to act.

That is why Royal DSM NV and WFP have joined forces to form the “Improving Nutrition, Improving Lives” partnership, leveraging DSM's research and development into food fortification to increase the nutritional value of WFP's “food basket” through products such as micronutrient powders and fortified rice.

Since its launch in 1986, DSM's *Sight and Life* initiative has played a key role in these efforts. The organization has evolved from a Task Force providing Vitamin A to the victims of a civil war to a think-tank that plays an influential role in shaping the way the world thinks about nutrition security.

This book tells the story of that evolution, placing the development of *Sight and Life* in the wider context of the world's growing understanding of micronutrients and their potential for good. We thank everyone who has contributed to the *Sight and Life* story during the past quarter-century and wish the initiative every success on its chosen path to build bridges for better nutrition.

Feike Sijbesma

CEO and Chairman of the Managing Board
Royal DSM NV

Josette Sheeran

Executive Director
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01 The Battle Against Vitamin A Deficiency

From scurvy to vitamin C



Jacques Cartier

The winter of 1536 was an unforgettably bitter one for the French explorer Jacques Cartier and his 61-strong crew of sailors. In search of fabled lands rich in precious metals and spices, they had crossed the Atlantic Ocean and were exploring the St Lawrence River in what is today Canada. The harshness of the Canadian winter took them completely by surprise, however: holed up near Quebec, tormented by the cold and without adequate provisions of food, they began to succumb to disease. Their gums swelled and bled; their teeth grew loose; their joints became stiff and sore; and their bodies became covered with suppurating wounds. They were afflicted by the ancient enemy of mariners worldwide – scurvy.

Scorbutus, to give the disease its Latin name, is one of the oldest nutritional disorders known to humankind. It is caused by a dietary lack of vitamin C. Twenty-five of Cartier's men were to die of the disease before the local Iroquois, with whom the French explorer had established friendly relations, intervened to help. They showed Cartier how to boil the needles of the indigenous Eastern White Cedar to make a medicinal tea. This drink was to save the majority of the expedition. Only much later was this natural remedy proven to contain 50 mg of vitamin C per 100 g.



James Lind

More than two centuries were to elapse between that bitter winter on the St Lawrence River and the dissemination of a scientific theory linking nutritional intake to the prevention of scurvy. That work was the brainchild of James Lind, a Scottish surgeon in the British Royal Navy. Lind was not the first person to note a link between the consumption of citrus fruit and the prevention of scurvy, but he was the first to prove it. More than this, he proved it by means of the world's first ever controlled experiment. As he records in his 1753 *Treatise on the Scurvy*, Lind provided certain sailors on a voyage undertaken in 1747 with two oranges and one lemon per day in addition to their normal rations. Other groups were given cider, vinegar, sulfuric acid or seawater to drink. The results clearly demonstrated that eating citrus fruit prevented scurvy. By 1795, the British Navy had adopted lemons and limes as a standard feature of their rations at sea, prompting Americans to nickname British sailors, and all Britons by extension, 'Limeys.'

It was not until the twentieth century, however, that the concept of vitamins was developed. The very term 'vitamin' was a neologism, in fact – the product of the research of the Polish-American biochemist Casimir Funk,

who in 1912 coined the term to refer to the non-mineral micronutrients which are essential to health. Believing that all these micronutrients were amines, and perceiving their biochemical activity as vital, he named them 'vitamines'. This name was later changed to 'vitamins'.

Human beings will develop scurvy if their diet lacks vitamin C, which is required for the synthesis of the group of proteins known collectively as collagen. Most other animals, by contrast, are capable of synthesizing their own vitamin C. The distinction of discovering vitamin C was not to fall to Funk, however. In 1907 the Norwegian biochemists Axel Holst and Alfred Fröhlich demonstrated that a condition similar to scurvy could be produced in the guinea pig by eliminating the intake of certain foods – and, even more significantly, that it could be cured by feeding the animals cabbage.



Albert
Szent-Györgyi

This realization triggered a search for a specific anti-scurvy nutrient. Between 1928 and 1933, two separate teams of researchers – one led by Albert Szent-Györgyi in Hungary, the other by Charles G King in the United States – succeeded in identifying a naturally occurring antiscorbutic substance. First located in the adrenal glands of animals, this substance was later found also to be present in paprika peppers. It became known as ascorbic acid on account of its ability to prevent scurvy or *scorbutus*. And, although not in fact an amine, it was given the alternative name 'vitamin C'. The discovery led Albert Szent-Györgyi to receive the 1937 Nobel Prize for Medicine.



Tadeusz Reichstein

Industrial synthesis of this naturally occurring nutrient followed hard on the heels of its identification in the laboratory. Between 1933 and 1934, the British chemists Sir Walter Norman Haworth and Sir Edmund Hirst, and the Polish chemist Tadeusz Reichstein, acting independently of each other, succeeded in synthesizing vitamin C. Haworth was the first to do this, and was to win the 1937 Nobel Prize for chemistry in recognition of this achievement. It was Reichstein's process, however – which derived the vitamin from glucose using the action of the fruit fly (*Drosophila melanogaster*) – that was to make large-scale vitamin manufacture a practical possibility.

The Swiss pharmaceutical company Hoffmann-La Roche used Reichstein's process to manufacture synthetic vitamin C from 1934 onwards. Branded 'Redoxon', these tablets – a mixture of the water-soluble vitamin C and the carrier sodium bicarbonate – are still available in the shops. Hoffmann-La Roche was to pioneer the industrial manufacture of many other vitamins, including the one with which *Sight and Life* has always been most closely associated: vitamin A.

What is a vitamin?

Vitamins are organic nutrients which are essential for life. The human body requires very small amounts of these nutrients to ensure normal metabolism, growth and physical well-being. Most vitamins are not made in the body, or only in insufficient amounts to meet our needs. They therefore have to be obtained primarily through the food we eat.

Vitamins are classed as micronutrients, and are present in food in minute quantities compared to the macronutrients protein, carbohydrates and fat. In industrialized countries, the average adult eats approximately 600 g of food per day on a dry-weight basis, of which less than 1 g consists of vitamins.



Casimir Funk

Each of the 13 vitamins known today has specific functions in the body, which makes each of them unique and irreplaceable. No single food contains the full range of vitamins, and inadequate vitamin intake results in vitamin deficiency disorders. A balanced and varied diet is therefore vital to meet the body's vitamin requirements.

Of the 13 known vitamins, four are fat-soluble, namely vitamins A, D, E and K. The others are water-soluble: vitamin C and the B-complex, consisting of vitamins B₁, B₂, B₆, B₁₂, niacin, folic acid, biotin and pantothenic acid.

The history of vitamins

Vitamin	Alternative name	Discovery	Isolation	Structure	Synthesis
Vitamin A	Retinol	1909	1931	1931	1947
Provitamin A	β-carotene	1831	1831	1930	1950
Vitamin D	Calciferol	1918	1932	1936	1959
Vitamin E	Tocopherol	1922	1936	1938	1938
Vitamin K	Phylloquinone	1929	1939	1939	1939
Vitamin B ₁	Thiamine	1897	1926	1936	1936
Vitamin B ₂	Riboflavin	1920	1933	1935	1935
Vitamin B ₃	Niacin	1936	1936	1937	1994
Vitamin B ₅	Pantothenic acid	1931	1938	1940	1940
Vitamin B ₆	Pyridoxine	1934	1938	1938	1939
Vitamin B ₇	Biotin	1931	1935	1942	1943
Vitamin B ₉	Folic acid	1941	1941	1946	1946
Vitamin B ₁₂	Cobalamin	1926	1948	1956	1972
Vitamin C	Ascorbic acid	1912	1928	1933	1933

Figures in black are water-soluble. Other vitamins are fat-soluble.

How the vitamins got their names

The first vitamin to be named was vitamin A. The use of the letter A was the brainchild of the American biochemist Elmer McCollum. He rejected Casimir Funk's term 'vitamin' in favor of 'Unidentified dietary factor fat-soluble A' because the substance discovered by McCollum did not contain nitrogen (amines are organic compounds derived from ammonia, and always contain nitrogen).

In 1921, the British biochemist Sir Jack Cecil Drummond suggested combining the use of letters of the alphabet with the term 'vitamin' to denote a range of related organic micronutrients. These micronutrients consequently became known as vitamins A, B, C and so on.



Sir Jack C Drummond

The eight water-soluble B vitamins were originally thought to be a single substance, but were subsequently found to be chemically distinct from one another, which is why they are differentiated by means of suffixed numbers – B₁, B₂ and so forth.

Vitamin A – The vitamin of sight

Industrial synthesis of vitamin A first occurred thirteen years after Hoffmann-La Roche had commenced the commercial manufacture of vitamin C. Unlike vitamin C, which is water-soluble and cannot be stored by the body, vitamin A is a fat-soluble alcohol and is stored by the liver. It is also known as retinol. The two vitamins share in common, however, the characteristic that – like most of the 13 major vitamins – they cannot be synthesized in the human body and must be derived from the diet.



Vitamin A
manufacture in the
early days

An association between eating liver and the prevention of night blindness was known even in Ancient Egyptian times, but vitamin A was not identified as such until 1913. The discovery was the work of the American biochemist Elmer McCollum and his colleague Marguerite Davis, who ascertained that butter fat and cod liver oil contained a fat-soluble nutrient. They were unable to identify its chemical structure, however.

It took the best part of two decades for this breakthrough to occur. The discovery fell to Paul Karrer, a Swiss biochemist whose work on plant pigments not only elucidated the chemical structure of carotenoids but also showed that some of these substances are transformed in the bodies of animals into vitamin A. Carotenoids were identified as early as 1831 by the German analytical chemist Heinrich Wilhelm Ferdinand Wackenroder, who found β -carotene to be present in the roots of carrots and consequently named the substance 'carotin'. Many forms of carotenoids exist in nature, but none of them can be synthesized by humans. They can therefore only be made available to the body via the consumption of particular types of food.



Paul Karrer

In 1930, Karrer elucidated the chemical structure for β -carotene, the chief precursor of vitamin A. This step made possible the identification of the chemical structure of vitamin A a year later – an achievement for which Karrer was awarded the 1937 Nobel Prize for Chemistry co-jointly with none other than Sir Walter Norman Haworth, who had been the first person to synthesize vitamin C chemically.

Vitamin A may be consumed directly as retinol in the form of a diet rich in liver, for instance, or it may be produced within the body by consuming the provitamin β -carotene, which occurs not only in carrots but also in a wide range of fruit and vegetables displaying the yellow to red color spectrum as well as in dark green leafy vegetables. In either instance, appropriate dietary intake is the precondition of healthy eyesight. A diet lacking in vitamin A will lead to, amongst other things, night blindness – the inability to see in dim light. If left untreated, night blindness can cause xerophthalmia. Meaning 'dry eyes' in Greek, xerophthalmia is a medical condition in which the eye fails to produce tears. If it goes untreated, it can trigger the ulceration of the cornea, the clear structure overlaying the iris, or colored part of the eye. The ultimate consequence of this condition is blindness. The link between vitamin A and sight is intimate.

**What is
 β -carotene?**

β -carotene is one of more than 600 carotenoids known to exist in nature. About 50 of the naturally occurring carotenoids can potentially yield vitamin A; they are thus referred to as provitamin A-carotenoids. The term 'provitamin' denotes a substance which is converted into a vitamin within an organism.

β -carotene is the most abundant and most efficient carotenoid in our foods. It has antioxidant properties that help neutralize free radicals – reactive and highly energized molecules which are formed either through certain normal biochemical reactions in the body (e.g., the immune response), or else through external sources such as air pollution or cigarette smoke. Free radicals can damage lipids in cell membranes as well as the genetic material in cells, and the resulting damage may lead to the development of cancer.

β -carotene is the main dietary source of vitamin A. The best sources of β -carotene are yellow/orange vegetables and fruit and dark green leafy vegetables. The β -carotene content of fruit and vegetables varies according to the season and degree of ripening.

**Otto Isler**

Otto Isler, a biochemist who worked for Hoffmann-La Roche, was the first person to synthesize vitamin A. Before 1945, the synthesis of vitamin A was not considered technically feasible, despite the fact that the chemical structure of vitamin A had been known since 1931. Otto Isler, however, who had a profound interest in the chemistry of natural compounds, undertook on his own initiative to try to find a way of synthesizing the vitamin.

Passionate in his search, Isler managed to convince his superiors within the company to fund major research into a potential synthetic route for producing vitamin A. Supported by a powerful team, he created a process whose main step is the Grignard reaction – an organometallic chemical reaction discovered by the French chemist François Auguste Victor Grignard, who was awarded the 1912 Nobel Prize for Chemistry in recognition of this achievement. The chemical process created by Isler and his team is still in use today at the manufacturing plant in Sisseln near Basel, Switzerland. The Sisseln plant formed part of Roche's Vitamins & Fine Chemicals Division, which was acquired by the Netherlands-based life sciences and materials sciences company Royal DSM N.V. in 2003.

**Victor Grignard**

First piloted in 1947, Isler's vitamin A manufacturing process was so successful that regular production commenced in 1948 with a targeted yield of 10 kg per month. Only a few months later, however, this target had to be revised upwards to 50 kg per month, and demand for synthetic vitamin A only increased thereafter. Isler and his team became responsible for continuously optimizing their pioneering process.

A decade and a half after pioneering the industrial manufacture of vitamin C, the chemists of Hoffmann-La Roche were leading the world again. Vitamin A, which they succeeded in synthesizing against all expectation, was to have a transformational effect on the lives of countless people around the world. But for this to happen, the humanitarian initiative *Sight and Life* had to be called into existence.

The creation of *Sight and Life*



Undernourished child, Ethiopia in the mid 1980s

In 1984–1985 famine struck the inhabitants of Ethiopia and what is today Eritrea. The effects of poor harvests (the result of record low rainfalls) were exacerbated by the horrors of war, as the Eritrean People's Liberation Front and other Ethiopian rebel groups sought to break away from the Marxist Ethiopian regime, the Dergue. The magnitude of the calamity, which claimed the lives of hundreds of thousands and left millions more destitute, was extensively publicized. It stimulated a powerful response in the form of the multi-venue Live Aid concert of July 13, 1985, in which musicians led by Bob Geldof raised \$100 million of relief funds for the stricken country.

Roche was also quick to respond. As the pioneer of the chemical synthesis of vitamin A, the company well understood the link between malnutrition and eye disorders, and grasped how quickly hunger might trigger widespread nutrition-related blindness in the populations exposed to the devastation of the war and famine. The company therefore made available, free of charge, the oily vitamin A solution necessary for the manufacture of 2.5 million vitamin A capsules. Dispensed widely in the famine-stricken region, these capsules saved thousands of children from the immediate threat of nutrition-related blindness.

Although the most dramatic humanitarian intervention in the company's history, it was not Roche's first attempt to use proprietary knowledge to meet the needs of a hungry world. At the end of the 1960s, the company had participated in a program in Central America to fortify sugar, an important staple food in the region, by adding vitamin A to liquid sugar and then drying the liquid back to a crystalline state. This involved making available application forms and mixing methods that would guarantee the homogenous distribution of the vitamin A in a stable form in sugar. Conducted under the umbrella of the World Health Organization (WHO), this program was highly successful, particularly in Guatemala. As Dr Hafdan Mahler, the then General Director of WHO, was to observe, "We know what strategies work. We must build on this experience by strengthening the current programs and introducing new ones – until all countries in which vitamin A insufficiency is a significant health problem are covered."



A girl with xerophthalmia, Indonesia

The 37th World Health Assembly decided in 1984 on a program to combat xerophthalmia. As a short-term measure, it envisaged the periodic or spontaneous provision of high-dose vitamin A preparations to particularly vulnerable populations. In the medium term, the fortification of suitable staple foods with vitamin A was envisaged, and in the long term the encouragement of increased farming and consumption of foods rich in vitamin A. It was within this conceptual framework that the "Task Force *Sight and Life*" – as it was initially known – was called into being.

In announcing this undertaking in its 1985 Annual Report, Roche wrote: "Naturally the solution of the entire problem far exceeds the scope of any individual company. This recognition nevertheless does not take away the obligation not only to provide help in situations of special need but also to try to improve the general situation by means of ideas, support and cooperation. For this reason, the Roche Task Force *Sight and Life* was created: it will initially systemize and intensify this activity within the framework of a three-year program. This covers the years 1986–1988. The budget will be approved for each year by the company management and then translated into a detailed working program."

“The specialist knowledge available to us and the contacts which we have had for years with influential international and private organizations such as WHO, United Nations International Children’s Emergency Fund (UNICEF), Helen Keller International (HKI) and the International Eye Foundation (IEF),” the report continued, “put Roche in a position to make an effective contribution to solving this urgent health problem. The *Sight and Life* project was conceived in consultation with the aforementioned institutions. It is not Roche’s intention to develop new activities in parallel to already-running projects. Rather, worthwhile existing projects which are supported by the authorities should be encouraged. For the first stage, projects in Bangladesh, Honduras, India, Indonesia, Malawi and in the Philippines have been selected. In addition to this, a reserve fund for use in absolute emergency situations has also been allocated within the budget.”

The initial commitment covered the following three areas:

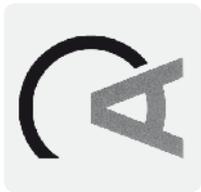
- › The provision of scientific and technical support;
- › The provision of vitamin A in suitable forms either at reduced cost or else free of charge during the introductory phase of public programs and also in emergency situations;
- › The provision of financial support to research development and training programs.

The Task Force *Sight and Life* was composed of representatives from Roche’s Vitamins and Pharmaceuticals divisions. These included doctors of medicine, nutrition specialists and researchers from other disciplines as well as communication specialists.

Its initial President was Dr Werner Hausherr, while Dr John Gmünder assumed the role of Secretary General. A press release announcing the creation of the task force conveys the idealism of the group’s initial members, who defined their objectives and approach as follows:

***Sight and Life* has set the following goals for its activities:**

- › The number of children in the developing countries who become blind as a result of the lack of vitamin A must swiftly be reduced by means of comprehensive and targeted actions. This means that in the medium and long term, the death rates of children in the Third World can be significantly reduced.
- › In its activities, the task force is as un-bureaucratic as possible so that the available scientific and technical know-how and the financial means are used as efficiently as possible. Whenever possible therefore, the task force dispenses with creating new structures and concentrates on the collaboration with internationally active organizations – WHO, HKI, the IEF and others – which for their part in turn work together with the responsible national, regional and local authorities.
- › Besides this, the task force sets particular store by making the populations of the industrial countries aware of the problem of inadequate vitamin A provision in the developing countries and thus encouraging further organizations and companies to support concrete measures in the fight against the blinding of countless children in the Third World.



The original
Sight and Life logo

Interviewed for the *Roche Internal Newsletter* in 1986, Dr John Gmünder explained in detail what the task force *Sight and Life* was attempting to achieve. “The logo that we have created gives a clear indication of our purpose,” he said. “The stylized eye with the horizontally positioned A points to the shocking fact that every year hundreds of thousands of small children in developing countries become blind as a consequence of acute lack of vitamin A and die as a result. ... Of course there are blind people in our latitudes, but more than three quarters

of all blind people live in developing countries. These amount to – taking blind children and adults together – approximately 35 million people, which is to say almost 1% of the population of the Third World. This figure indicates the shocking dimensions of this suffering.”



John Gmünder

“The frequency of blindness is 10 – 40% higher in developing countries than in industrial countries,” Dr Gmünder continued. “In our regions of the world, the loss of eyesight is generally related to advancing age or else is the result of injury; in the developing countries by contrast, people become blind above all because they suffer an acute lack of vitamin A, because they develop inflammatory infections as a consequence of inadequate hygiene, or because they are subject to parasitic diseases, for instance ochoceriasis, which is known as river blindness. The condition of the eye triggered by lack of vitamin A is called xerophthalmia. Approximately 10 million children in the developing world suffer from this affliction. And the WHO puts the figure of children becoming newly blind every year at half a million. Experience shows that more than two thirds of these children with conditions of the eye die within a few weeks of becoming blind. This has to do with the fact that lack of vitamin A is usually associated with a general deficit in nutrition and a lowered resistance to infectious diseases, but it also frequently has to do with the fact that blinded small children are often ostracized by their families. Lack of vitamin A is, however, as we today know, the major cause of the blinding of small children in large areas of Asia, Africa, Latin America, the near East and the West Pacific.”

Dr Gmünder’s analysis was confirmed by Dr Alfred Sommer, working at that time at the International Center for Epidemiologic and Preventive Ophthalmology (ICEPO), who was quoted in the same publication as saying: “Increasing the provision of vitamin A should in practical terms be the most effective measure to improve the chances of survival of small children in developing countries.”

A quarter of a century of *Sight and Life*



The Kubus building,
Kaiseraugst –
Sight and Life’s home
at the HQ of DSM
Nutritional Products
in Switzerland

What needs to be appreciated from today’s perspective, 25 years after the founding of *Sight and Life*, is that the chemical synthesis of vitamin A was a still relatively recent breakthrough at the time, and that the link between lack of vitamin A, xerophthalmia and child death was the result of even more recent research. Dr Gmünder explained this when interviewed a year into the existence of the Task Force *Sight and Life*: “Roche’s first contribution to the improvement of vitamin A provision was the development of the process for the fully synthetic industrial production of vitamin A. This prodigious scientific achievement was the work of Dr Otto Isler precisely 40 years ago, in 1946. This meant that this chemically complex natural ingredient, which is essential for life, was in principle made available to an unlimited extent and at low cost. First to profit was initially the population of the Western Hemisphere, who had the opportunity to supplement their vitamin A provision by taking vitamin A preparations or by consuming foods fortified with vitamin A. Margarine and cooking oils are often fortified in this manner. To meet the vitamin A requirements of large populations in countries of the Third World, however, different methods must be developed which are tailored to the individual situations.” He went on to point out that Roche had been producing vitamin A in one of its own factories in India since 1962. The vitamin A was given to children in the form of a standardized oily solution or else incorporated into cooking oils.

Originally conceived as a three-year initiative, *Sight and Life* commemorated 25 years of service to science and humanity in 2011. In almost a quarter-century *Sight and Life* was to evolve into a humanitarian initiative that

would make donations totaling \$36 million (US), support nearly 3,350 projects in more than 80 countries and donate more than 80 million vitamin A capsules, mainly for children aged six months to five years (based on *Sight and Life's* Annual Report 2009). No longer a temporary task force, but an established operation with a key role to play in the field of micronutrients, *Sight and Life* in its lifetime has forged major partnerships with:

- › Biomarkers of Nutrition for Development (BOND);
- › Christoffel Blindenmission (CBM);
- › Flour Fortification Initiative (FFI);
- › Global Alliance for Improved Nutrition (GAIN);
- › Groupe de Recherche et d'Echanges Technologiques (GRET);
- › Helen Keller International (HKI);
- › International Association for the Prevention of Blindness (IAPB);
- › Johns Hopkins University (JHU);
- › Mahidol University;
- › Micronutrient Forum (MNF);
- › Micronutrient Initiative (MI);
- › National Institute of Nutrition (NIN);
- › Northwest University;
- › Save the Children;
- › Swiss Federal Institute of Technology (ETH);
- › Swiss Red Cross (SRK);
- › Tufts University;
- › United Nations International Children's Emergency Fund (UNICEF);
- › Vitamin Angels;
- › World Food Programme (WFP);
- › World Health Organization (WHO).



The Helen Keller Award

Sight and Life has received, among many other awards, the 1991 HKI Spirit of Helen Keller Award in recognition of its work towards the eradication of vitamin A deficiency in developing countries, and the 2003 IVACG Award for 15 years of contributions to Global Vitamin A Deficiency and Control.

Dr Werner Hausherr, *Sight and Life's* President from 1986–1989, was succeeded by Dr Guido Richterich (Member, F. Hoffmann-La Roche Executive Committee, President *Sight and Life* 1989–1993), Andres F Leuenberger (Deputy Chairman, F. Hoffmann-La Roche Executive Committee, President *Sight and Life* 1993–2003), Feike Sijbesma (Member and subsequently Chairman of the Managing Board of DSM, President *Sight and Life* 2003–2008) and Stephan Tanda (Member of the Managing Board of DSM, Chairman *Sight and Life* 2008 to the present). The role of Secretary General was occupied by Dr John Gmünder from 1986 to 1994, passing then to Dr Martin Frigg (1994–2005) and then to Dr Klaus Kraemer as Director (2005 to the present).

These facts and figures tell only a tiny fraction of the *Sight and Life* story, however, which is of a 25-year journey that has touched the lives of millions. This book tells the story of that journey – of the road *Sight and Life* took, of the companions the organization met along the way, and of the many discoveries it made during that first quarter-century of its existence.

Growing
the evidence
base for
micronutrients.

02 From Vitamin A to Micronutrients

From foundation to a Helen Keller International Award



Helen Keller

The *Sight and Life* Task Force commenced operations on 1 April 1986. Its objective was to help combat xerophthalmia – an eye disease caused by vitamin A deficiency from which approximately 10 million children in the developing world suffered at the time. The 1986 *Sight and Life* Annual Report estimated that every year, one million of these children lost their sight. Of these, it noted that two thirds died after a short period.

An active response to requests from the WHO, which in 1985 launched a ten-year program to fight against nutrition-related blindness, the creation of *Sight and Life* was part of the wider move to tackle vitamin A deficiency, which had been identified by the 37th World Health Assembly as one of the five main nutritional problems in the world. The WHO set a budget of \$25 million and targeted 60 countries in Africa, South-East Asia and Latin America. The initiative was supported by a wide range of international bodies and non-governmental organizations. Speaking for *Sight and Life* at the time, Dr Fritz Gerber, the then acting chairman of Roche, said: “Roche recognizes its responsibility as part of an open and free society and will contribute to solutions for health and nutrition problems in the Third World.”

The initial activities of *Sight and Life* included the provision of scientific and technical advice, free distribution of vitamin A capsules in emergencies, and financial support for selected research programs. The Task Force was active only in those countries which were classified as problem areas by the WHO, and where the projects were supported by the local health authorities. From the outset, the approach of *Sight and Life* was collaborative, and agreements on coordinating efforts in the worldwide fight against xerophthalmia were made with a wide number of organizations, including HKI, the IEF, the ICEPO, the International Agency for the Prevention of Blindness (IAPB), the International Vitamin A Consultative Group (IVACG), and the WHO. Local organizations for the blind, private charities with an interest in the prevention of blindness and local health services were also important partners.

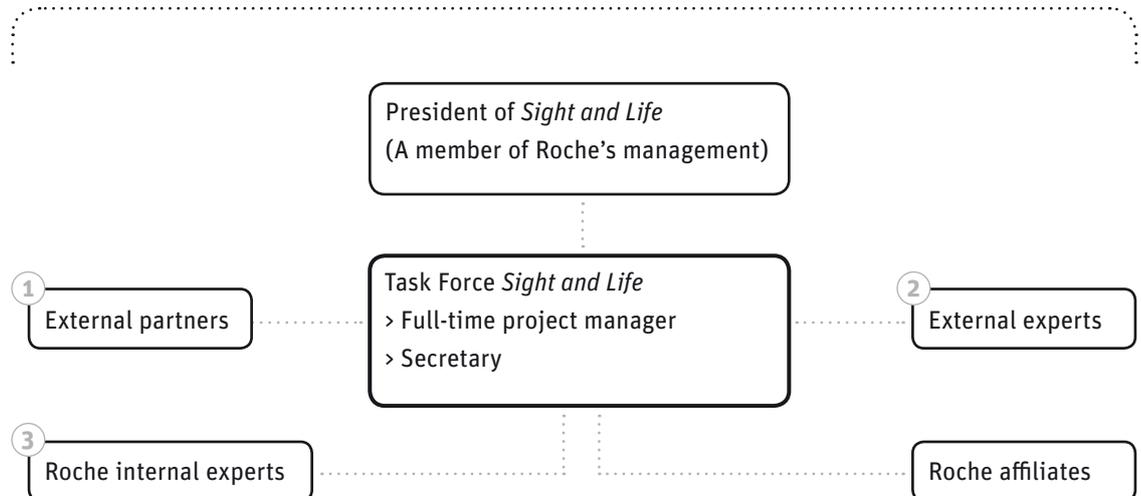


Dosing with
vitamin A, Ethiopia

The Task Force acted in accordance with a clear set of principles:

- > To have no commercial intentions whatsoever;
- > To operate on purely humanitarian grounds;
- > To limit its activities to countries where xerophthalmia was recognized as a public health problem;
- > To cooperate with established organizations;
- > To aim to become a serious and reliable source of assistance to its partners;
- > To provide Roche vitamin A capsules where feasible;
- > To provide financial support to selected projects in research, social marketing and education;
- > To engage in information activities such as the publication of brochures and a newsletter, and the organization of video conferences;
- > To establish and strengthen personal relationships within the vitamin A community;
- > To stay out of politics.

The initial structure of the Task Force *Sight and Life*



① External partners:

- > WHO, UNICEF, NGOs (HKI, IEF, SRC, CBM, IAPB, ICEPO)
- > Local organizations for the blind
- > Local health services (health centers, flying doctors)

② External experts:

- > Scientists from WHO, universities

③ Internal experts:

- > Scientists from the former Roche Vitamin Division's
 - > Research Department
 - > Pharmaceutical Department
 - > Technical Department

Dr. John Gmünder, the first Secretary General of *Sight and Life*, recalls the challenges which the Task Force had to confront in its fledgling years: “It was crucial for us to establish strong partnerships with other organizations similarly committed to the fight against xerophthalmia. At the same time, we had to define the areas in which we were going to act – vitamin A capsule distribution, research, education and information. The first batches of capsules had to be produced, put through quality control, packaged and labeled while we simultaneously prepared a great deal of promotional and educational material and a wide range of communication activities. We participated actively in education and training events, and of course we had to create our own organization and ensure that it was working efficiently. So there was a lot to be doing in the early days. We needed to prove to the vitamin A community that we were a serious partner, offering valuable help in a reliable manner. We never lost sight of that objective.”

How *Sight and Life* got its name



Alfred Sommer

“Roche had decided to make a formal commitment to the battle against vitamin A deficiency, building on the ad hoc interventions it had already been supporting for a number of years,” recalls Dr Alfred Sommer, Dean Emeritus, Johns Hopkins Bloomberg School of Public Health.

“Dr John Gmünder would drop by from time to time to discuss this undertaking and seek advice as to where Roche should be focusing its efforts. We at Bloomberg were aware at the time that vitamin A had a huge influence on physical and mental well-being. The link had not yet been proven, however, and the rest of the world seemed reluctant to accept the theory.

“One day John told me that Roche had decided to sponsor a new organization called *Sight or Life* – the implication being that if you couldn’t see, you weren’t living. I felt, however, that this sent too negative a message, and that it might be construed as offensive by people who were blind and lived very full lives. I therefore suggested calling the new organization *Sight and Life*, because vitamin A is important for sight specifically but also for life in general. This little change gave the Task Force a very positive name, and one which was intimately associated with vitamin A.”

Over the years the name has proved itself. Research has come to show that vitamin A not only plays many vitally important roles beyond its effect on sight, but is also critical to life.

Initially set up for a three-year period in response to a famine and war which had shocked the world, *Sight and Life* was to look back on its initial period “with much confidence and optimism,” according to its 1988 Annual Report. “Worldwide efforts to improve vitamin A nutrition in developing countries are gaining momentum and vitamin A is increasingly valued as an important element in child survival strategies.”

During the three years from 1986 to 1988, *Sight and Life* supported a total of 52 projects in 29 countries, reaching over two million children. The Task Force described its activities as being to run vitamin A intervention programs (capsules; liquid vitamin A; food fortification), to assess and monitor the vitamin A status of children, to give financial support to selected research projects, and to provide training in the detection, treatment and prevention of xerophthalmia. The success of its efforts was measured by the number of children reached in intervention programs, the decline in the incidence of xerophthalmia, the number of countries, projects and

conferences with which the Task Force was actively involved, and the feedback provided by partners within the vitamin A community.

Even at this early stage of its existence, *Sight and Life's* experience in the field made it necessary to adapt its initial focus and approach. Thus the following amendments to existing treatment policies were listed in the 1989 Annual Report as being of great importance:

“1. In addition to use for xerophthalmia prevention and treatment, vitamin A is now also recommended for high-risk children suffering from severe infections, prolonged diarrhea or general malnutrition.

2. Furthermore, in an effort to safeguard young children of refugee families against the acute risk of blindness, the UN High Commissioner for Refugees has instructed that high doses of vitamin A should be administered immediately to all young children at the time of registration, with an extra dose to be given to those showing symptoms of xerophthalmia.

3. The WHO recommends using the services of the Expanded Programme on Immunization (which reaches 50% of the world's children) to deliver vitamin A to target groups in high risk areas.

4. Finally, the WHO, in its 1968 Essential Drug List, has included besides the standard vitamin A capsules (200,000 IU) also an oral oily solution (100,000 IU/mL) and sugar-coated tablets (10,000 IU).”



The Helen Keller International Award, “La Pleureuse”

Nevertheless by 1991, according to the *Sight and Life* Annual Report of that year, in some 37 countries, as many as 50 million children under five were suffering some degree of vitamin A deficiency. The weakening of the body's natural defenses associated with vitamin A deficiency exposed these children to increased risk from infectious diseases such as measles, diarrhea or respiratory tract infections. More than half a million new cases of child blindness were reported annually, most of these due to vitamin A deficiency. Not that *Sight and Life* had reduced the scale of its support: on the contrary, the number of its intervention projects had risen from the 1988 figure of 52 to 91, and the Task force was additionally supporting 38 research projects and 6 training and education projects.



Sight and Life is awarded La Pleureuse

The value of the Task Force's efforts was recognized in 1991 by the presentation of the prestigious HKI Award at the United Nations (UN) in New York, followed by a congressional reception at the US Capitol in Washington. The honor was shared with two distinguished Latin American ophthalmologists, Dr Francisco Contreras, Director General, Instituto Nacional de Oftalmologia, Peru, and Dr Newton Kara-José, Director of the Blindness Programme at the University of Campinas, Brazil. The two gatherings offered a unique opportunity not only to focus public attention on the worldwide problem of preventable blindness but also to commemorate Helen Keller's lifelong humanitarian crusade for the blind as well as her role as founder of HKI.

Helen Keller and George Kessler

HKI traces its history to the life's work of two extraordinary individuals, Helen Keller and George Kessler. Helen Keller was the first deaf and blind person to earn a Bachelor of Arts degree. She was taught to communicate by Anne Sullivan, a visually impaired former student of the Perkins Institute of the Blind in South Boston. Their relationship was immortalized in the play *The Miracle Worker* by William Gibson, which was turned into a film in 1962. Helen Keller became well known as a pacifist author, political activist and lecturer who campaigned on a range of progressive issues, including women's suffrage.

George Kessler was a wealthy New York merchant who survived the sinking of the *Lusitania* in 1915. While recovering in London, he resolved to devote his remaining years to helping soldiers blinded in combat. With the support of the then 35-year-old Helen Keller, George and his wife Cora Parsons founded the Permanent Blind Relief War Fund for Soldiers & Sailors of the Allies in New York in 1915. This organization was to become in due course HKI.

Source: www.hki.org, 2010

Helen Keller International at a glance

Founded in 1915, Helen Keller International (HKI) is among the oldest nonprofit organizations devoted to preventing blindness and reducing malnutrition. Headquartered in New York City, HKI works in 22 countries: 13 in Africa, eight in Asia, and the United States.

HKI builds local capacity to combat blindness and malnutrition by establishing low cost, sustainable programs. It also provides scientific and technical assistance, as well as invaluable research and data, to governments and international, regional, national and local organizations around the world to help expand current approaches and develop effective new approaches.

Mission

HKI's mission is to save the sight and lives of the most vulnerable and disadvantaged. It combats the causes and consequences of blindness and malnutrition by establishing programs based on evidence and research in vision, health and nutrition.

Vision

HKI envisions a world where ...

- > No one suffers from preventable or treatable blindness or low vision;
- > No one suffers from undernutrition; and
- > Fewer people suffer loss of their productive years due to disability and premature death.

Source: www.hki.org, 2010

**Example
intervention:
Vitamin A
Child Survival
Project
in Nepal**



Mother with child,
Nepal



Bitot's spots

The Vitamin A Child Survival Project in Nepal was a large-scale social intervention study with three major components reflecting divergent opinions on the appropriateness of different strategies relevant to the establishment of a national vitamin A deficiency control program in Nepal.

The three major project components were:

- > Semi-annual distribution of high-dose vitamin A capsules;
- > Provision of high-dose vitamin A capsules plus basic primary health care services (immunization, de-worming, acute respiratory infections, oral rehydration therapy);
- > Provision of basic primary health care services plus nutrition education of mothers on the signs and symptoms of vitamin A deficiency and the dietary sources of vitamin A, but no capsule distribution program.

65,000 children aged six months to 10 years from seven districts of Nepal were enrolled in the study, which started in late 1988 and was concluded in June 1992.

The Vitamin A Child Survival Project was run under the auspices of Nepal Netra Jyoti Sangh and responsibility for program development, implementation and evaluation was shared with the University of Michigan, USA. While some of the consultants and support staff came from the university's Department of Population and International Health, the majority of the project team (about 140 people) was recruited from the Ministry of Health of Nepal, the King Mahendra Eye Hospital in Bharatpur and the local communities involved in the project. The vitamin A capsules required by the project were supplied by *Sight and Life*.

The project results clearly demonstrated that large-scale vitamin A control programs are feasible in Nepal and, by utilizing village volunteers, can easily be integrated into the existing primary health-care system without additional salary costs for the government.

Nutrition education, potentially a very powerful means of controlling vitamin A deficiency, was found to be the most expensive and most difficult approach. The capsule distribution approach was the cheapest alternative, with immediate results and high coverage rates. A well-motivated community health worker can contribute tremendously to high participation rates in capsule distribution programs, which, for many areas of Nepal, are the intervention of choice.

However, in areas where the risk of Bitot's spots¹ and the levels of wasting are high, the implementation of more extensive vitamin A deficiency control programs which also focus on maternal literacy, nutrition education, and food security is recommended.

Another interesting finding was the fact that the risk of xerophthalmia was higher in the age group of five to 10-year-olds than among children less than five years of age, and it was, therefore, recommended that the vitamin A distribution program be expanded to include children aged five to 10 years.

Source: *Sight and Life Annual Report 1992*

¹Bitot's spots are the buildup of keratin debris located superficially in the conjunctiva, which are oval, triangular, or irregular in shape. These spots are a sign of vitamin A deficiency and are associated with conjunctival xerosis. Bitot's spots are superficial, foamy gray spots on the white of the eyeball.

***Sight and Life's* early achievements**

Sight and Life's first Secretary General, Dr John Gmünder, stepped down in 1994. By this time the organization had provided 16 million doses of vitamin A in either liquid or capsule form to 159 different intervention projects in 52 countries. Reflecting in 2010 on its early efforts, he said, "The most important achievement was the findings of Dr Alfred Sommer and his team at the ICEPO. They found that providing vitamin A supplementation to children older than six months reduced mortality by 30 per cent, cut the severity of infectious diseases in general, lessened the incidence of severe complications and fatality in the case of measles, and provided a protective effect against severe diarrhea. Above and beyond this, they brought to the fore the importance of complementary strategies for promoting better health among populations in developing countries. These included creating awareness by disseminating basic information about nutrition and child health, promoting breastfeeding, maintaining high levels of immunization, improving standards of hygiene and sanitation and providing clean drinking water, giving families access to health services and other community-based services, and reducing the adult illiteracy rate, especially amongst women."



Martin Frigg (middle)
with ICEH alumni

A new Secretary General and an expanded newsletter

Under Dr Martin Frigg, who succeeded Dr John Gmünder in January 1995 when *Sight and Life* was in its tenth year, the role of the organization continued to evolve. "My first objective on taking up the position was to turn our budget from an annual into a permanent one," he recollected shortly before his death in 2010. "This was achieved, and the organization's budget remained constant at 1 million Swiss francs per year for a long period. It was important to ensure that *Sight and Life* occupied positions in the vitamin A arena that were unique. This endeavor was supported by a heightened focus on the newsletter, whose format was reworked and whose focus was turned more sharply on activities directly initiated or supported by *Sight and Life* itself. The Xerophthalmia Club Bulletin, whose origins lay in the International Agency for the Prevention of Blindness, was incorporated into the newsletter, whose distribution within the vitamin A community was significantly broadened. An important part of my role was to review very efficiently scientific papers and to disseminate their content via the newsletter. I also used my computer-programming abilities to develop databases that facilitated the steering of the organization, which had to efficiently manage a wealth of information regarding finances, projects, addresses and specialist literature."

Writing in the 1995 *Sight and Life* Annual Report, Dr AF Leuenberger, the then President of the organization, looked back on the Task Force's development:

"When the Task Force *Sight and Life* was founded almost ten years ago, it was decided not to create any new structures but to work together with existing organizations with the necessary field experience. This has proved to be a wise decision, and the concept has been successful beyond all expectations: the Task Force can concentrate on its function as a hub of experience, information and support. It can hence employ its resources to maximum effect."

"But this concept only works because there are organizations combating vitamin A deficiency that not only are highly competent, but also justify the trust placed in them. Most of all, time and again we were able to observe how professionally our partners operate, even in very difficult conditions, and how well they are able to adapt to the manifold cultural environments in their target areas. This is because efficient research and aid need not only cost consciousness and management skills, but also creativity and inventiveness."

“When I read this year’s *Sight and Life* Annual Report, I realize the extent of the efforts of our many partner organizations. I would like to thank them here for their excellent co-operation. I am proud that F. Hoffman-La Roche Ltd through the Task Force *Sight and Life* is able to contribute to the worldwide efforts in fighting vitamin A deficiency.”

Sugar fortification: An important route to improved eye health

International Conference on the fortification of sugar with vitamin A Guatemala, 12–15 March 1996



Sugar crystal with vitamin A beadlet attached



Fortified sugar, Guatemala

In Guatemala, sugar fortification has been implemented since the sixties. When the importance of vitamin A for child health was recognized, the Institute of Nutrition of Central America and Panama (IN-CAP) devoted much effort to reducing vitamin A deficiency. Sugar was identified as the best vehicle for vitamin A supplementation as it is consumed in regular quantifiable quantities by the majority of the population, it is relatively cheap and accessible and it is produced largely by a centralized process.

Based on a special water-soluble form of vitamin A, a relatively simple method of fortifying sugar with a shelf-life of approximately one year was developed. The vitamin A level in the sugar was set at a concentration of 15 micrograms (50 IU) per gram of sugar. Importantly, this level does not cause any negative taste, texture, color or flavor changes in the final product.

The case study of the success of the Guatemala sugar fortification was summarized in a document issued by UNICEF. Guatemala was therefore not surprisingly chosen to be the venue of the 1996 International Conference on the Fortification of Sugar with Vitamin A.

At the opening of the conference, the president of Guatemala, Mr Alvaro Arzu, welcomed the participants, and received an award on behalf of the Republic of Guatemala for its pioneering role in the fight against vitamin A deficiency. At the meeting, the status of knowledge on the consequences of vitamin A deficiency on health and development of children was presented, as well as the role of sugar fortification and the fortification of other foods. Dr Keith West of Johns Hopkins University, Baltimore, USA, pointed out that vitamin A deficiency was never likely to be eliminated but could and should be kept under control. This had been shown in Guatemala as, when sugar fortification was discontinued, vitamin A deficiency had once again become a public health problem.

There was a general feeling and agreement among the participants from all over the world, representing ministries of health, universities, research institutes and industries, that collaboration was essential when addressing vitamin A deficiency. It was also felt that there were still many technical problems to be solved, especially in vitamin A fortification of foods. The key to successful sugar fortification would be for new sugar production factories to install customized equipment to mix the vitamin A into the sugar. And, as the technology was simple, the basic investments required were considered almost negligible when set against the public health benefits. The meeting stressed that the lesson learnt from salt fortification with iodine was that one should not wait to take action until perfect solutions were found. Rather, interventions should be begun that were known to work and these should continuously be improved over time. This lesson remains valuable today.

At the end of the conference, a declaration named the ‘Guatemala Declaration on Combating Vitamin A Deficiency through Sugar Fortification’ was signed by representatives of at least 33 countries, 28 enterprises and 39 organizations. This was an important milestone as it set the scene for fortification of not only sugar but also other staple foods.

Source: *Sight and Life* Newsletter 1/1996

**Interview
Dr Donald S
McLaren**



Donald S McLaren

Distinguished scientist Dr Donald S McLaren is one of the great pioneers of the study of vitamin A deficiency disorders. Throughout his extraordinary life, he has been at the forefront of research in this field, publishing many groundbreaking books, papers and other key texts. In the period since his retirement, he has played a significant role in *Sight and Life's* work.

“When considering my career,” observed Dr McLaren in an interview with *Sight and Life Magazine* in 2011, “you have to remember that it took place in a totally different era from today. Everything was entirely different; there’s no chance that anybody else would follow the same path today.

“I studied Medicine at Edinburgh. After qualifying in 1949 with an MB ChB degree, I ended up in a hospital in a tribal area in Orissa, India. Through this experience, I felt directed towards scientific work. I submitted my research to Edinburgh University and was awarded a Clinical Doctor of Medicine degree. Most of my work had to do with xerophthalmia, the most common blinding disease prevalent in young children in the world at that time.

“After five years, I joined the London School of Hygiene and Tropical Medicine, to start my PhD in nutrition. As my PhD studies came to a close, an opportunity arose to work for the World Health Organization (WHO) as consultant in Indonesia. I found that very severe blinding – occasioned by vitamin A deficiency – was prevalent in number of big cities in Indonesia. The report I wrote on the subject was the first that WHO had ever issued on the disease. After a year, I was invited to attend the very first international meeting on xerophthalmia – my paper was only one of two on findings in young children.

“By the early 1960s, WHO had become much more interested in my work. They commissioned a scientific research program, including a survey of the whole world – I traveled in Africa and the Middle East. This was the very first time, scientifically, that understanding of VADD and xerophthalmia was put together and published. Part of this research, funded by the National Institutes of Health in the US, was the first ever trial in the field, under experimental conditions, of vitamin A capsules aimed at preventing the disease. I was responsible for carrying out that work, along with another colleague from WHO. I wrote the very first book on the subject, *Malnutrition and the Eye*, published in 1963. I was able to pioneer research into that phase of vitamin A deficiency during the early days of the conquest of xerophthalmia.

“In terms of my achievements, the area that I was able to contribute to in the case of vitamin A deficiency was, largely, communicating what was known in the laboratory and the hospital to governments, to international organizations, to the public – and to broadcast it, and bring people to understand how serious it was and what a terrible disease it was. I could help people understand that only few units of vitamin A in the diet could prevent everything going wrong. My work was very influential in that regard.”

Abridged interview with *Sight and Life Magazine*, 3/2011

A widening focus

Towards the end of the twentieth century, two new developments were to influence the course of *Sight and Life*. One was the creation of the Millennium Development Goals (MDGs) by the United Nations; the other was a widespread broadening of research and focus to include a more extensive range of micronutrients in supplementation and fortification programs, and not just vitamin A. The MDGs are discussed in greater detail in chapter 3, which outlines the world's growing understanding of the complex interactions of a wide range of vitamins and minerals and their impact on health and well-being and the severe negative consequences of deficiencies on individuals, communities, and nations.

Sight and Life had been founded as a short-term response to a single vitamin deficiency; a decade and a half into its existence, based on the ever-developing science, it was starting to reconsider the appropriateness of this exclusive focus. In doing so, the organization was reflecting the thinking that was happening in the wider micronutrient arena, and which was to lead in 2006 to the establishment of the Micronutrient Forum. This new forum was created to reflect the recent evolution of science and program development in the field of micronutrient nutrition. It replaced the International Vitamin A Consultative Group (IVACG) and the International Nutritional Anemia Consultative Group (INACG), both of which had been set up in 1975 with funding from the United States Agency for International Development (USAID). Through its formation, the importance of multiple micronutrients for health and development was acknowledged.

The Micronutrient Forum

The Micronutrient Forum focuses on the impact of micronutrient deficiencies on public health and development, concentrating primarily on populations that are deficient in what can be called the “big five”: vitamin A, iron, folate, iodine, and zinc. The Forum does this primarily through global meetings and consultations. The global meetings create a forum for leading scientists, policy-makers and programmers to discuss the latest scientific and programmatic evidence supporting the role of micronutrients in health, thereby providing the mechanism for experts to review and advance policy-relevant science.

Source: www.micronutrientforum.org



The 2nd Micronutrient Forum, Beijing 2009

The Copenhagen Consensus 2004

Dr Martin Frigg retired as Secretary General of *Sight and Life* in 2005, having served in the position for eleven years. He was succeeded by Dr Klaus Kraemer, who, in his initial editorial for the *Sight and Life* Newsletter (2/2005), wrote: “Providing micronutrients to fight malnutrition was ranked number two amongst the factors having the highest impact on solving the world’s greatest challenges by a panel of internationally renowned economic experts in the *Copenhagen Consensus 2004*. This encourages us to be at the forefront when it comes to improving the nutrition and health of children and mothers in developing countries. We cannot accept that one billion children are malnourished and live in poverty, and that more than ten million children under the age of five years still die every year of diarrhea, pneumonia, measles, malaria and AIDS. Many of these fatalities could be prevented by an optimal supply of vitamins and minerals.”

Micronutrient supplementation rated top priority at 2008 Copenhagen Consensus



The Copenhagen Consensus, 2008



Bjørn Lomborg

In the spring of 2008, a panel of the world's leading economists determined that eliminating micronutrient deficiency in children offers a better rate of return than combating global warming, disease or terrorism. The expert panel, which included five Nobel laureates, met at the 2008 Copenhagen Consensus to evaluate 30 proposed solutions to 10 of most serious challenges facing the world today.

The “winning” solution addressed the lack of vitamin A and zinc in nearly 140 million children. The solution? Provide vitamin A to 80 percent of children aged two and below in Sub-Saharan Africa and South Asia, where current vitamin A coverage is 73 percent and 71 percent respectively, according to UNICEF. For zinc, provide supplements to infants aged 6–12 months to reach 80 percent of children in need in South Asia and Sub-Saharan Africa, where current zinc coverage is essentially zero. The estimated cost for this solution was \$60 million a year, with a return of more than \$1 billion annually. More simply, for every dollar spent, the world would realize more than \$17 in benefits from better health, greater earnings potential and fewer deaths.¹

Douglass North, a Copenhagen Consensus panel member and Nobel laureate told *Reuters*, “It [micronutrient supplementation] has immediate and important consequences for improving the well-being of poor people around the world, that's why it should be our number one priority.”²

First held in 2004, the Copenhagen Consensus was established by Bjørn Lomborg to help policymakers, NGOs and philanthropists around the world determine how to best invest capital to address pressing global concerns. This year, panelists considered the following issues: malnutrition and hunger; air pollution; conflicts; diseases; education; global warming; sanitation and water; subsidies and trade barriers; terrorism; and women and development.

Reviewing each issue, the panel answered the following question: “If you had an extra \$75 billion to do good in the world, where would you spend it over the next four years?”

The panelists selected micronutrient supplementation as the best way to improve the world based on a challenge paper and proposed solutions authored by economist Sue Horton of Wilfrid Laurier University in Canada, Harold Alderman of The World Bank and Juan Rivera of The National Institute of Public Health, Mexico.

To explain the consequences of micronutrient deficiency to the economists, the Horton paper provided data on the causal relationship between micronutrient deficiency, undernutrition and increased mortality, morbidity and reduced economic output. The paper outlined how on a global scale, undernutrition threatens the world's ability to meet the first Millennium Development Goal, which focuses on the eradication of extreme poverty and hunger. An unmet first goal will impede progress on subsequent goals. Finally, Horton explained that while the cost of undernutrition is high, there are inexpensive ways to deliver micronutrients to populations in need.

Other proposed solutions outlined in the Horton challenge paper included:

- Biofortification or fortifying staple crops with micronutrients. These agricultural improvements would cost approximately \$60 million annually, with benefits of \$1 billion – a benefit-cost ratio of more than 16:1.
- De-worming of pre-school children. For \$26.5 million the program would yield \$159 million annually – a benefit-cost ratio of 6:1. The benefits include reduced anemia, improved growth, cognitive development and future income potential.

¹ Copenhagen Consensus 2008, Press Release

² Reuters, 30 May. Story edited by Tim Pearce

- › Community-based nutrition promotion. While the previous solutions all focused on specific micronutrient deficiencies, a community-based program would attempt to promote improved overall nutrition. Techniques might include children's health days where immunizations, vitamin A supplementation and de-worming activities take place; programs focused on growth promotion and nutrition education. The cost of community-based nutrition programs was estimated at \$789 million annually for a benefit of approximately \$10 billion; a benefit-cost ratio of 12.5:1.

Panel composition and ranking

The Copenhagen Consensus Panel members included:

- › Jagdish Bhagwati, Columbia University
- › François Bourguignon, Paris School of Economics and former World Bank chief economist
- › Finn E Kydland, University of California, Santa Barbara (Nobel laureate)
- › Robert Mundell, Columbia University (Nobel laureate)
- › Douglass C North, Washington University, St Louis (Nobel laureate)
- › Thomas Schelling, University of Maryland (Nobel laureate)
- › Vernon L Smith, Chapman University, (Nobel laureate)
- › Nancy Stokey, University of Chicago

For each challenge, the panel addressed the following question: "If you had an extra \$75 billion to do good in the world, where would you spend it?" More than 50 experts spent two years developing solutions to the top 10 global issues. The solutions were presented in the form of 10 challenge papers, each containing one or more solutions. The panel reviewed and discussed each paper with the principal author and with two other experts who provided written critical appraisals. The panel then met in a closed session to individually rank proposals in order of importance, based on benefits and costs. The final ranking was determined by taking the median of the individual rankings.

By 2007, Dr Kraemer was able to write in the *Sight and Life 2007 Annual Report* that the mission of the 21-year-old organization was being advanced "on the basis of our new strategic framework focusing on the broad family of essential micronutrients," stressing that "an integrated, sustainable approach is needed to ensure overall human well-being." He noted that "We still face the problem of two billion people worldwide being affected by micronutrient deficiencies, particularly of vitamin A, the B vitamins, iron, iodine and zinc, at greatest risk among whom are infants and young children as well as pregnant and nursing women. At the same time, the phenomenon that has come to be known as the Double Burden of Malnutrition – where there is concurrent underweight and stunting among young children and overweight and obesity in older children, adolescents and adults within the same population – is an emergent public health problem that leads to increased childhood mortality or a higher risk of chronic disease in later life. About one third of all children under five years of age worldwide are stunted and almost 50% are anemic, while at least 155 million school-age children are overweight or obese." Micronutrient deficiency – which affects extensive populations not only in the developing world but also in the developed world – is the subject of our next chapter.

Thus, from its initial role of focusing attention on vitamin A and the part it played in the protection of eyesight, especially in the developing world, *Sight and Life* has adapted with science to become an advocate for the role of multiple micronutrients in health and development, not only in the developing world but in all individuals, communities, and nations. Much work is still to be done, however, to ensure optimal health for all.

**Meeting
ever-changing
needs**

“The various people who have led *Sight and Life* to date have all had very different personalities and perspectives, but they have all wanted to do the right thing. More than this, they have always been sensitive and responsive to the issues of the day. So the initiative has evolved to meet the changing needs of the world in which it operates, demonstrating considerable creativity and flexibility along the way. Today *Sight and Life* is playing an extremely valuable role as a facilitator that brings together the best in the worlds of scientific research, policy-making and program development.”

Professor Alfred Sommer, Dean Emeritus, Bloomberg School of Public Health

**Interview
with Richard
Oosterhoff**

Site Director,
Sisseln Branch
Site, DSM
Nutritional
Products AG

I’ve been here for four years and run the site. We have 11 manufacturing plants at this location; they employ 1,000 people and produce vitamin A, folic acid, and vitamin E, among others.

The process of producing vitamin A involves complex chemistry, which makes it exciting for us. We also know that the whole world uses vitamin A as a nutritional ingredient – it’s something you need for life, and to stay healthy, so it’s very appealing.

It’s important for us to bring the best quality products to the market. Regulations and guidelines have dramatically increased over the years, and the way in which we produce vitamin A is very different now to how we did it in the past. We’ve been investing in this area to make sure our customers have genuine peace of mind. We are one of the few suppliers of vitamin A in the Western world, so, if you buy our products, you are buying something that’s really good quality. After all, if you’re swallowing something, you need to know that the quality is there, and we’re working hard to ensure this.

We are also innovative in terms of bringing new solutions. We formulate products for different kinds of application, such as the nutritional programs we have in developing countries, beverages, or stable products that are acceptable to different religions around the world. We’re also trying to innovate our process, so that we can deliver the highest quality product at the lowest possible cost to the market.

What I enjoy above all is that we really contribute something. Because we have large manufacturing capabilities, and we have a large market share, we make an equally large contribution to the nutritional health of people around the globe. What makes me especially proud is that DSM has an active partnership with the WFP. Of course we do our work for profit, but we are also doing

something important for people who are not as fortunate as ourselves. To look at photographs of kids in the developing world and see them taking our products, which have been produced and shipped almost door-to-door from our site to people who really need them ... that's a very good feeling indeed.

Obituaries



Michael C Latham,
1928–2011

An expert on international nutrition and tropical health, **Prof. Michael C Latham** was a physician, public health worker, nutritionist, author and academic. He taught nutrition at Harvard and Cornell and consulted in Africa, Asia and South America. His research embraced infant nutrition, the control of parasitic diseases in humans, and the supply of micronutrients to poor populations.

Michael consistently served the international health and nutrition community, often exceeding expectations, for close to six decades. He contributed to the achievement of the many ambitious goals in technical fields, policy, programs, information sharing and capacity building in the USA and internationally. He was one of the pioneers in moving a global public health agenda to one that embraces public health nutrition; nowhere is this needed more than in low- and middle-income countries where malnutrition continues to affect millions of women and children. Michael established a technical and policy foundation that continues to serve us well as we face a future of challenges embodied by financial uncertainty, climate change, diminishing natural resources and insecurity.



Philip Musgrove,
1940–2011

Economist, academic, author and *Health Affairs* journal Deputy Editor **Dr Philip A Musgrove**, an expert in the economics of global health and development, died in a tragic boating accident at Iguazu Falls, Argentina. Phil previously worked as an editor at the Fogarty International Center of the National Institutes of Health (NIH) on the Disease Control Priorities Project. Prior to that, he was a principal economist at the World Bank, where he was especially expert in health systems in Latin America. In 1999–2001 he was seconded by the Bank to the WHO.

From 1982 to 1990, he was Advisor in Health Economics at the Pan American Health Organization, having already served as a consultant to the World Bank's Living Standards Measurement Study, among other roles. He taught at the University of Florida, Johns Hopkins University's School of Advanced International Studies, George Washington University, and American University. He also lectured at Latin American universities and research institutions and edited and co-authored numerous publications.



Martin Frigg,
1943–2010

Martin Frigg was a leading research scientist, an accomplished painter and sculptor, and the Secretary-General of *Sight and Life* from 1994 to 2005. He studied biology in Zurich before taking a research position with Hoffmann-La Roche, where he dedicated himself to researching the effects of vitamins on the health of animals. He published countless research papers, was involved in numerous international research projects, and spent many weeks on research activities abroad.

Martin believed that the results of basic research should serve people's well-being. During the 1990s, he followed this principle himself, giving up his work as a researcher and taking over the leadership of *Sight and Life*. He was very familiar with vitamins and their effects, and so devoted himself to combating their deficiency, working alongside major global and local organizations and NGOs. He also created the *Sight and Life* Newsletter, which was distributed to affected communities worldwide.



José María Bengoa Lecanda,
1913–2010

José María Bengoa Lecanda supported the Basque government in the organization of military health services during the Spanish Civil War. He later sought refuge in Venezuela, working as a rural physician and subsequently developing the Nutrition Section of the Ministry of Health and Social Assistance. He founded the Venezuelan School of Nutrition and Dietetics, as well as the scientific journal *Archivos Venezolanos de Nutricion*.

In 1955, Dr Bengoa joined the Nutrition Unit of the WHO in Geneva, which he led from 1963 until his retirement in 1974. He returned to Venezuela as head of the Planning Department of the Venezuelan Council for Scientific Research and professor of Food and Nutrition Planning. He was advisor to the Health Commissioner of newly democratic Spain's first Basque government and became Executive Director of the CAVENDES Foundation. His awards included being named a Hero of Public Health.



Carl E Taylor,
1917–2010

The founder of the academic discipline of international health, **Carl E Taylor, MD, Dr PH**, dedicated his life to the well-being of the world's marginalized people. Born in the Indian Himalayas, his career began as a pharmacist's assistant in his medical missionary parents' clinic in the Indian jungle.

Following medical school at Harvard, he worked in Panama before returning to India in 1947 as Director of Fatgarh Presbyterian Hospital. In 1949, he conducted the first ever health survey of Nepal. He later founded the department of preventive medicine at the Christian Medical College Ludhiana. Taylor was the founding chair of the Department of International Health at Johns Hopkins and instrumental in designing the global agenda for primary healthcare in the 1960s and 1970s. He was also China Representative for UNICEF, senior advisor to Future Generations and more recently Future Generations Graduate School, then Afghanistan Country Director for Future Generations.



John Lawrence Beard,
1947–2009

John Beard was one of the world’s most renowned iron researchers and President-elect of the American Society for Nutrition, among other distinguished posts. He received his PhD in nutrition from Cornell University, served as a Penn State faculty member for 25 years, and was named “Distinguished Professor” in the Nutritional Sciences department. His *Sight and Life* obituary notes “he had an unparalleled commitment to science, his colleagues, and his students”. He was considered to be one of the most influential and well-respected experts in the world on iron in the brain and neurobehavioral function.

His research was instrumental in changing the way scientists think about how the brain uses iron. It has influenced approaches to dietary supplementation in developing countries, and has offered new perspectives for the treatment of clinical disorders. He was most interested in translating these findings into “real world” applications, in order to help those in need.



Guillermo Arroyave,
1922–2008

Sight and Life Magazine notes that “**Guillermo (Willy) Arroyave ...** was a man and a scientist for all seasons, and a major contributor to the honor and nutritional reputation of his native Guatemala, and to our knowledge of human nutrient deficiencies and their control.”

Dr Arroyave began his career working with a single micronutrient (iodine) and ended with the formulation of a vision for world agricultural and food policy. He worked at the Institute of Nutrition of Central America and Panama almost from its inception in 1949, before moving to the United States to train further in nutritional biochemistry. He received a PhD from the University of Rochester in 1953. Over 40 years, he had a publication record of over 200 contributions. His work in fortification in Guatemala was honored by a conjoint award from INCAP, UNICEF, the Committee for the Blind and Deaf, and San Carlos University.



Norman I Krinsky,
1928–2008

A scientist who led the field of carotenoid research to unexplored places, **Norman I Krinsky** devoted more than half a century to research with these plant pigments. He examined nature’s yellows, oranges and reds, and discovered the secrets of their importance to our lives. Few research publications on carotenoids do not include a reference to his work. Dr Krinsky began his research into carotenoids in 1952, when he was awarded a PhD in biochemistry.

His interest in this topic was a platform for the next phase of his illustrious career, when he worked at Harvard University as a US Public Health Service Postdoctoral Fellow. In 1960, he became an assistant professor at the Tufts University School of Medicine, where he remained for the rest of his rich and colorful career. His work provided valuable insights into the actions of carotenoids, including the bioconversion of carotenoids in various food vehicles to vitamin A.



Rainer Gross,
1945–2006

Dr Rainer Gross was the Director of the Nutrition Section at UNICEF headquarters in New York. He was noted for multiple contributions in the field of public health nutrition, including leadership and innovation in research on micronutrients. Dr Gross received doctorates in both human nutrition (1974) and agricultural plant sciences (1982) from the University of Giessen. Most of his professional career was spent within the German Agency of International Cooperation, where he implemented collaborative, university-based community nutrition training programs in Rio de Janeiro, Brazil (in the 1980s), Jakarta, Indonesia (1990s) and Lima, Peru (2000s).

He was also an innovator and pioneer in two important innovations in public health nutrition with respect to micronutrients. These included the efficacy and safety of intermittent-day administration of iron supplements and other micronutrients, and the conceptualization and exploration of the use of the foodlet format of multiple micronutrient supplements.



Clive E West,
1939–2004

Clive E West was a world expert on micronutrient deficiency in developing countries and received international recognition for his research and teaching in this field. According to the *American Journal of Nutrition*, in its obituary in 2005, his untimely death robbed the nutrition field of a scientist with true insight about and a rare vision of ways to prevent micronutrient deficiency, working for much of his career in the Department of Human Nutrition at Wageningen Agricultural University. By the time of his death, “it had become obvious to the world that here was someone who knew about vitamins and minerals, who had a vision of the way forward, and who had the energy and the know-how needed to create new knowledge. He was involved in a major project for developing and testing genetically modified plant foods to combat micronutrient deficiencies, on which he worked with increasing urgency.”



John Glover,
1919–2003

One of the vitamin A world’s pioneering figures, **John Glover** spent his working life in the University of Liverpool’s Department of Biochemistry. His introduction to vitamin A came when he joined the renowned fat-soluble vitamins group of RA Morton as a PhD student, becoming Professor in 1966.

“John Glover was a scientist with exceptionally broad knowledge and great insight,” wrote George Britton in the *Sight and Life* Newsletter. “His pioneering work ... helped to lay the foundation for much of our understanding of the importance of vitamin A. Beginning his research career by studying the conversion of β -carotene into vitamin A, he went on to discover the excentric mode of carotene cleavage, which became known as the Glover-Redfearn pathway. Glover was also at the forefront of pioneering studies on the transport of vitamin A in the body, through his part in the discovery and characterization of the plasma retinol-binding protein RBP.”



Paul Arthur,
1956–2002

Dr Paul Arthur was one of the rising stars of the world public health nutrition community when he succumbed to a cerebrovascular accident at the age of 45 years in Ghana. At the time of his death, Dr Arthur held a joint appointment as director of the Kintampo Health Research Centre, Ministry of Health, Ghana, which he established in 1994, and as senior lecturer in epidemiology at the London School of Hygiene and Tropical Medicine.

Dr Arthur established himself as a leading contributor in the vitamin A community with his field direction of the Ghana VAST child health study, which aimed at assessing the impact of hypovitaminosis A on mortality and morbidity from childhood infections. At the time of his death, he headed the field research effort toward the resolution of the latest of the public health issues of vitamin A nutrition in low-income countries.



Abraham Horwitz
1911–2000

Dr Abraham Horwitz was the Director of the Pan American Health Organization (PAHO) from 1958 to 1975, as well as a world-renowned expert on health nutrition. Dr Horwitz's career in international public health spanned six decades. At the time of his death, he was president of the Pan American Health and Education Foundation and chairman of the International Vitamin A Consultative Group. He was director of the School of Public Health at Johns Hopkins University and Professor of infectious diseases, bacteriology, and immunology at the University of Chile.

He served four consecutive terms as Director of PAHO, promoting the integration of health with economic development and obtaining large capital investments in health and sanitation services in the Americas. The author of numerous articles on epidemiology, communicable diseases, preventive medicine, education in health, nutrition, and public health administration, he received many distinctions and awards, and decorations from numerous governments.



**James Allen
(Jim) Olson,**
1924–2000

In its obituary, the *Journal of Nutrition* notes that **Prof. James Allen Olson** made multiple contributions to the field of nutrition and to the nutritional biochemistry of vitamin A and carotenoids, ranging from fundamental studies of chemistry and enzymology to applications in assessment of human vitamin A status. "In addition to many original research publications, he wrote numerous insightful and stimulating reviews [and] was primary author or co-author or co-editor of many books... His contributions to our profession also included significant service at the local, national, and international levels," the Journal said.

His service to the field of nutrition was recognized by the Borden Award and the Elvehjem Award from the AIN and the Atwater Award from the American Society for Clinical Nutrition, and by election as an AIN Fellow. For his contributions to international nutrition programs, he received Distinguished Service Citations from institutions around the world.



John Wilson,
1919–1999

Sir John Wilson overcame the tragedy of blindness at the age of 12 in a school laboratory accident to pioneer work among the blind and those with disability of all kinds. As founder-director of Sight Savers International, he made possible the Xerophthalmia Club Bulletin by putting up the money to start it in 1972. Later, he founded and inspired the collaboration between Antoinette Pirie and Professor Venkataswamy that led to the establishment of the extremely successful, one and only nutrition rehabilitation center dedicated to xerophthalmia treatment and prevention in Madurai, South India.

In the 1980s, Sir John turned his energy and enthusiasm to the cause of avoidable disability of all kinds. He established Impact, an international initiative under the auspices of the UN Development Programme. Projects included the Lifeline Express hospital train in India to the Jibon Tari (Boat of Life).

03 Micronutrient Deficiency in the Developing World



Child blinded due to vitamin A deficiency

So often many of us eat because it is either time to eat, the food is there or we are hungry. We often neglect to consider what it would be like to have no food or why what we eat is important for ensuring our health.

Micronutrients, more commonly known as vitamins and minerals, are present in small quantities in food and are an essential component of a healthy diet. They include trace elements, such as iron, iodine and zinc, among others, and minerals such as calcium and magnesium, as well as the full range of vitamins. Infinitely smaller than macronutrients (including protein, carbohydrates and fat) and required in much smaller amounts by the body, micronutrients are powerful agents in keeping our bodies and minds healthy and helping the body fight against illness and disease. Their availability in the right quantities and the correct combinations can make the difference between a healthy existence and one that is plagued by poor health. Indeed, a lack of micronutrients results in micronutrient deficiency, and its severe consequences can ultimately lead to death.

What are micro-nutrients?

Micronutrients are dietary components, often referred to as vitamins and minerals, that although only required by the body in small quantities, are vital to health, disease prevention and well-being.

What are vitamins?

Vitamins are organic compounds that are required in minute quantities to sustain life and prevent disease. Most vitamins are obtained through food, although a few are partially produced by the body. The first vitamin was discovered in 1912 and today there are 13 known vitamins – vitamin A, B-complex (consisting of vitamins B₁, B₂, B₃, B₆, B₁₂, folic acid, biotin and pantothenic acid), C, D, E and K.

What are minerals?

Minerals, as with vitamins, are indispensable (essential) in small amounts to ensure that the body grows, develops, and stays healthy. Minerals are found in wide range of foods. The body uses minerals to perform many different functions — from building blood and strong bones to transmitting nerve impulses and maintaining a normal heartbeat.

What are macronutrients?

Unlike micronutrients such as vitamins and minerals, macronutrients are required by the body in larger amounts and include proteins, carbohydrates, and fats. They, too, are indispensable for our health and well-being.

One of the scourges of our age



A case of rickets

If vitamins were one of the key nutritional discoveries of the early twentieth century, the importance of the way in which micronutrients interact within the body is one of the major realizations of nutritional science in the early twenty-first century. Despite our growing understanding of the complex ways in which micronutrients help to maintain health, micronutrient deficiency remains one of the scourges of our age. No fewer than 1.1 million children under the age of five die every year as a result of vitamin A and zinc deficiencies alone.



Pallor of the palm due to anemia

Every year, 115,000 women die during pregnancy due to iron-deficiency anemia, which also accounts annually for approximately 600,000 stillbirths and deaths of babies within the first week of life. Anemia is also related to a failure in the complex interaction of nutrients that are required to build up healthy levels of hemoglobin for red blood cell formation. Not only are lives lost outright; they are also permanently impaired. Each year, 18 million babies are born with a mental impairment due to maternal iodine and iron deficiency during pregnancy, while 150,000 babies are born with neural tube defects resulting from an inadequate intake of folate by their mothers before and during the early stages of pregnancy. And – despite all the work that has been done in the past 25 years to combat vitamin A deficiency – the lack of this essential micronutrient causes no fewer than 350,000 children to become blind every single year (making it the biggest single cause of childhood blindness). And there is more.

Research shows that vitamins and minerals play a critical role in developing the brain. The window of opportunity is from the months before conception until a child is about two to three years old. Once this chance is missed, it can never be regained. If a child survives this period of time, but did not obtain sufficient micronutrients either during the pregnancy or once complimentary food was introduced after the age of six months, the likelihood of it suffering from poor health, cognitive impairment, and then obesity and chronic diseases in later life, is much higher. Micronutrient deficiencies also hamper a child's immune system, so that it is more prone to infectious diseases, such as measles or diarrhea, which it may not survive. Exclusive breastfeeding for the first six months of life, followed by the introduction of a nutrient-rich complementary diet together with continued breastfeeding until at least two years of age, improves overall health and brain development, which gives children a higher likelihood of succeeding at school and going on to achieve as adults.

The world is clearly being confronted with a problem of huge proportions. Given the scale of the challenge, and the subtlety of the action (and interactions) of micronutrients themselves, it is perhaps no surprise that the subject of micronutrient deficiency is complex and sometimes controversial.

What is health?

1 a: the condition of being sound in body, mind, or spirit; esp. freedom from physical disease or pain
b: the general condition of the body <in poor ~> <enjoys good ~> **2:** flourishing condition: WELL-BEING <the economic ~ of a country> **3:** a toast to someone's prosperity

The Merriam-Webster Dictionary, www.merriam-webster.com

“Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”

WHO definition of health, 1946

“Health is the ability to adapt to one's environment.”

Georges Canguilhem, *The Normal and the Pathological*, 1943

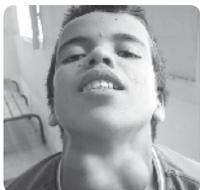
The fight against infectious diseases



Richard Semba

Putting the issue of micronutrient deficiency in its historical perspective, we can concur with Prof. Richard Semba of the Johns Hopkins University School of Medicine and a leading authority on nutrition-related blindness, who writes that “In the last two centuries, there has been a general improvement in the health of people worldwide that has been attributed largely to changes in nutrition, hygiene, and public health. At the beginning of the 19th century, the burden of morbidity and mortality from infectious diseases such as malaria, cholera, measles, tuberculosis, and diarrheal disease and nutritional deficiency diseases such as pellagra, rickets, and vitamin A deficiency was relatively high in Europe, North America, and much of the rest of the world.” One needs only to think of the portrayal of the effects of cholera in Thomas Mann's 1912 novella *Death in Venice* to be reminded of the horror that industrial urban societies had of such epidemics in only very recent times. “By the end of the 20th century,” Dr Semba continues, “these diseases were largely eradicated from industrialized countries, but many of these diseases and their associated morbidity and mortality continue to be major problems in developing countries today.”

**International
Council
for Control of
Iodine
Deficiency
Disorders
(ICCIDD)**



A case of goiter
– iodine deficiency

1986 – 2011: 25 years of contribution to prevention of brain damage of children

The ICCIDD is an international non-profit, non-governmental organization globally renowned for its leadership role in the fight against Iodine Deficiency Disorders. It is also the only organization in the world that is focused solely on the elimination of iodine deficiency disorders and on the achievement of that goal through universal salt iodization (USI) programs.

The ICCIDD had its Inaugural Meeting on 22–28 March 1986 in Kathmandu, Nepal. It is a volunteer-driven international NGO registered in Canada with corporate offices in Ottawa. The ICCIDD has 700 members in 71 countries, and their skills range from endocrinologists to nutritionists, public health professionals, development workers, scientists, educators, salt producers, lab technicians and communication specialists.

The mission of the ICCIDD is to advocate to governments, citizens, and development agencies a priority commitment to iodine nutrition through a multidisciplinary approach that involves all relevant partners including salt producers. Its vision is a world virtually free from iodine deficiency disorders with national endeavors in each country to maintain optimal iodine nutrition, primarily through universal consumption of iodized salt. The focus of our activities is to eliminate iodine deficiency in the world population especially during the developmental period to prevent brain damage and learning disabilities in children.

The ICCIDD is a network-building and advocacy organization. It supports national programs in various ways with technical, scientific, advisory, managerial, communication or analytic assistance and always in collaboration with UN agencies like UNICEF, WHO and the World Food Programme (WFP). It is a founding and active member of the Global Network on Sustained Iodine Nutrition and is the lead agency for national assessments. It publishes an IDD quarterly newsletter which serves the entire community of IDD workers.

ICCIDD was granted Consultative Status with the WHO due to ICCIDD's advocacy work, as well as with UNICEF. The accreditation gives it the right to speak to the Governing Bodies of those two UN Agencies as well as other UN bodies.

Iodine deficiency has substantial effects on growth and development and is the most common cause of preventable mental impairment worldwide. Mild iodine deficiency impairs cognition in children, and moderate to severe iodine deficiency in a population reduces IQ by 10–15 points. Notable progress has been made since in global elimination of brain damage due to iodine deficiency. World coverage of iodized salt has increased from less than 20% in the 1980s to about 70% today. For the past 25 years, ICCIDD has spurred the global IDD control effort. ICCIDD has played a significant role in this remarkable effort by providing scientific expertise and political support, in collaboration with WHO, MI and UNICEF. However, reaching that last 30% remains a major challenge for us all.

For more information on ICCIDD, visit www.iccid.org

Different manifestations of micronutrient deficiency

One might infer from this observation that the micronutrient deficiencies to which Prof. Semba refers no longer pose an immediate threat to health in the developed world, or that the developing world is alone in experiencing its effects. This conclusion would be premature, however, because the diets of some sectors of society in industrially advanced countries can also be deficient in micronutrients. The picture of a well-off developed world and a disadvantaged developing world may be true in outline, but it is not so in detail.

From the frequency of highly publicized humanitarian aid initiatives around the world, it could be deduced that all forms of malnutrition can be prevented by ensuring food security and the timely provision in emergencies of large quantities of staples such as rice, corn and wheat to prevent starvation. Again, this deduction would be false. Staple foods, while providing sufficient energy input to keep the body alive, do not necessarily supply the full range of micronutrients (and even macronutrients, particularly high-quality protein and essential fatty acids) that are necessary for long-term growth and optimal health. Women of childbearing age, pregnant and lactating women, children in their first two years of life and, of course, the sick and the elderly are particularly vulnerable to the effects of micronutrient deficiency.

Food and nutrition security

A distinction should therefore be made between the commonly used terms of food security on the one hand and nutrition security on the other. The Food and Agriculture Organization of the UN (FAO) estimated in October 2010 that 925 million people do not have enough to eat – more than 60 percent of chronically hungry people are women and around 3.5 million children under the age of five die due to malnutrition each year in developing countries. More than 1.6 billion people are anemic, due largely to micronutrient deficiencies. The FAO defines food security as existing “when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.” The FAO believes that “food-based strategies, by increasing availability and consumption of a nutritionally adequate micronutrient-rich diet, are the sustainable way to improve nutrition.” In reality, food security frequently means that, although people have enough food energy for survival, this food often does not provide sufficient micronutrients for optimal health. Improving the diets of the world’s poor through food-based strategies alone is a complex and long-term undertaking requiring rising incomes, improved access to food, better health and sanitation service delivery, etc. In the short- and mid-term, the fortification of staple food and specially formulated complementary foods is required and has been shown to have a direct impact on improving the nutritional status and health of the most vulnerable, together with the general population. Fortification of staple (commonly eaten) food, such as salt with iodine, flour with folic acid, other B-vitamins and iron, and milk with vitamins A and D, has been common practice in industrialized countries for many years in order to prevent deficiency.

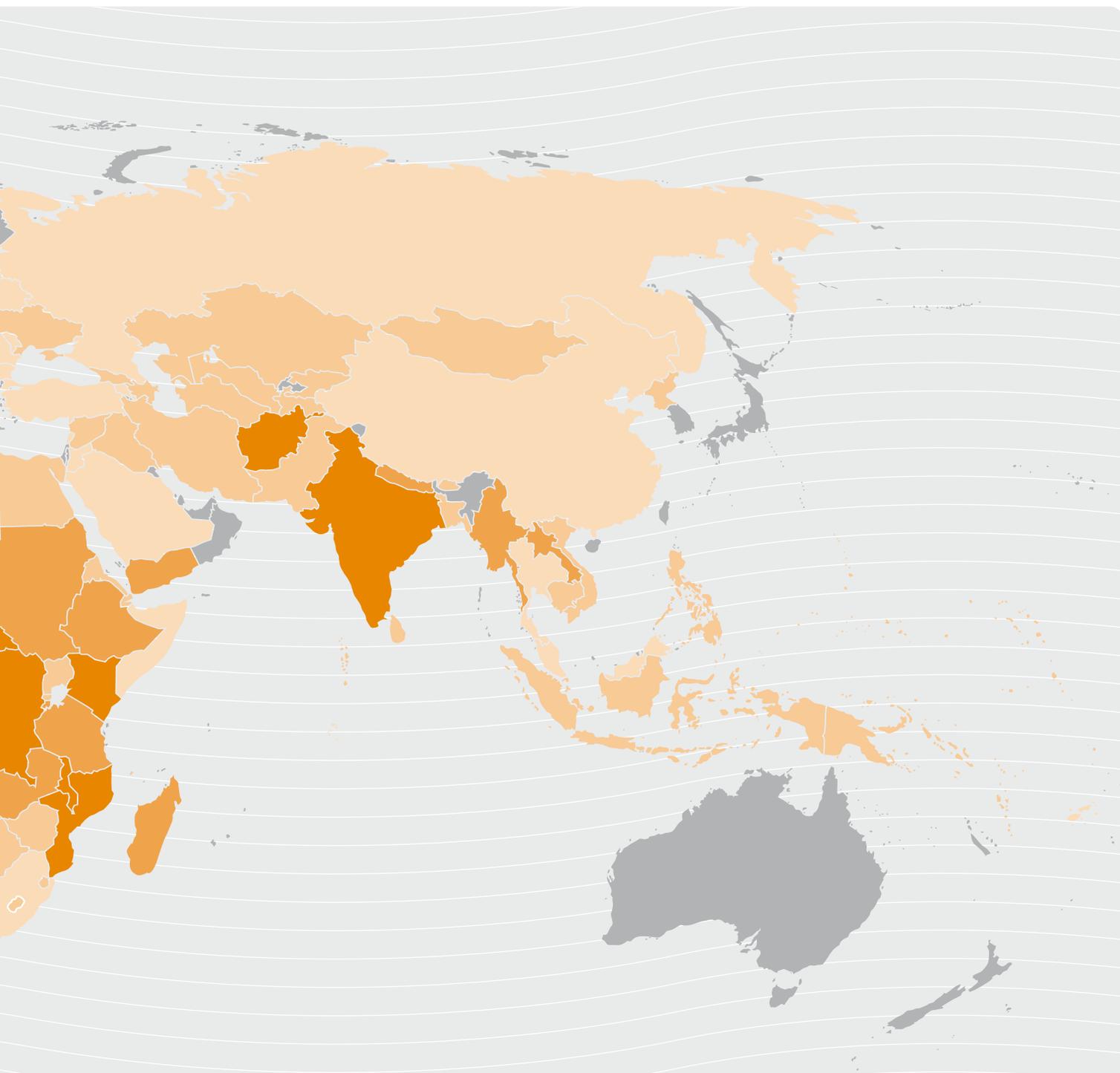
Nutrition security, by contrast to food security, has been defined by Agnes R Quisumbing as “adequate nutritional status in terms of protein, energy, vitamins, and minerals for all household members at all times.” Clearly there are occasions, particularly emergency situations, when food security in these terms may be impossible. Nutrition security is, however, essential if large-scale malnutrition is to be eradicated. One thinks of populations – such as

those of Ethiopia and Eritrea in the 1980s, at the time when *Sight and Life* was founded – who are still ravaged by the effects of man-made and natural disasters. They not only desperately need adequate energy intake to prevent hunger, but also require the vitamins and minerals which are essential for many of the key body functions. Outside of emergencies there are populations who habitually consume nutritionally inadequate food (in terms of quality). These diets often provide energy-dense foods but often lack vital vitamins and minerals and so can lead to ‘hidden hunger’. Add to these a sedentary lifestyle and a situation can result whereby the body becomes overweight, even to the point of obesity, while being starved of the micronutrient intake it requires to function optimally. Such populations may be found throughout the world, from Michigan to Micronesia. As a result, micronutrient deficiency is not just a condition of the poor or underdeveloped but affects people across the world.

Origin and introduction of some terms describing nutritional deficiency among children in developing countries

Year(s)	Term	Notes
1900–1930	<i>Distrofia Pluricarencial</i>	Term used by early Latin American workers meaning ‘multiple deficiency state.’
1935	Kwashiorkor	From the Ga language of West Africa. This translates as ‘the disease of the deposed child.’
1955	Protein deficiency	Term reflecting thinking at the time on the primary cause of Kwashiorkor.
1959–1960	Protein-calorie malnutrition (PCM) Protein-energy malnutrition (PEM)	PCM first introduced in late 1950s. Evolved into protein-energy malnutrition (PEM). Used to cover whole range of malnutrition other than states caused primarily by specific nutrients (such as scurvy, pellagra). PEM is still widely used.
1980s–1990s	Energy-nutrient malnutrition (ENM)	In recognition that other nutrients besides protein (e.g., zinc, vitamin A) significantly contribute to malnutrition and growth faltering. Not widely used.
1990s	Micronutrient deficiency	Primarily used to refer to key micronutrient deficiencies: vitamin A, iodine, zinc and iron.
Late 1990s	Malnutrition	Term used widely by international organizations (such as UNICEF) to refer to ENM and growth-faltering.

Scientists use the term malnutrition to refer to both under- and overnutrition. Undernutrition generally comprises low energy intake as well as a lack of dietary quality due to the lack of micronutrients. Overnutrition generally refers to excessive energy intake, but can also include a deficiency of micronutrients.



Severity of Hidden Hunger was determined based on the proportion of under-fives affected by anemia, vitamin A deficiency, stunting as an indicator of zinc deficiency.

UNICEF State of the World's Children 2009, WHO Global database on vitamin A deficiency and anemia

What is hidden hunger?



A child in Haiti

Hidden hunger does not refer to the overt and obvious hunger of individuals who are unable to afford enough to eat. It refers to the deficiencies of micronutrients (vitamins and minerals) in individuals or populations as a consequence of poor dietary quality, which negatively impacts on health, cognition, function, survival and economic development.

Hidden hunger is a growing problem that affects both the developing and the developed world. The most obvious victims are the 2 billion people in developing countries whose diet does not provide them with the vitamins and minerals they need – usually because they cannot afford or cannot obtain the nutritious foods they need. But hidden hunger also claims victims in the developed world – people who certainly do not look hungry. A prime example could be where obesity or being overweight can be a sign that their bodies are still hungry for crucial micronutrients.

The impact of hidden hunger is huge: globally stunted growth and anemia in children are a major cause of health problems in later life, particularly the increasing prevalence of overweight/obesity and chronic diseases. This has terrible personal and social consequences. It also results in a double burden for the health systems, with associated massive health costs and a negative impact on economic productivity.

Dr Klaus Kraemer, Director of *Sight and Life*, believes that the ‘missing link’ between health and food needs addressing as a matter of urgency: “Micronutrient deficiency is often a hidden problem where people may have an adequate supply of energy from the food they eat, but the nutritional value is insufficient to meet their needs for optimal growth and development. Hidden hunger is under-recognized, and not enough is done to combat this problem, which not only results in long-term health problems for individuals but also impacts on the health of communities. It eventually has huge economic consequences, especially for developing countries.”

What causes micronutrient deficiency?

The main reasons for micronutrient deficiencies are:

- > Poor quality diet
- > Low bioavailability
- > Poor knowledge and caring practices
- > Low income
- > Seasonal variation in food availability
- > Cultural factors and beliefs
- > Increased requirement due to losses and infections

The consequences of malnutrition

The consequences of malnutrition are severe and long-lasting – not only for the individuals affected by this debilitating condition but also for the societies of which they form a part. Dr Dirk Schroeder, the Adjunct Associate Professor of Global Health at Emory University, defines them thus: “Children who are malnourished have longer and more severe illnesses and have a higher risk of dying compared to better-nourished children.

Malnourished children also have delayed motor development and lower cognitive function and school performance. In adulthood, individuals who were malnourished as children have impaired work capacity and worse reproductive performance. Finally, malnutrition can have negative effects not only on those afflicted but also on their offspring.” Dr Schroeder describes the causes of malnutrition as numerous. “These causes,” he observes, “are intertwined with each other and are hierarchically related. The most immediate (or proximate) determinants of malnutrition are poor diet and illness. Poor diet and illness are themselves caused by a set of underlying factors that include family access to food and maternal care-taking practices. These underlying factors are influenced by the basic socioeconomic and political conditions within which poor families are attempting to raise well-nourished children. An accurate understanding of the relationships among these various causes of malnutrition and the relative contribution of each is essential for the design of efficient and effective programs to reduce malnutrition and its consequences.”

In addition, children also face the double burden related to undernutrition or malnutrition. In the developing world, a significant number of malnourished children are not only chronically malnourished now, but are also increasingly at risk of obesity and overweight and connected diseases in later life. This interrelationship occurs when a child’s diet is not optimal in the critical period of early development, yet it survives and undergoes a rapid period of growth. The research also shows that infants with low birth weight due to malnutrition, who then have an inadequate diet, tend to become overweight and obese in adulthood. Finally, children carrying fat around the belly area (abdominal obesity) have also been shown to have a higher risk of chronic diseases later in life. This makes adequate nutrition (in terms of energy and nutrients) crucial in the early period of life – the first 1,000 days from conception (and even before) to two years of age.

The global burden of inadequate nutrition security

Around the world, poor nutrition security creates a situation where:

- > at least 195 million children are affected by chronic undernutrition or stunting (short height for age), resulting from poor fetal growth and reduced growth in the first two years of life;
- > at least 3.5 million preventable under-five deaths per annum, caused by intra-uterine growth retardation (low birth weight), sub-optimum breastfeeding (non-exclusive breastfeeding in the first six months of life), the introduction of low quality complementary foods after six months, severe wasting, stunting, and deficiencies of micronutrients;
- > 190 million pre-school children (~32%) and nearly 20 million pregnant mothers (~10%) are vitamin A deficient;
- > 5.8 million children under the age of five are affected by xerophthalmia as a result of vitamin A deficiency, which can cause irreversible blindness;
- > some 19 million children a year are born with impaired mental capacity, predominantly as a result of a simple lack of micronutrients, most notably iodine and iron; and
- > some 30% of non-pregnant women, increasing to 47% of pregnant women, suffer from anemia, causing the deaths of 115,000 women a year, and stillbirths or deaths of approximately 600,000 babies within the first week of life.

Source: *Sight and Life* 2009 Annual Report

The Millennium Development Goals (MDGs)



The MDG Summit opens at UN Headquarters

The MDGs were officially established at the Millennium Summit in 2000 by the UN, and are endorsed by all 192 UN member states and at least 23 international organizations.

The UN Development Programme describes the eight goals in the following terms: “The MDGs are the most broadly supported, comprehensive and specific development goals the world has ever agreed upon. These eight time-bound goals provide concrete, numerical benchmarks for tackling extreme poverty in its many dimensions. They include goals and targets on income poverty, hunger, maternal and child mortality, disease, inadequate shelter, gender inequality, environmental degradation and the Global Partnership for Development.

The Millennium Development Goals

These are the most broadly supported, comprehensive, and specific development goals the world has ever agreed on. Each goal has a number of key targets and provides concrete, numerical benchmarks for tackling extreme poverty in its many dimensions.

Impact of malnutrition interventions on the MDGs

MDG 1: Eradicate extreme poverty and hunger	> Individuals lose more than 10% of lifetime earnings, and many countries lose at 2–3% of their GDP due to malnutrition.
MDG 2: Achieve universal primary education	> Reducing malnutrition increases cognitive development and contributes to school learning and school completion rates.
MDG 3: Promote gender equality and empower women	> Anti-female biases in access to food, health, and care resources may result in malnutrition, possibly reducing women's access to assets. Addressing malnutrition empowers women more than men.
MDG 4: Reduce child mortality	> Malnutrition is the underlying cause of 3.5 million preventable child and maternal deaths a year and accounts for 35% of disease in children under 5.
MDG 5: Improve maternal health	> Micronutrient interventions can significantly reduce maternal mortality rates.
MDG 6: Combat HIV/AIDS, malaria and other diseases	> Malnutrition leaves the body more prone to disease. Nutrition interventions improve adherence and treatment outcomes for anti-retroviral therapy (ART) and TB patients. Proper nutrition slows the development of the HIV virus and improves the body's acceptance of retroviral medication.
MDG 7: Ensure environmental sustainability	> Given projected population increases and land and resource scarcity, agricultural systems will be stretched. New nutritional interventions can offer viable and sustainable solutions.
MDG 8: Develop a global partnership for development	> Addressing malnutrition and hunger requires a coordinated approach that includes all actors: donors, donor countries, and aid agencies combined with private sector innovation.

Adopted by world leaders in the year 2000 and set to be achieved by 2015, the MDGs are both global and local, tailored by each country to suit their specific development needs. They provide a framework for the entire international community to work together towards a common end – making sure that human development reaches everyone, everywhere. If these goals are achieved, world poverty will be cut by half, tens of millions of lives will be saved, and billions more people will have the opportunity to benefit from the global economy.”

The eradication of extreme poverty and hunger is the first of the eight MDGs. Much remains to be done, if this goal is to be achieved by 2015.

**MDG 1:
Eradicate
Extreme
Poverty &
Hunger**

Target 1: Halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day

Target 2: Achieve full and productive employment and decent work for all, including women and young people

Target 3: Halve, between 1990 and 2015, the proportion of people who suffer from hunger



North Darfur, Sudan

According to the UN Department of Public Information, “The MDG1 target of cutting in half the proportion of people in the developing world living on less than \$1 a day by 2015 remains within reach for the world as a whole. However, this achievement will be largely the result of extraordinary success in Asia, mostly East Asia. In contrast, little progress has been made in reducing extreme poverty in Sub-Saharan Africa.” In the same fact sheet, published to support a high-level event on the MDGs at UN Headquarters in September 2008, the UN Department of Public Information continues: “Even though the proportion of people worldwide suffering from malnutrition and hunger has fallen since the early 1990s, the number of people lacking access to food has risen. With recent increases in food prices, it is estimated that 1 billion people will go hungry, while another 2 billion will be undernourished.”



Robert Zoellick,
the Philippines

The world’s leaders (governments, private sector, and NGOs) met in September 2010 to discuss their position in terms of meeting the MDGs by the promised date of 2015. The outcome was a re-commitment to the MDGs that was supported by the announcement of major new commitments against poverty, hunger, and disease with an emphasis on the most vulnerable – women and children. The summit saw over \$40 billion in resources being pledged over the next five years towards keeping these promises. Of specific significance was that nutrition security was recognized, at the highest level, as being key.

Robert Zoellick, President of the World Bank, has in fact called MDG1 the “forgotten Millennium Development Goal.” Today, one in four children in developing countries is underweight. At the same time, rich and poor countries alike are facing a dramatic increase in the number of overweight and obese children and adults, leading to a significant increase in the chronic diseases which are major causes of death, disease and disability. The multiple burden of malnutrition is most evident in emerging economies.

The victims whose stories don't hit the headlines

At any one time, there are 200 million people who need food assistance just to get enough energy to live – these are generally people living in emergency situations, for example after natural disasters or drought, or refugees. However, there are a further estimated 2 billion people who suffer from the less outwardly visible, but equally debilitating hidden hunger or micronutrient deficiency – and whose situation receives less attention and makes fewer headlines. Right now, the UN WFP estimates that 250 million infants and unborn children lack nutrition security, which will leave them under-developed, prone to illness, facing learning difficulties, and, counter-intuitively, more likely to become obese as they grow older – all of which means they are likely to have a negative, rather than positive, impact on the societies in which they live. This results in significant health costs and sharply reduced economic output from unproductive individuals – as well as untold private misery.

Case study



Bisavit-A

An innovative solution to micronutrient deficiency

A program dedicated to giving a nutritionally adequate diet to children who would not otherwise have all the necessary nutrients was initiated in 1994 in Vietnam. The Fasevie program's goal was to provide local players in the health and nutrition sectors and the food industry with long term solutions to reducing malnutrition in Vietnam. Once tested and validated, these solutions were to make up a 'toolbox' for combating malnutrition. Finally, the goal was for the package of methods and tools to be handed over to Vietnamese partners who could go into action, by themselves.

The Fasevie program was driven by the understanding that what we eat throughout our lives is largely established during childhood and adolescence and that it is therefore essential to encourage children to eat properly from the earliest possible age. The program focus was on children between the ages of six and 12 years.

Local recommendations for local people

Although Vietnam had already staged two nationwide campaigns every year to distribute vitamin A capsules to school-age children, these campaigns could not be used long term because the level of regular governmental investment required was not sustainable. As a result, a solution that could be implemented independently by local players, without the help of government or international aid, was required.

The Fasevie program factored in the importance of issuing nutrition recommendations. People generally find it hard to follow these, either because they are unaware of them, or because they have insufficient time or financial resources.

Finally, the program's strategy bore in mind the fact that, based on experience, the intake of micronutrients can be increased in the short and medium term by supplementing and, in particular, fortifying commonly eaten foods. Longer term, this approach makes it possible to set up a communication structure that educates people about the importance of a nutritionally adequate diet, and shows them how what they eat affects their health.

With this in mind, the program took a two-pronged approach to tackling the challenge of reducing vitamin and mineral deficiencies among school-age children. First, it launched education campaigns to raise children's awareness of malnutrition-related problems and micronutrient deficiencies. Secondly, it enacted a know-how transfer that made it possible to supply an affordable vitamin and mineral fortified food product through the local food industry's established distribution channels.

Effective partnership is the way forward

One of the program's key elements was that it used local Vietnamese partners. In close collaboration with GRET, a long-term partner of *Sight and Life*, the National Institution of Nutrition (NIN) was appointed by the government to head up the anti-malnutrition program for children, which meant it brought to the project its research and training expertise, alongside its wide-ranging experience of food production and nutrition.

NIN cooperated with the Hai Ha Company, a specialized manufacturer of quality confectionary and biscuits which uses modern equipment and technology and has a well-developed control system. At the program's inception, Hai Ha offered 40 different biscuits and 30 types of confectionary to consumers in Vietnam, Laos, and Cambodia.

Hai Ha developed a fortified biscuit – Bisavit-A. Children who eat five of these biscuits per day meet 30% of the daily requirement of vitamins A and B₂ and iron, as well as 25% of the vitamin C requirement. At just 4 cents a day, it was affordable to even the poorest children.

Production and marketing of the fortified biscuit was authorized at the start of 2003. Clinical studies examined the children's iron and vitamin A levels after six months of including the biscuits in their daily diet.

Easy, well-accepted nutritional benefits

Not only were the biscuits very well accepted by the children, but they were also easy to distribute in school snack breaks. The children also learnt about malnutrition and the need for an improved diet in order to eradicate it. Many went on to play an active part in educating the people around them, passing on nutrition and healthy eating messages at family mealtimes.

In effect, schools played a key role by providing nutrition education, aided by a comic booklet published by the program which addressed key nutrition and healthy eating messages. Teachers, who have a high status in Vietnamese society, also attended a two-day nutrition training course.

The program also utilized other community communication channels, ranging from monitoring centers for young children to newspaper-based awareness campaigns, a 30-second advertising spot on local television and the use of the biscuit distribution network as a means of education, via leaflets that accompanied the product.

Signs of success

Aside from the increased level of consumption of fortified biscuits and the significant change in children's knowledge, the main signs of success were that staff at the schools were heavily involved in the operation of the program and bore a great deal of responsibility by organizing the management of biscuits directly with the manufacturer.

Secondly, local partners (i.e., the manufacturer, provincial Department for Education and Training, the People's Committee of Quang Nam province) wanted to extend the model to all lowland districts due to the success of the program.

However, the program faced some challenges. The school fund which enabled the program to run effectively in each school was not always enough to help the most disadvantaged students to obtain biscuits, due to the location of some schools, which were less advantaged than others. Therefore, questions were raised in regards to financing certain activities (including education on nutrition) for the desired extension and this remained unresolved.

Nevertheless, the Bisavit-A project has now been adopted as one of the five key elements in the NAP (National Action Plan – Vietnam's Health Ministry), and remains an integral part of the Fasevie program.

The cost-effectiveness of micronutrient interventions

Micronutrient interventions are clearly cost effective. The Copenhagen Consensus Center estimates that the total cost of vitamin A supplementation per child per annum is \$1.20 in South East Asia and Sub-Saharan Africa, with a benefit-cost ratio of 17:1; \$1.60 a year in Central Asia, with a benefit-cost ratio of 13:1; and \$2.60 a year in Latin America, with a benefit-cost ratio of 8:1.

Progress from 2000 to date**2000**

- › MDGs

2002

- › UN General Assembly special session on children
- › Creation of GAIN (Global Alliance for Improved Nutrition)

2005

- › International Congress on Nutrition

2006

- › Creation of the Micronutrient Forum

2007

- › World Bank report Repositioning Nutrition as Central to Development

2008

- › Lancet Series, Maternal and Child Undernutrition
- › Copenhagen Consensus places micronutrients center stage
- › World Economy Forum formed the Global Agenda Council (GAC) on Food Security

2009

- › Castel Gandolfo Declaration
- › United Call to Action on Vitamins and Mineral Deficiencies
- › Beijing Private Sector Declaration at 2nd Micronutrient Forum
- › Amsterdam Initiative for Malnutrition (AIM)
- › Obama administration signals its commitment to addressing hunger
- › International Congress on Nutrition in Bangkok – Nutrition Security for All
- › UN Standing Committee on Nutrition / European Commission High Level Meeting in Brussels
- › G8's \$20 billion commitment on Food
- › Scaling Up Nutrition (SUN): A Framework for Action launched

2010

- › G20 pledge additional \$5.0 billion over the next five years towards achieving MDGs 4&5
- › African Union summit places safe motherhood and child health high on Africa's agenda
- › SUN Framework and Roadmap launched
- › Feed the Future (FTF), the new US government global hunger and food security initiative, is launched
- › The Global Strategy for Women's and Children's Health launched by UN Secretary General
- › UN Secretary General includes nutrition security and the importance of nutrition at the MDG summit
- › Nutrition included in the 2010 MDG outcome document
- › 1,000 Days: Change a Life, Change the Future – Partnering to Reduce Child Undernutrition movement launched by Hillary Rodham-Clinton, the United States Secretary of State, and Irish Minister of Foreign affairs, Micheál Martin
- › African First Ladies sign a call for action to put nutrition at the heart of development

However complex and sometimes controversial, micronutrient deficiency is a scourge of our age that can be tackled successfully and cost-effectively. Appropriately planned and managed programs can bring the right nutrients to the most vulnerable and point the way towards the eventual lessening of the long-term negative impact on human life and the economic burden on developing countries. It does, nonetheless, take commitment and political will.

Micronutrient deficiency is, however, not a burden that is carried by the developing world alone. The world's richest nations are also being impacted to a considerable extent. Although the developed world may have access to sufficient food, poor education and poor food and lifestyle choices are creating their own large-scale legacy.

DSM extends its partnership with the World Food Programme – the world's largest humanitarian agency fighting hunger



Nutrimix Plus in Nepal, 2011

In early 2010, DSM, of which *Sight and Life* is the humanitarian initiative, announced a three-year extension of its global partnership with the WFP, giving renewed hope for some 90 million people in 73 countries.

The aim of the partnership is to fight the debilitating effects of hunger and malnutrition in the developing world, where it is estimated that the cost of child malnutrition accounts for between 2% and 3% of GDP. The partnership, which includes *Sight and Life*, has resulted in the trial and testing of new products and programs to tackle hidden hunger. This has led to the development of a more sophisticated understanding of the problem and has been active in building awareness of hunger and hidden hunger and the available innovative solutions.

Important role for *Sight and Life*

Sight and Life is committed to the partnership through providing ongoing scientific expertise that focuses on the design, implementation, monitoring and evaluation of large-scale programs distributing micronutrient powders and other commodities including new innovations such as the enzyme phytase.

Key has been the WFP's shift in strategic focus from food security (providing enough calories) to also ensuring nutrition security (providing nutrient-rich food). The DSM Nutrition Improvement Program (NIP) has an additional important role to play, providing specialist support in the fields of food technology and product procurement.

The partnership theme Improving Nutrition – Improving Lives highlights the importance of public-private partnerships in solving global hunger and delivering nutrition security.

Source: *Sight and Life Magazine*, issue 1/2010

CDC

Centers for Disease Control and Prevention

Health Protection – Health Equity

Founded: 1946

Headquarters: Atlanta, GA, USA

Website: www.cdc.gov

Collaborating to create the expertise, information, and tools that people and communities need to protect their health – through health promotion, prevention of disease, injury and disability, and preparedness for new health threats.

CIDA**Canadian International Development Agency**

Founded: 1968

Headquarters: Gatineau, Quebec, Canada

Website: www.acdi-cida.gc.ca/home

Leads Canada's international efforts to help people living in poverty.

DFID**UK Department for International Development**

UK Government Department responsible for promoting development and the reduction of poverty

Founded: 1997

Headquarters: London and East Kilbride, Glasgow, UK

Website: www.dfid.gov.uk

DFID's mission is to eliminate global poverty by making a greater impact on achieving the Millennium Development Goals.

FAO**Food and Agriculture Organization of the United Nations**

For a world without hunger

Founded: 1945

Headquarters: Rome, Italy

Website: www.fao.org

Achieving food security for all is at the heart of FAO's efforts – to make sure people have regular access to enough high-quality food to lead active, healthy lives.

GAIN**Global Alliance for Improved Nutrition**

Founded: 2002

Headquarters: Geneva, Switzerland

Website: www.gainhealth.org

GAIN is committed to accomplishing the global health goals which are related to its vision of a world without malnutrition.

**Gates
Foundation****Bill and Melinda Gates Foundation**

All lives have equal value

Founded: 1994

Headquarters: Seattle, Washington, USA

Website: www.gatesfoundation.org

To increase opportunity and equity for those most in need.

GRET**Groupe de Recherches et d'Echanges Technologiques**

GRET is an NGO that supports sustainable development processes in urban and rural areas by building on social equity, economic promotion and respect for the environment.

Founded: 1976

Headquarters: Paris, France

Website: www.gret.org

GRET is a French non-profit, non-partisan, non-denominational, non-discriminatory structure whose philosophy is commitment and innovation.

HKI**Helen Keller International**

HKI is a non-profit organization dedicated to preventing blindness and reducing malnutrition worldwide

Founded: 1915

Headquarters: New York City, NY, USA

Website: www.hki.org

HKI's mission is to save the sight and lives of the most vulnerable and disadvantaged.

It combats the causes and consequences of blindness and malnutrition by establishing programs based on evidence and research in vision, health and nutrition.

IFPRI**International Food Policy Research Institute**

Sustainable solutions for ending hunger and poverty

Founded: 1975

Headquarters: Washington, DC, USA

Website: www.ifpri.org

To provide policy solutions that reduce poverty and end hunger and malnutrition.

MI**Micronutrient Initiative**

Solutions for hidden hunger

Founded: 1997

Headquarters: Ottawa, Canada

Website: www.micronutrient.org

To develop, implement and monitor innovative, cost-effective and sustainable solutions for hidden hunger, in partnership with others.

PATH**Program for Appropriate Technology in Health**

A catalyst for global health

Founded: 1977

Headquarters: Seattle, Washington, USA

Website: www.path.org

PATH's mission is to improve the health of people around the world by advancing technologies, strengthening systems, and encouraging healthy behaviors.

UNICEF**United Nations International Children's Emergency Fund**

'Unite for Children'

Founded: 1946

Headquarters: New York, NY, USA

Website: www.unicef.org

UNICEF is mandated by the United Nations General Assembly to advocate for the protection of children's rights, to help meet their basic needs and to expand their opportunities to reach their full potential.

USAID**United States Agency for International Development**

Founded: 1961

Headquarters: Washington, DC, USA

Website: www.usaid.gov

The US Agency for International Development (USAID) is an independent agency that provides economic, development and humanitarian assistance around the world in support of the foreign policy goals of the United States.

WFP**United Nations World Food Programme**

Fighting Hunger Worldwide

Founded: 1963

Headquarters: Rome, Italy

Website: www.wfp.org

WFP is the food-aid arm of the United Nations system. Food aid is one of the many instruments that can help to promote food security, which is defined as access of all people at all times to the food needed for an active and healthy life. The policies governing the use of WFP food aid must be oriented towards the objective of eradicating hunger and poverty. The ultimate objective of food aid should be the elimination of the need for food aid. Recently, WFP has moved its focus from aid to a food assistance addressing nutritional needs of their beneficiaries.

WHO**World Health Organization**

'Working for Health'

Founded: 1948

Headquarters: Geneva, Switzerland

Website: www.who.int

WHO is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends. In the 21st century, health is a shared responsibility, involving equitable access to essential care and collective defense against transnational threats.

World Bank**The World Bank**

Working for a world free of poverty

Founded: 1944

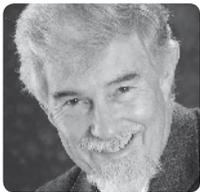
Headquarters: Washington, DC, USA

Website: www.worldbank.org

To fight poverty with passion and professionalism for lasting results. To help people help themselves and their environment by providing resources, sharing knowledge, building capacity and forging partnerships in the public and private sectors.

Sharing
knowledge
for improved
nutrition.

04 Micronutrient Deficiency in the Developed World



David Thurnham

Micronutrient deficiency is not the preserve of developing nations. Despite the fact that the gulf between developed and developing nations in terms of both food availability and living standards is enormous, micronutrient deficiency has an impact on the richest countries in the world.

Regardless of the huge differences in the quality of life experienced around the globe, links between nutrition, poverty, education and politics mean that the world's poor face micronutrient deficiency irrespective of where they live.

Dr David Thurnham, Emeritus Professor – University of Ulster, notes that, despite the recent turbulence in the banking world and its effect on the economy of many countries, food availability and living standards in the developed countries of the West are vastly superior to the conditions experienced by many people living in the developing regions of Africa, Asia and many other parts of the world. However, despite widespread food availability, he says that nutritional problems still exist and, with them, poverty, deprivation and lifelong health problems.

A developed world divided

Although there is widespread availability of energy-rich food and beverages in the developed world, many individuals lack micronutrients due to the poor food choices they make. The best-educated and more affluent members of society usually have the best nutrition and may even boost this with supplements. Meanwhile, the poorer members of society are consuming ever-growing quantities of foods high in fat and carbohydrates that are often inexpensive and energy-rich, but with little or no nutrients. In the poorest sector of society, consumption of vegetables and fruit is often severely limited, lowering people's intake of vital vitamins and minerals and negatively impacting on their health and ability to concentrate, for example at school.

'Thanks' to poor diets, children from low socio-economic strata do not appear to be consuming food that contains enough nutrients per energy unit. In other words, their diet has a poor nutrient density.

The surge in consumption of less nutrient-dense foods is partly due to how food prices have changed in the last half century. While the price of what are considered to be the most healthy foods, such as fruit and vegetables, has increased significantly, the price of corn-, soybean- and maize-derived food products has declined.

In the United States, there is a direct link between the large-scale production of maize and micronutrient deficiency. Maize is produced in large quantities not just to feed the beef and poultry industries, but also to be converted in fructose corn syrup, a sweetener which is a by-product of maize starch and is used in many processed foods.



Barry Popkin

In his 2009 book *The World is Fat*, Prof. Barry Popkin notes that cheap corn, wheat, and soybeans are a major focus of the US government and subject to long-term government intervention. Products using fructose syrup, for example, have long been subsidized, meaning that sweets and soft drinks are relatively cheap. As a result, according to Professor Popkin, the model of agricultural development that is being followed in the United States is backfiring dangerously.

"On one hand, we have much cheaper beef, poultry, corn, soybeans, and sugar," says Professor Popkin. "But on the other, this has occurred at the expense of healthy plant foods – particularly fruit and vegetables, whose relative cost is great compared with fats, sugars, and meats in today's marketplaces. The results for all of us – not only in America but around the globe – have been devastating."

The link between poverty and malnutrition

Poor education and obesity are other factors that, in addition to cheap calories, are having consequences in the developed world in terms of malnutrition. In 2008, more than 49 million people living in the United States experienced food insecurity. Negative nutrition- and non-nutrition-related outcomes have been associated with food insecurity in children, adolescents, and adults. These range from poor academic achievement, the inadequate intake of key micronutrients, and poor health, to the increased risk for and development of chronic disease (including diabetes, heart disease, and hypertension), and poor psychological and cognitive functioning.

The increasing cost of medical expenses and healthcare is another important factor. Although the level of overt vitamin deficiency is generally considered to be low in the developed world, there are people who have a low intake of micronutrients, and this compromises their health in the long as well as short term.

Indeed, although his ideas are not embraced by the complete scientific community, Prof. Bruce Ames argues that people accelerate their aging when their diets are even modestly deficient in essential micronutrients. His triage theory links micronutrient inadequacy with diseases of aging, based on the theory that the body favors short-term over long-term survival. In essence, due to mechanisms developed during evolution to protect against episodic vitamin and mineral shortages, the human body achieves short-term survival by prioritizing the allocation of scarce micronutrients. However, this is achieved to our long-term detriment and potentially results in diseases associated with age, such as cancer and heart disease.

The short-term role of vitamin K, for example, is to clot blood; however, in the longer term, it stops blood vessels from becoming calcified, or stiffened. Based on Professor Ames's theory, if the body has a shortage of vitamin K, it will focus on its short-term requirements to the detriment of the long-term goal of keeping blood vessels healthy, and this could lead to increased heart disease in later life.



An overweight family

Today's sedentary, 'couch-potato' lifestyle means that people do less manual labor and are exercising less. They are not only becoming fatter, but this lack of outdoor activity is also impacting on their levels of vitamin D production, which is predominantly obtained from sunlight. In addition, the sunscreens that dermatologists urge people in the developed world to use as protection against harmful UV rays likewise negatively impact on the production of vitamin D by the skin. This has resulted in a noticeable decrease in vitamin D levels in many developed as well as developing countries, which is affecting the risk of falls and bone fracture. Recent research even indicates that vitamin D is important for many more bodily functions.

These new developments in science and the thinking about the short- and long-term role of micronutrients in health and disease, together with tools that measure vitamins with far greater sensitivity than in the past, are giving micronutrients a renaissance.

Ultimately, "Our biology, which was shaped by millions of years of evolution, is not prepared for our modern society, which has profoundly changed how we eat, drink, and move," says Professor Popkin.

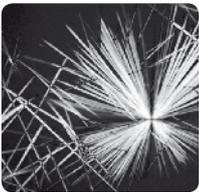
Thus, just as developing countries are being hampered by micronutrient deficiency, so too is the developed world – even though this concept has been less widely appreciated.

The story of vitamin D deficiency

Probably the most common but unrecognized medical deficiency in the developed world, vitamin D deficiency, is thought to impact more than 50 percent of children and adults in the United States, says Dr Michael Holick, professor at Boston University School of Medicine. In addition, it is estimated that some 70–90 percent of children and adults in Europe are believed to be vitamin D deficient. The difference between these two regions may well be as a result of the fact that, while some dairy products are fortified with vitamin D in the US, it is forbidden to fortify most dairy products with the vitamin throughout much of Europe. In Europe, bar Finland and Sweden, only cereals and a few margarines are permitted to be fortified with vitamin D.

However, “We are now recognizing that the amount of vitamin D necessary for satisfying a person’s requirement is probably five to ten times what was previously thought,” Dr Holick notes.

Until the end of 2010, it was recommended in the United States that children and adults up to 50 years of age should consume 200 units of vitamin D a day. According to the latest recommendations, however, North Americans need on average 600 units of vitamin D per day, while people aged 71 and older may require 800 units. Yet, says Dr Holick, adults should instead be taking between 2,000 and 4,000 units a day. The obese, meanwhile, should take two to three times the recommended adult dosage.



A vitamin D crystal

Why the emphasis on vitamin D? Research indicates that, during pregnancy, women who are deficient in vitamin D are more likely to develop eclampsia and to give birth by Caesarian section. In addition, their children are more likely to have respiratory tract problems, and to be at risk of developing multiple sclerosis or type one diabetes later in life, or do not reach their peak height or bone mineral density.

“For adults, vitamin D deficiency will precipitate and exacerbate osteoporosis² and causes a bone disease called osteomalacia,³ often misdiagnosed as fibromyalgia and a painful aching in the bones and muscles. Many doctors are unable to find any cause of this and often give a misdiagnosis,” says Holick.

Vitamin D deficiency in adults has also been shown to increase the risk of developing colon, prostate and breast cancer, among others, by as much as 50 percent. It also appears that the risk of heart attack increases by 50 percent, type two diabetes by 33 percent, and peripheral vascular disease⁴ by 80 percent. Finally, vitamin D deficiency is now associated with an increased risk of asthma, upper respiratory tract infections and influenza.



Michael Holick

“I would have hoped, says Dr Holick, “that they would substantially raise recommended intakes and, more importantly, safe upper intake limits. More foods could then have been fortified with vitamin D, and more vitamin D would have been added per serving. The deficiency would thus have been addressed more efficiently.”

“Hopefully they’ll also get the message in Europe, and begin to fortify other dairy products with vitamin D, as well as other foods such as pasta, to markedly increase the intake in the general population,” he says.

Sunshine is another source, although our tendency to avoid the sun or to use a sunscreen with a factor of 30 or more reduces our ability to make the vitamin in our skin by 95 percent. People from northern climes, such as the British, are also unable to make the vitamin from mid October to mid April, even if they get sun exposure.

²Osteoporosis means “porous bones” and is sometimes known as the fragile bone disease.

³Osteomalacia is a condition affecting adults where the bones become weak and softer than normal.

⁴Peripheral vascular disease refers to any disease or disorder of the circulatory system outside of the brain and heart.

“The only chance is to take supplements and get some sensible sun exposure on your arms or legs; you can spend 15 minutes outside, depending on your degree of skin pigmentation, the latitude, and so on – and you never want to burn,” Dr Holick says. It’s likely that vitamin D is the vitamin of the decade.

The extent of the problem

A survey carried out in Germany in 2005 and involving 15,000 participants revealed that some 30 per cent of the population had low micronutrient intakes. While this cannot be taken to mean that micronutrient deficiency is prevalent in the German population, it does point to a lack of intake that was, perhaps, underestimated in the past. It also indicates that, although people in developed countries can find everything they need for a quality diet in the supermarkets, they are not selecting or obtaining all the nutrients that they need for optimal health and disease prevention. Finally, it raises the question of whether there is a link between poor nutrition, especially micronutrient inadequacies, and the development of cancer, diabetes, coronary heart disease, osteoporosis, and fractures. Research will, we hope, offer answers – just as over the years it has clearly linked multiple micronutrients to undernutrition.



Examples of fortified foods

Fortification has a relatively long history in the developed world. Fortified corn meal, for example, dates back to a program initiated in the United States in 1943, when the US National Research Council recommended enrichment standards for food products. This was first enacted in South Carolina, when vitamins B₁, B₂, niacin, and iron were added to corn products. A revised fortification policy was proposed in 1974 by the Food and Nutrition Board of the National Academy of Sciences to incorporate all cereal grain products, including flour, followed by mandatory fortification with folic acid in 1998. Although flour fortification is far from being a prerequisite in Europe, restoration of the micronutrients lost in milling is also required in Canada and Denmark.

Margarine fortification can be traced back to the introduction of butter rationing in Denmark. In 1918, butter, a natural source of vitamin A, was made available at a low price and this triggered a fall in the consumption of non-enriched margarine. As a result, the prevalence of xerophthalmia declined drastically, before disappearing altogether in 1919. When butter rationing was discontinued in 1920, and access to this source of vitamin A was therefore reduced, xerophthalmia reappeared. Such observations on the positive impact of milk fat, but not of margarine made with plant fat, eventually led to the fortification of margarine with vitamin A.

Iodine deficiency currently impacts approximately 2 billion individuals around the globe. In many countries around the world, iodine deficiency is controlled via universal salt iodization and is generally successful. In the developed world, around 50 percent of Europeans are thought to be mildly iodine deficient, as salt iodization is not mandatory in all countries. As salt is often supplied from a few major sources and processing is centralized, iodization is relatively easy. Switzerland was the first country to introduce salt iodization in 1922.

Exploring the micronutrient controversy



Fortified salt

While developing countries face acute issues of malnutrition, developed countries also have to combat micronutrient inadequacies. This is therefore a global health issue.

The use of micronutrients is, however, not without controversy. Some people believe that micronutrients are not necessary, while others, generally individuals who follow a healthy diet, take them daily as supplements. It is recognized and even recommended by some that taking a daily multivitamin provides valuable insurance against a possible shortage of micronutrients in the diet. This is supported by the fact that some micronutrients, including vitamin D and folic acid, are extremely difficult to obtain from one's diet in sufficient quantities.

Supplementation is one answer to meeting the shortfall from the diet. It is well recognized that women planning a pregnancy should take a folic acid supplement, ideally before conception, thereby reducing the risk of birth defects such as neural tube defects (NTDs). Research however shows a low compliance rate of taking a folic acid supplement in women of childbearing age, which means that it might be more effective to add folic acid to commonly consumed foods in order to ensure this benefit reaches most women of childbearing age.

South Africa, for example, embarked on a program of mandatory folic acid fortification of the staple foods maize meal and wheat flour in 2003. A study conducted in 12 public hospitals in four provinces of South Africa revealed a significant decline in the prevalence of NTDs following folic acid fortification, with a decline of 30.5 percent, or 1.41 to 0.98 per 1,000 births. Meanwhile, research indicated that the cost-benefit ratio in averting NTDs was 46 to 1. These results are consistent with decreases observed in other countries that have fortified staple foods and illustrate the large benefits for individuals and health systems.

Taking vitamins and minerals in order to meet dietary requirements through either supplementation or fortification can support overall health, but must be done in a controlled and monitored manner and should never replace consuming a healthy, balanced diet, if this option is available.

While developing countries face significant deficiencies in micronutrients that have a public health impact, we are also seeing a rise in chronic diseases and obesity in low- and middle-income countries, where significant proportions of the population have become more affluent.

Fascinating new research shows that the development of diseases in later life might well be related to the nutritional status of the mother before, during, and after birth. This is known as the Barker hypothesis. It has shown that low birth weight babies are at risk of developing certain diseases such as hypertension, type two diabetes, and obesity later in life.

It is essential for a woman of childbearing age to have an adequate diet before, during, and after pregnancy, and during breastfeeding. After six months of exclusive breastfeeding the mother needs to ensure that safe, appropriate, nutrient-dense complementary foods are added to the diet, together

with continued breastfeeding until the child is at least two years of age, in order for it to have the best start in life and be protected against malnutrition and, eventually, the development of chronic diseases later in life.

A longitudinal study carried out in Guatemala highlighted how important it is that children have an adequate diet at the start of life, as it showed how this impacted on the individual's overall performance and eventually their income potential. Studies have also demonstrated that women in developing countries often do not themselves have adequate diets. This not only impacts on their health, but also results in low birth weight babies and, ultimately, impacts on the short- and long-term cognitive and physical development of the infant when the complementary diet of the child is inadequate. It is important to note that for the first six months of a child's life a mother's breast milk is expected to meet the infant's nutritional needs – nature has established that the child will receive the nutrition it needs, at the expense of the mother's nutritional status.

As has also been highlighted, micronutrient deficiency is not only limited to developing countries. A study in Germany measured the blood levels of vitamin A in well-educated women and found that they were considerably lower than the recommended level.

The Healthy Lifestyle in Europe by Nutrition in Adolescence (HELENA) study, which has investigated nutrient intake and the status of male and female European adolescents, also found that more than 50 per cent of adolescents had vitamin D deficiencies, while 30 per cent had problems with iron metabolism and anemia.

More research is needed to develop indicators for nutrient status that are reliable and easy to measure, and in order to allow us to intervene to improve health outcomes around the world – in developed and developing countries – so as to improve the lives and health outcomes of millions.

Attitudes also vary, not only between the developed and developing world, but also within the developed world and, more specifically, between America and Europe. Americans, for example, are more open to taking dietary supplements than are Europeans, while the latter remain more skeptical about food fortification or any alterations to the traditional diet. In many developing countries there is also a lack of recognition that the traditional diet is inadequate and that, although food-based strategies are important in the long-term, proven cost-effective interventions are required in the short and medium term to prevent deficiencies. This is especially critical for women of childbearing age, and at the time when complementary foods are introduced after six months of age.



Education in the field

The need for advocacy

Sight and Life sees advocacy as an essential tool in the fight against micronutrient deficiency. At present, the organization's advocacy focuses primarily on the developing world, but advocacy around malnutrition in all its forms is to increase. Advocacy is important as it is critical that nutrition should be placed high on the world's development agenda. There should also be commitment at the highest political levels if we are to change millions of lives for the better. *Sight and Life* creates awareness of the issues pertaining to micronutrient deficiency and encourages dialogue and conversations in order to ensure nutrition is recognized as being critical, not only to prevent disease, but also to optimize health and physical and mental performance. *Sight and Life* is therefore a catalyst in the field – a convener that allows others to gather, and one that calls on and partners other players when something needs to be done.



The *Sight and Life* team, 2011

Sight and Life has considered itself suited for this role because it has significant knowledge in the field of micronutrients. This is thanks not only to its own experience and expertise, but also to its international network of experts and the host of experts with knowledge of micronutrients and their applications within its parent DSM. *Sight and Life's* approach to advocacy is to build on the scientific evidence and to turn that evidence into programmatic actions. It supports the creation of scientific evidence, and communicates this through its magazine and website. Furthermore, it has a network that allows it to communicate extensively and influentially. *Sight and Life* also partners with a number of organizations in advocacy campaigns around micronutrient deficiency. This is primarily driven by the fact that nutrition is largely underfunded, compared to other issues in the fields of agro and health. Micronutrient provision lies between these two sectors and relies on the breaking down of the silos in which they have traditionally functioned. Nutrition-specific and nutrition-sensitive interventions need to be engaged and scaled up.

Sight and Life has various key partners. It has a partnership with the WFP and with Johns Hopkins University and others, focusing on feeding the world's poor and people afflicted by emergencies. This highlights the fact that its primary focus is on the developing world where most of the burden of micronutrient deficiency lies. It contributes significantly towards the developed world and its advocacy campaigns ensure that micronutrient deficiencies are addressed globally.

Ultimately, *Sight and Life's* goal is to focus on a range of areas, from driving awareness and improving education around the vital role of micronutrients throughout the lifecycle to influencing government policy and driving change to being actively involved in programs and interventions in many countries.

Reflections

There are significant deficiencies of some micronutrients in the developed world. There is, therefore, a need to intervene – from both the public health and cost perspectives. Yet a balance has to be found. Some people in these countries may be found to have intakes that are too high, while others may require supplements or fortified foods. The risk of low intake resulting in disease needs to be managed, alongside the risk of harmfully high intakes. It is the goal of *Sight and Life* to work towards interventions that ensure that populations throughout the world receive adequate amounts of micronutrients to ensure optimal health.



Preschool children
Chongqing, China

While the possibility of harm, due to excess, cannot be entirely excluded, it is important for policy-makers to accept that there is always a trade-off. This was the case with folic acid fortification in the United States, where cases of colon cancer initially increased after fortification was introduced because people with early stages of cancer of the colon did not fully benefit from the introduction of folic acid. Subsequently, the total number of cases of colon cancer has decreased since mandatory folic acid fortification, as people who did not have early stage colon cancer have benefited from fortification with folic acid. The lesson to be learned could therefore be that risks have to be acknowledged, judged and managed to ensure the maximum benefit of any intervention.

Taking into account the world's countries with aging populations and the concomitant increased health costs, it is necessary to consider optimum interventions that will result in reduced long-term costs to the public health systems and the greatest benefits to the overall population. Nutrition issues should be considered as more important yet viewed more critically than in the past, since nutrition interventions may yield a greater cost benefit than many other more costly medical interventions. They do, however, require careful assessment, surveillance, follow-up, and possibly fine-tuning.

A nutritionist's view

Susan Gross, PhD, MPH, RD is a nutritionist and evaluation specialist at Johns Hopkins University's Bloomberg School of Public Health, in the Department of Population, Family and Reproductive Health.

Susan is a registered dietician with a PhD in maternal and child health, with an emphasis on nutrition, and has worked in the field of children and maternal nutrition for 20 years. Her work focuses on children with special needs and, specifically, targeted supplemental nutrition for women and infants and young children.

"We have a rich nation. When our youngest children – one-year-olds – add solid foods and liquids other than formula or breast milk to their diets, they tend to favor refined sugars and high fat foods, but the variety of fruit and vegetables is low," says Susan. "We also see iron deficiency anemia, which is definitely related to the fact that their source of calories is iron-poor ... There is also a problem with children drinking excess amounts of milk and juice, which means there's an increasing problem with obesity. There are often children who are considered at risk for overweight by the age of two, with a Body Mass Index of 85 and above. We see a lot of dental caries, too."

"As we learn more about vitamin D, we know that, although most people get enough to prevent rickets, vitamin D has other important functions in the body. It's a micronutrient that our wealthy, prosperous nation is now finding problems with and deficiencies are on the increase."

"Our developed nations make it very easy for us to get calories, but these are not always high-quality/nutrient-dense calories," says Susan.

The double burden

"It's established that, for children, obesity is a double-edged sword. In obese children, there are increased risk factors for chronic diseases such as cardiovascular disease, hypertension and type two

diabetes. We're seeing these symptoms and risk factors developing earlier in these children. If you are obese at the age of three, the probability of being obese at 13 is five-fold compared to those not obese at three. And those obese at 13 are almost 90 percent likely to be obese as adults."

"Obesity is affecting our ability to absorb and use micronutrients. Vitamin D is so important, too, not just in terms of bone health but also other parts of our health. If it's compromised, everything associated with it in our system is in trouble."

"As long as foods that are high in sugar or refined carbohydrates and fat are cheaper and more available than nutrient-dense foods, and as long as it's cheaper to get 'fast food' than salad, parents will shop wisely for things that are the most economical, but not always best for a healthy diet." In the United States, schools have just had the Child Nutrition Reauthorization Act 2010. This act, for the first time in 20 years, is increasing the amount of money that goes to school lunches so they can improve the quality of the lunches. "As long as schools don't have policies in place that promote healthy foods we need to be concerned ... there has to be reform."

"Farmers in the United States produce a great deal of corn which is often used to produce corn syrup, a major source of refined sugar in many food products. And as long as it's not a priority to make foods healthy, there'll be a problem. Our sizes are so large and the portions distorted – a child's meal at a fast food restaurant is actually the portion an adult should be eating. We're also exporting this idea to everyone around the world – some of our most successful exports are fast food restaurants," concludes Susan.

An unavoidable issue

Micronutrient deficiency is an issue we cannot afford to ignore. It demands our attention not only because of the importance of optimum nutrition, but also because of its impact on healthcare costs. B vitamins, for example, are related to cognition and to cognitive diseases of ageing, such as Alzheimer's, while vitamin D, if taken in sufficient quantity, reduces the risk of falls and associated fractures. There is also a moral imperative that disabilities and deaths that could be prevented with an optimal diet should be prevented.

Micronutrient deficiency not only has an economic impact, but also plays a role in giving people a healthy and productive life, for as long as possible. Nutrition and lifestyle play a significant role. Nutrition is closely linked to overall lifestyle such as exercise, stress management and alcohol intake. And, since the poorest members of our developed countries are those most afflicted with lowest quality diets, a number of different approaches are required. Ultimately, infants, children and people on low incomes, or those heavily supported by governmental contributions, are being handicapped by poor quality diets. This can and should change.

05 Taking a Strategic Approach

Initially founded in 1986 to promote vitamin A and its link to preventing blindness in children in the developing world, *Sight and Life* has evolved considerably over time to reflect the changing world in which it operates, as well as new scientific developments in the field of micronutrients. Today, its focus has moved from 'sight', a single condition, a single vitamin focus, to 'life' itself, embracing an all-encompassing approach to micronutrients and their broader role in promoting health and well-being, and preventing disease, disability and death.

Sight and Life now addresses the crucial relationship between micronutrient intake and health. It addresses the critical role played by micronutrients in addressing both over- and undernutrition. Its current activities include providing micronutrients to counter inadequate nutritional intake, supporting educational and training programs to foster good nutritional practice, cooperating with scientific establishments, academic institutions and healthcare organizations to grow the science of micronutrients, and active involvement in global advocacy to place nutrition at the centre of the development agenda.

Then and now

On 1 July 1987, *Sight and Life* started a donation program of soft gelatin vitamin A capsules, each of which contained 200,000 international units of vitamin A as a complement to UNICEF's capsule distribution activities. Capsules were dispatched, upon request, to Bangladesh, Bolivia, Madagascar, Mexico, Nepal, Vietnam, and Zimbabwe, with further shipments to Ghana, India, and San Salvador in process.

At that time, single, large doses of vitamin A were viewed as an extremely effective and low-cost, short-term strategy that helped to prevent and combat xerophthalmia until a permanent solution could be found. Two types of vitamin A programs were practiced at the time: The periodic, universal distribution of large doses of vitamin A to children of defined ages, usually on a semi-annual basis, and the targeted distribution of vitamin A within existing Primary Health Care Programs to individuals actually or potentially affected by xerophthalmia.

Children over one year of age received a full dose of vitamin A, and infants half as much. Massive dosing was seen to take advantage of the fact that a large proportion of the vitamin A given was stored in the liver for future use and thus protected a preschool child for approximately 4–6 months. The soft gelatin capsules were

recognized as a well-established and convenient form of supplying high doses of vitamin A. UNICEF was then the most important supplier of vitamin A capsules worldwide, distributing tens of millions of capsules to more than 20 countries where, under the direction of local health authorities, specific programs for the prevention and control of xerophthalmia had been introduced.

***Sight and Life*
in the 1980s**

“Not many people have access to the internet in the developing world. We rely on the printed page, so *Sight and Life* Magazine has always been very helpful indeed. It helps with knowledge dissemination by sharing current literature and research on nutrition and other aspects of health, as well as supporting the printing of thousands of books. The ‘yellow magazine’ abstracts cut across disciplines and reach every corner of the globe.”

Dr Boateng Wiafe, MD, MSC (Community Eye Health), Regional Director for Africa Operation Eyesight Universal

An increasingly recognized measure



***Sight and Life*
is honored by
the Micronutrient
Forum, 2007**

A decade later, the fortification of commonly eaten foods with micronutrients including iodine, iron, and vitamin A was one of the main strategies used to improve micronutrient status. Fortification was viewed as one of the measures that influenced the improved quality of food, together with improved agricultural practices, improved food processing and storage, and improved consumer education to adopt good food preparation practices.

In 1996, *Sight and Life* had supported 245 projects in 65 countries, including 113 vitamin A capsule donation projects, 11 research projects, 4 technical support projects and 9 training and education projects. Donations of 5.2 million vitamin A capsules contributed to the fight against the worldwide vitamin A deficiency problem. Forty per cent of its activities were allocated to Africa, 28 per cent to the Americas, and 32 per cent to Asia.

By 1997, food fortification was also increasingly recognized in developing countries as a measure to improve the micronutrient status of large populations, especially the most vulnerable. When fortification of staple foods commonly purchased was undertaken, it meant that it was unnecessary to make changes in the customary diet of a population. Thus, it would not require individual compliance and could therefore have a significant health impact in a fairly short time – this was beneficial in many countries where micronutrient deficiencies were identified as being a significant public health problem. As a result, fortification was seen as something that could often be relatively quickly implemented and be sustained over a long period. It was, therefore, seen as possibly the most cost-effective means of overcoming micronutrient deficiencies.

The challenge for the food industry was, however, to take economic, social, and political factors into account when planning fortification intervention strategies, with the critical goal of playing a key role in improving the physical, social, and economic well-being of billions of people.

Food fortification programs in operation at the time included a pioneering program for the fortification of sugar with vitamin A in Guatemala. Sugar was identified as the best vehicle for vitamin A supplementation by the

Institute of Nutrition of Central America and Panama (INCAP), as it is consumed in regular predictable quantities by the majority of the population, is relatively cheap and accessible, and is produced by a relatively centralized process. Based on a special water-soluble form of vitamin A, Dry Vitamin A Palmitate, Type 250 CWS, a relatively simple method of fortifying sugar was developed which did not cause any negative changes in the final product.

Guatemala's pioneering role in the fight against vitamin A deficiency culminated in a declaration entitled the "Guatemalan Declaration on Combating Vitamin A Deficiency through Sugar Fortification", and signed by representatives of at least 33 countries, 28 enterprises and 39 organizations at the International Conference on the Fortification of Sugar with Vitamin A in March 1996.

***Sight and Life* in 1997**

In 1997, 38% of *Sight and Life's* grants were allocated to activities in Africa, 27% to the Americas and 35% to Asia. It published four Newsletters, each with a circulation of 3,000.

Refocusing efforts on micronutrients

By 2007, *Sight and Life* had refocused its efforts on the benefits of a broad range of micronutrients, rather than just vitamin A. It championed the fight against micronutrient deficiency, in particular nutritional anemia, and aimed to ensure that anemia and its link to nutrition received the recognition merited by the magnitude of the problem, with almost 50% of preschool children and over 40% of pregnant women being anemic globally. The first meeting of the Micronutrient Forum in Istanbul, Turkey, 2007, recognized *Sight and Life's* contribution to the field of micronutrients by making it the first organization to be honored for its commitment and work.

In handing the citation to Dr Klaus Kraemer, Director of *Sight and Life*, Chairman of the Micronutrient Forum Dr Alfred Sommer of the Johns Hopkins Bloomberg School of Public Health stated that, "The Forum honors *Sight and Life* in recognition of its long-standing commitment to alleviating micronutrient deficiency around the world."

The cure of vitamin A deficiency

"This illness [vitamin A deficiency] can be conquered, and millions of children can be saved from blindness and death. All that is necessary is imagination, commitment and political will."

Dr Alfred Sommer, Johns Hopkins Bloomberg School of Public Health, Baltimore USA
Source: 1987 *Sight and Life* Annual Report, translated from the German

The problem of micronutrient deficiency



Cooked rice

Our growing understanding of the problem of micronutrient deficiency

An extract from: Leaving the Chrysalis Behind – Chairman’s Concluding Remarks, 2nd Micronutrient Forum, Beijing, 15 May 2009, given by Dr Alfred Sommer, Johns Hopkins Bloomberg School of Public Health, Baltimore, USA

“I can’t help but reflect on how far this meeting, and our shared journey to control micronutrient deficiency, has come since the first IVACG meeting nearly 35 years ago. It was not as if the world was ignorant about micronutrients – iodine and iron had long been on the agenda. But the world just didn’t care. Micronutrient deficiency did not provide the same public urgency as, say, H9N9 Flu. And I believe [...] that nutritional scientists and policy-makers were caught in a time warp of orthodoxy.

“IVACG, the earliest progenitor of the Micronutrient Forum (MNF), was built by Martin Foreman, of the US Agency for International Development (USAID), to bring together clinical researchers, like myself, with nutritional scientists, policy-makers and others who design and implement programs, to pursue the possibility that vitamin A deficiency as a cause of childhood blindness might be much greater than the world recognized, and to conduct research that would establish its cause and design effective interventional programs. It proved, as we all now know, to be a major cause of pediatric blindness. But most ministers of health remained disinterested, on the not unreasonable grounds that they had committed their meager resources to child survival strategies.

“By 1992, multiple teams in multiple countries had conclusively demonstrated that improving vitamin A status dramatically reduced childhood mortality. The ministers of health could prevent up to a million children from dying and going blind every year with one intervention; a ‘twofer’ if ever there was one.

“Instead of reveling in this commitment, discussions at IVACG remained acrimonious for many years ...

“Twenty years later, we are still awaiting those effective dietary changes, while periodic dosing, driven by UNICEF, HKI, and others, and largely funded by the Canadian and American governments, has proved to be a remarkably effective and scalable strategy. [...] In the past 10 years, UNICEF has supplied 5.3 billion high-dose supplements of vitamin A – and that does not count vitamin A dosing with syrup in India. Extrapolating UNICEF estimates, even with current coverage rates of only 70–80%, the lives of 3.5 million children have probably been saved in the past 10 years alone.

“I dwell on this because I was struck [...] by how far we have come from that original orthodoxy; by the range of innovative approaches to micronutrient deficiencies now being vigorously pursued. These include everything from centralized fortification schemes using multiple micronutrients, to ‘point of consumption’ fortification with micronutrient powders in the home. We’ve heard about wheat flour fortification, UltraRice™ and NutriRice™. We’ve heard about the pro-active and thoughtful rollout of zinc for home treatment of diarrhea.

“As Chairman Mao once proclaimed, ‘Let a thousand flowers bloom’. They are blooming, and those that prove most successful need to be aggressively pursued as we sharpen the focus of our advocacy, investment, and momentum.”

In 2007, *Sight and Life* also launched a book on Nutritional Anemia, presenting the leading research in this field in a single volume for the first time. In order to make the information accessible to a wide range of audiences, a Guidebook giving a comprehensive summary of the book was also released and a review by the Journal of the American Medical Association described it as “... a well-organized, well-written, and user-friendly resource that healthcare professionals, including clinicians working with patients with anemia, will want to have on their bookshelves or as an icon on their computer desktops.” In 2007, the organization’s projects ranged from multiple-micronutrient-fortified school meals in China to tackling micronutrient deficiency with the aid of multiple-micronutrient-enhanced school meals in Cambodia and Tanzania.

A milestone publication

***Sight and Life’s* 2007 Guidebook on Nutritional Anemia**

Extract: Preface to *The Guidebook: Nutritional Anemia*
Jane Badham, Michael B Zimmermann, Klaus Kraemer
Sight and Life Press, 2007



Jane Badham

“Two hundred million children under the age of five, mostly living in Sub-Saharan Africa and South Asia, fail to reach their full cognitive, motor and social-emotional potential because of micronutrient deficiencies and inadequate stimulation. These children will probably fail at school, fail to achieve their income potential, and remain trapped in the poverty cycle. A tragic reality.

“In May 2002, the General Assembly of the United Nations re-emphasized that control of nutritional anemia should be one of the global development goals to be achieved in the early years of this new millennium. Sadly, there has been little documented progress in the global fight against anemia and WHO data shows that 818 million children under the age of five and women are affected by this public health problem, mainly in developing countries. About one million of them die every year. This shows the magnitude of the problem and highlights the urgent need for action.

“*Sight and Life* has always championed interventions to address micronutrient deficiency, including iron deficiency and nutritional anemias, and, as a result, has published a book, *Nutritional Anemia*. In a single volume, it highlights for the first time all the critical factors in addressing nutritional anemia, with contributions from leading scientists in their respective fields. It has become clear that the effective control of anemia requires integrated solutions that are tailored to the particular needs and opportunities in each country. Components of any such an approach include micronutrient supplementation of the most vulnerable groups (particularly children and women of childbearing age), food fortification, dietary diversification and education, as well as control of diseases such as malaria, worm infections, and other chronic endemic infections. While each of these can help reduce the burden of anemia, none is capable of doing the job on its own.



Michael Zimmermann
and Klaus Kraemer

“[...] This Guidebook’s ... intention is to give an overview of the latest scientific thinking and the challenges facing the world as we go forward in planning, implementing and monitoring interventions to address what is undoubtedly the biggest nutritional problem that the world currently faces.”

Meanwhile in 2005, the Nutrition Improvement Program (NIP), which forms part of DSM’s Human Nutrition and Health marketing activities, was founded with the aim of improving human health and prosperity by eliminating micronutrient deficiency through the development of innovative nutrition products and business models.

Working in close collaboration with governments, international governmental and non-governmental organizations, and the private sector, the program provides support for fortification of staple foods in developing countries. In 2007, the program played a central role in launching the innovative ‘nutritious rice kernel’ NutriRice™.

**Making rice
fortification
work:
NutriRice™**



Bruno Kistner

“In the past, rice fortification often failed because potential beneficiaries tended to pick out the discolored or shaped kernels which carried nutrients. Furthermore, other technologies did not maintain the nutrients in the kernel when the rice was being washed and cooked, or only partially did so.

“Unlike other fortified rice kernels on the market, NutriRice™ technology uses natural rice from broken rice kernels and is therefore non-GMO. Jointly with Bühler engineers, our scientific and technical experts managed to protect the nutrients inside the extruded kernel during the extrusion process. At the same time, thanks to many years of trials and research, any shape or color kernel can be copied.

“NutriRice™ is a breakthrough because it can be made invisibly, and the kernel protects the added nutrients when the rice is washed and cooked. This makes it a cheap and effective carrier for a whole range of essential nutrients, and brings white rice close to a balanced diet at a very low cost. At the same time, it means that people do not need to change their dietary habits.”

Bruno Kistner, NIP, DSM Nutritional Products Ltd., Switzerland

That same year, Feike Sijbesma, the president of *Sight and Life* and incoming Chief Executive Officer and Chairman of the Managing Board of DSM, announced a global humanitarian partnership with the UN WFP, the largest provider of food aid to the world’s hungry. “The life science industry is able to make a major contribution to fighting global malnutrition and hunger,” Mr Sijbesma said, adding, of DSM, that “We cannot be successful, nor can we call ourselves successful, in a society that fails.”

In tackling the numerous challenges of feeding people in refugee and emergency settings, DSM and WFP are trialing and testing new product solutions and program designs, developing a more sophisticated understanding of the problem and the needs and wants of the people they are targeting, and building awareness among

multiple stakeholders of the problems and available solutions. DSM also advised the WFP during the design of its Nutrition Improvement Approach, which saw the WFP focusing more on including nutrient-rich food (nutrition security), beyond providing food security (sufficient energy).

The partnership sees DSM assist the WFP with expertise, high nutrient products, and financial support to feed more of the world's poorest a nutritious meal. *Sight and Life* brings its expertise in nutrition science and advocacy to the partnership. DSM's commitment requires the active participation of its employees, and focuses on two initiatives:

> **Nutrition enhancement**

DSM is providing WFP with DSM expertise, know-how, and products to increase the nutritional value of the WFP food basket

> **Employee engagement**

DSM employees are supporting WFP projects, and organizing and participating in events to create awareness of malnutrition

A strategic framework

Sight and Life cares about the world's most vulnerable populations and exists to help improve their nutritional status. Acting as their advocates, it guides original nutrition research, disseminates its findings and facilitates dialog to bring about positive change.

Historical snapshots

Between 1986 and 2007, *Sight and Life* allocated \$37 million of funds, covered 80 countries and distributed 77 million vitamin A capsules.

In 1987

***Sight and Life* supported 15 projects in 12 countries.**

It distributed 1.2 million capsules.

It saw the mass distribution of liquid vitamin A via dispenser:

- > To refugee camps in Malawi (100,000 doses)
- > To Pernambuco, Brazil (80,000 doses)
- > To Japara, Central Java, Indonesia (for a cost-effectiveness study)

Vitamin A was also added to monosodium glutamate in Indonesia.

In 1997

***Sight and Life* supported 241 projects in 75 countries. These included:**

- > 137 vitamin A capsule donations
- > 9 research projects

- > 3 technical support projects
- > 11 training and education projects

A travel grant for the IVACG Meeting allowed a number of scientists to participate. Individual study grants were awarded for courses at the Institute of Ophthalmology in London.

In 2007

***Sight and Life* supported 184 projects in 46 countries, including:**

- > 48 vitamin A capsule donations
- > 11 research projects
- > 4 technical support projects
- > 24 training and education projects
- > 6 travel grants for congresses and workshops

A snapshot of WHO

The World Health Organization (WHO) is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends.

WHO believes that, in the 21st century, health is a shared responsibility, involving equitable access to essential care and collective defense against transnational threats.

WHO operates in an increasingly complex and rapidly changing landscape. The boundaries of public health action have become blurred, extending into other sectors that influence health opportunities and outcomes. WHO responds to these challenges using a six-point agenda. The six points address two health objectives, two strategic needs, and two operational approaches. The overall performance of WHO will be measured by the impact of its work on women's health and health in Africa.

Adapted from www.who.int, 10 November 2011

Today, the fight to combat global hunger and malnutrition is of ever-increasing complexity. The interplay of micronutrients in single diseases and conditions means that there is an ever greater need to stay up to date with latest science and evidence and to support the most up-to-date research and discussion as more gaps in knowledge become apparent. At the same time, there is a real need to move from talk to action.

Sight and Life's approach



Building bridges for better nutrition

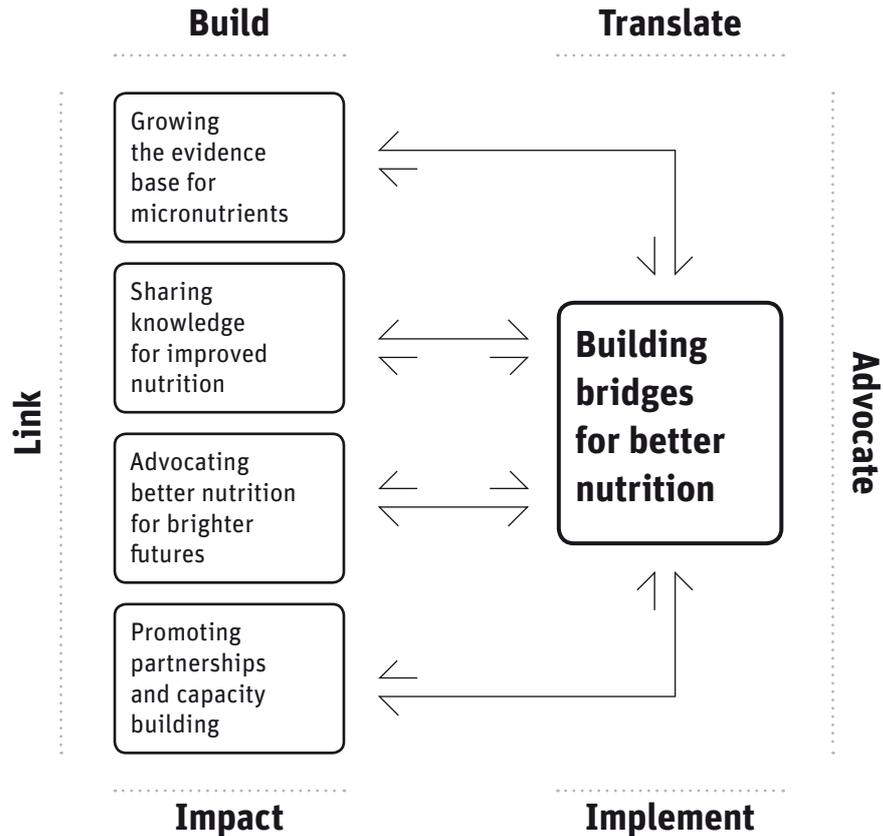
“Building bridges for better nutrition”

To ensure a sustainable improvement in human nutrition, health and well-being, *Sight and Life* encourages:

- 1. Growing the evidence base for micronutrients
- 2. Promoting partnerships and capacity building
- 3. Advocating better nutrition for brighter futures
- 4. Sharing knowledge for improved nutrition

www.sightandlife.org

Sight and Life has a key strategy to build bridges for better nutrition



Sharing knowledge for improved nutrition

A key element of the *Sight and Life* strategy relates to the creation and dissemination of knowledge on hidden hunger and micronutrients, with emphasis on the importance of evidence-based knowledge.



WFP members in
Porto, 2010

Thus, the Second World Congress of Public Health Nutrition in Porto, Portugal on 23–25 September 2010 saw some 600 public health nutritionists meet to discuss and debate the most recent advances in human nutrition and its intimate relationships with public health. With the theme of ‘moving towards healthy and sustainable nutrition for all’, the program was most relevant to the current global discussion of how we protect and promote health towards the eradication of poverty and the need to ensure not only food security but also nutrition security, with the focus on the most vulnerable – women, infants, and young children.

Sight and Life was involved in three sessions over the three days, including a workshop on ‘Evidence in multiple micronutrient nutrition: From history to science to effective programs’. This featured input from Dr Klaus Kraemer and Dr Jee Hyun Rah of *Sight and Life*, as well as Dr Richard Semba of Johns Hopkins University School of Medicine, and Dr Lynette Neufeld, Chief Technical Advisor to the Micronutrient Initiative, among other experts in the field.

A lunch forum was also hosted by *Sight and Life*, which had a very practical, hands-on, lessons-learnt approach to using MNPs in large-scale settings. Each presentation not only offered food for thought, but also showed the high-level commitment of the WFP and DSM in using their partnership to learn about the practical implications of scaling up MNP programs and using their learning to benefit others. Introduced by Mauricio Adade, Chief Marketing Officer, DSM, it featured eloquent presentations by Stephen Anderson, Country Director of the WFP in the Philippines, as well as Joris van Hees, Sam De Greve, Romeo Frega, Christine Klotz and Siti Halati, all of the WFP, and highlighted how the implementation of MNP programs can and does differ significantly in different settings. It also showed that, when it comes to the scaling-up of interventions, it is often not the formulation or technical issues that are the most complex, but the other critically important elements of distribution and social marketing.

Finally, *Sight and Life* co-hosted another lunch forum which examined the latest research to highlight the fact that, just as there are micronutrient deficiencies in the developing world, so too are there concerns in the developed world. This was introduced by Dr Manfred Eggersdorfer, Senior Vice President of Nutrition Science & Advocacy of DSM Nutritional Products Ltd.

Growing the evidence base for micronutrients



Vitamin A capsule distribution by Vitamin Angels in India

Sight and Life's multi-faceted and multi-disciplinary approach is to support both humanitarian and scientific projects.

In early 2011, *Sight and Life* and Vitamin Angels, as two of the world's outstanding independent humanitarian organizations dedicated to fighting malnutrition, teamed up in an effort to attack vitamin A deficiencies in India. Both organizations strongly felt that, by combining the unique strengths of each into a single coordinated effort to address this issue, much more could be accomplished.

Through the signing of this partnership, both partners hope to engage other international and Indian for-profit, non-profit and government entities to mobilize support and participate in the initiative, so as to harness innovative public-private partnerships to sustainably tackle the vitamin A deficiency epidemic in India and improve the lives of millions of infants, children and women.

“Through this partnership, *Sight and Life's* advocacy and technical expertise and Vitamin Angels' successful implementation of universal vitamin A supplementation projects aim to reach millions of those in India who have, to date, not had access to life-saving vitamin A.”

Dr Klaus Kraemer, Director, *Sight and Life*, 5 January 2011

Advocating better nutrition for brighter futures



Mother and child in Honduras

Advocacy, partnerships, and the formation of networks are all part of *Sight and Life's* strategy to increase the understanding of the consequences of hidden hunger. It also welcomes the promotion of partnerships that address hidden hunger, including science-to-programs initiatives.

Sight and Life's key role in the DSM WFP partnership highlights its critically important work in the area of partnerships and the formation of networks.

Sight and Life believes that partnerships are, from a development perspective, fundamentally about breaking down silos. One reason that nutrition has not played a more prominent role in development policy has been due to the complexity of developing and implementing nutrition intervention programs. However, by combining commitment from donors, field experience from aid agencies, and research and development innovation from the private sector, a new paradigm in development can be created to deliver high-impact results for those that are most in need.

**DSM and
WFP's
partnership
program**

DSM and WFP's partnership program "Improving Nutrition – Improving Lives" has to date helped approximately 10 million people across Nepal, Kenya, Bangladesh and Afghanistan, among other countries, to enrich their lives through proper nutrition.

Promoting partnerships and capacity building



Johann Jerling with
ANLP members

Alongside advocacy, *Sight and Life* embraces capacity building, policy-making and the creation of guidelines. Dr Johann Jerling (PhD) is Director of the Centre of Excellence for Nutrition at North-West University (Potchefstroom Campus), South Africa. In addition to his work leading a group of dedicated scientists working in the field of nutrition, he is heavily involved in the African Nutrition Leadership Program (ANLP). Through seminars and creating networks, the ANLP assists in the development of future leaders in the field of human nutrition in Africa. According to him, *Sight and Life's* role with relation to capacity building is very open:

"If I have a good idea that's broadly in the interest of the organization, I can go to *Sight and Life* and make a case for it. If it's a good idea, it'll be considered – and if it's not, I'll also get feedback, which is also very useful in growing the ANLP.

Sight and Life has provided sponsorship towards the ANLP for the past four or five years. In the first year, we simply received money, but now *Sight and Life* is saying to us, 'let's start thinking with you' and is asking us how we are evaluating the situation and thinking around issues. I really appreciate this, as this is what true partnership is all about. Money is just a (necessary) vehicle, but what we really need is the brains behind it, to constructively criticize and help us to do things better in order to achieve our goals. I really enjoy the openness, whereby we can actually sit around a table and take decisions on what is best – not just from the point of view of a sponsor or organizer, but what would best serve the interest of developing future leaders of nutrition in Africa."

**Supporting
disadvantaged
communities
in Nepal**

"I've been involved in providing healthcare services in Nepal for 25 years. People here still go to spiritual and traditional healers, so we need to focus on awareness. Since obtaining an MSc at University College, London with the support of *Sight and Life*, I have carried out research, fundraising, and capacity building for institutions. I train rural health workers, and I focus on intervention programs and strategy. My research knowledge has helped drastically change levels of awareness in tens of thousands of rural community people and slum dwellers."

Jib Acharya, Child Welfare Scheme Nepal (CWSN)

Building bridges

Strategic approaches towards building bridges to better nutrition also include a series of approaches to addressing nutritional shortfalls due to what and how we eat. Much of the food consumed by people in both the developing and developed worlds today lacks sufficient amounts of the essential nutrients, especially the micronutrients. However, various approaches to fortification can be used to tackle this shortfall.

The main strategic approaches for combating micronutrient deficiency include: short-term supplementation; medium-term food fortification, including fortification of staple foods and home fortification; long-term dietary diversification – getting people to grow and eat more of the types of foods that they require (such as vitamin A rich vegetables); and public health measures such as de-worming and anti-malaria projects. Each has its advantages and disadvantages, and each has a unique role to play. At present, there are four large categories of micronutrient intervention programs:



Vitamin A capsules

- › **Supplementation** is a short-term approach to addressing micronutrient deficiencies. It incorporates the provision of vitamins and minerals such as vitamin A, iron, folic acid and zinc, among others, in the form of supplements (usually capsules or tablets). Examples include the twice-yearly high-dose vitamin A supplementation program for children under five implemented in many developing countries (worldwide, there are close to 30 countries that have achieved a national vitamin A coverage of > 80%); vitamin A supplementation for postpartum women; an iron and folic acid supplementation program for pregnant women; and therapeutic zinc supplementation as part of the treatment of diarrhea.



Packets of fortified food

- › **Food fortification** includes fortification of staple (commonly eaten) foods such as flour and rice, as well as the fortification of condiments such as soy sauce with either a single micronutrient or multiple micronutrients. Single fortification can be seen in the fortification of sugar with vitamin A in Guatemala, Honduras and El Salvador, as well as vitamin A fortified vegetable oil in for, example, West Africa. Iron, meanwhile, is added to soy sauce in China, while iodine is added to salt in many countries. Multiple micronutrient fortification with a range of vitamins and minerals is generally added to maize meal and wheat flour, e.g. in South Africa.
- › **Home fortification** uses products such as micronutrient powders and lipid-based nutrient supplements. These are given to the mother to add to the food traditionally eaten by the child in the home. Examples are single sachet micronutrient powders such as MixMe™ or Sprinkles™, which provide all the micronutrients a child needs for a day. These are used in *Sight and Life's* partnership programs, as well as lipid-based nutrient supplements such as NutriButter™.
- › The **food-based approach**, meanwhile, promotes dietary diversification through, for example, nutrition education, homestead production, and maternal education.

Homestead Production & Helen Keller International



A mixed orchard –
homestead
production

HKI's Homestead Food Production program is one of a number of strategies deployed by HKI and its partners around the world to alleviate malnutrition and address the global food price crisis. The program has put crops in the ground, nutrients in the diet, and meals on the table in many communities most severely affected by prolonged malnutrition.

The program helps improve communities' local food production systems by creating year-round gardens with micronutrient-rich fruits and vegetables and small farms for raising poultry and livestock.

HKI provides technical and managerial support as well as start-up supplies, such as seeds, seedlings, saplings and chicks to local non-governmental organizations (NGOs), which integrate Homestead Food Production into their ongoing activities.

Among other elements, the fruits and vegetables from the gardens ensure the availability of vitamins and minerals essential for proper immune system function and full physical, intellectual and cognitive development. Meanwhile, the eggs, poultry and other animal foods raised by the gardeners support the body's ability to utilize the micronutrients.

Adapted from www.hki.org/reducing-malnutrition/homestead-food-production/ 10 November 2011

Sight and Life's value to researchers



Parul Christian

"*Sight and Life* is very useful to researchers such as myself. It helps us to create connections with the audiences who matter for our work. It also assists in the dissemination of important information to a very wide readership around the globe. Last but not least, it gives important practical support to projects aimed at combating micronutrient deficiency."

Parul Christian, Professor, Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, USA, *Sight and Life Magazine*, 1/2007

***Sight and Life's* internship program**

Sight and Life established its original internship program in 2007, when it was initiated in partnership with the School of Public Health at Johns Hopkins University. This program was, however, triggered by *Sight and Life's* desire to manage the significant number of proposals for funding that they were receiving. At the suggestion of Dr Keith West it was decided to establish an internship that offered students the chance to come to Switzerland, work with *Sight and Life*, and assist with the assessment of funding requests.

The first intern was Hua Jing, who completed her PhD at Johns Hopkins and who did her thesis work in Bangladesh. She was with *Sight and Life* for three months – the current duration of the internship, although it may be



Keith West

extended to four months. To date, *Sight and Life* has had five Johns Hopkins students. A new program was initiated in 2011 with Tufts University in the United States. Vanessa Oddo was the first intern; her project was to assess the quality of field work in a project undertaken in Kenya.

The internship program has been a great success and interns have been involved with grant proposals assessment, extracting data, preparing slides for presentations and writing papers using data we have amassed. On their part, interns get an insight into *Sight and Life's* role as a bridge between the private and public sector and the work of a humanitarian initiative. They also learn about what the public sector is doing to address micronutrient malnutrition, and obtain first-hand experience working in an environment associated with the private sector. The feedback received is that *Sight and Life* is highly rated as an internship experience.

Experiences of a *Sight and Life* intern

Two of *Sight and Life's*
interns

Dr Jee Hyun Rah, MS, PhD, with a background in international nutrition, joined *Sight and Life* as Nutrition Manager for DSM's partnership with the UN WFP in February 2009, having been Johns Hopkins intern in 2008.

Her experience as an intern led directly to her post at DSM and *Sight and Life* where she is responsible for planning of studies and programs, analyzing data and writing papers for scientific journals on nutritional topics, including nutritional anemia, hidden hunger, fortified rice and micronutrient powders.

"I enjoyed my internship very much," Dr Rah says. "I was therefore extremely interested in the opportunity of coming back to Switzerland to work in the newly created role of Nutrition Manager for DSM's partnership with the UN WFP."

"I also help with the editing of *Sight and Life* Magazine and work closely with the Johns Hopkins University intern."

Overall, Dr Rah's responsibilities fall into two main areas. Within the framework of the DSM-WFP partnership, her role is to provide technical expertise concerning the studies and programs which are conducted. She is therefore responsible for ensuring that such studies and programs are properly designed, implemented, and evaluated.

Working for *Sight and Life* means a great deal to Dr Rah.

"Despite its small size as an organization, *Sight and Life* plays an enormously influential role in international nutrition and has terrific potential for doing good in the world. Scientists and other academics are continually developing new insights into the relationship between nutritional intake and health, and these insights need to be communicated in clearly intelligible form to the people who are running programs in the field," she says.



Venkatesh Mannar

“My interest in food fortification grew out of my background with the salt industry in the 1970s and 1980s and involvement with the use of salt as a vehicle for nutrients such as iodine, and later with iron. During the 1990s, as iodization programs took root and expanded rapidly, more evidence was available on the importance of micronutrients such as vitamin A and iron for maternal and child health and survival. When I joined the Micronutrient Initiative in 1994, one of my priorities was to expand the fortification of staple foods with essential micronutrients. Since then, the concept of food fortification has been widely accepted by governments and the food processing industry around the world as a key intervention to address micronutrient deficiencies – complementary with other approaches. While a number of organizations have contributed to this effort, I would like to highlight *Sight and Life’s* role in supporting the development of scientific evidence and showcasing the results to enable application in programs around the world. In all of its efforts, *Sight and Life* has drawn on the best expertise and ensured the highest standards.”

Venkatesh Mannar, President, Micronutrient Initiative



Marc van Ameringen

“There are certainly the resources and technology out there to end malnutrition. In the best case scenario, there will still be some minimum level of under-nutrition and obesity in the world, but it is feasible to dramatically reduce most forms of malnutrition. The key obstacle is changing peoples’ attitudes, especially at the level of key decision-makers in all sectors, on the importance of investing in programs and partnerships that can significantly improve nutrition and health outcomes for the two billion people who are malnourished. Unlike in the case of many vaccines, we’re not waiting for a new big discovery; we already know enough to do something. I’ve spent 25 years managing programs in developing countries, and feel strongly that if we have the right leadership and commitment, I don’t see why in 20–30 years we should have anywhere near the same level of malnutrition we have today.”

Marc van Ameringen, Executive Director GAIN

A woman in a pink sari is carrying a large white sack on her head. She is surrounded by a crowd of people in a rural setting. In the foreground, a man in a white shirt is bent over, and another man in a brown shirt is looking towards the woman. There are several large sacks and some plastic jugs on the ground. The background shows more people and trees.

In a world of 7 billion people, we must think differently to build a healthier future



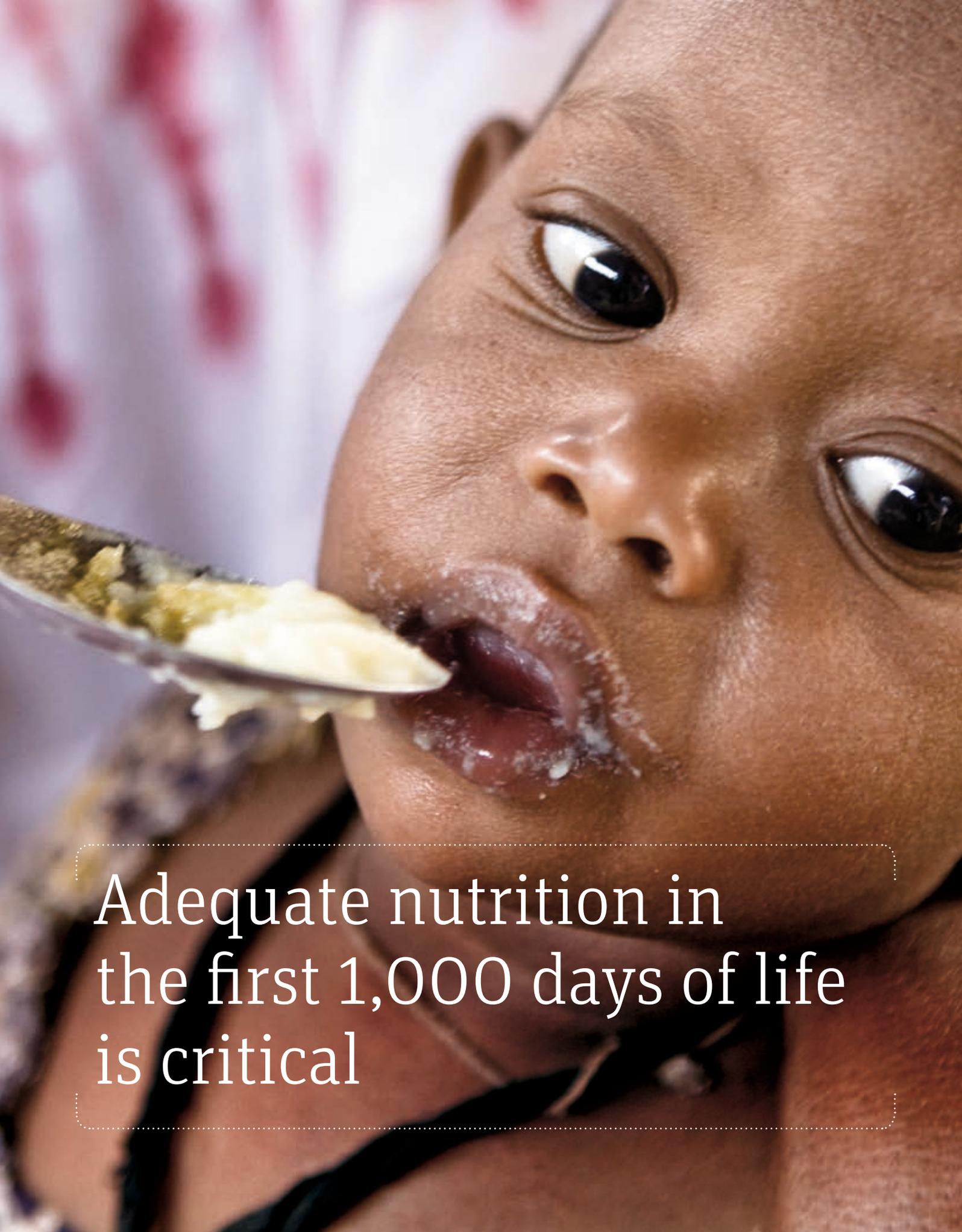


Nutrition solutions are the
smartest investment in the
future we can make

A young child with dark skin and thin features is walking on a dirt path. The child is wearing an orange t-shirt and shorts, and blue sandals. They are carrying a large, rectangular brick on their back and holding a large, crumpled white bag in their right hand. The background shows a dirt path with some sparse vegetation and a blurred background.

Hidden Hunger results
in poor growth
and increased mortality

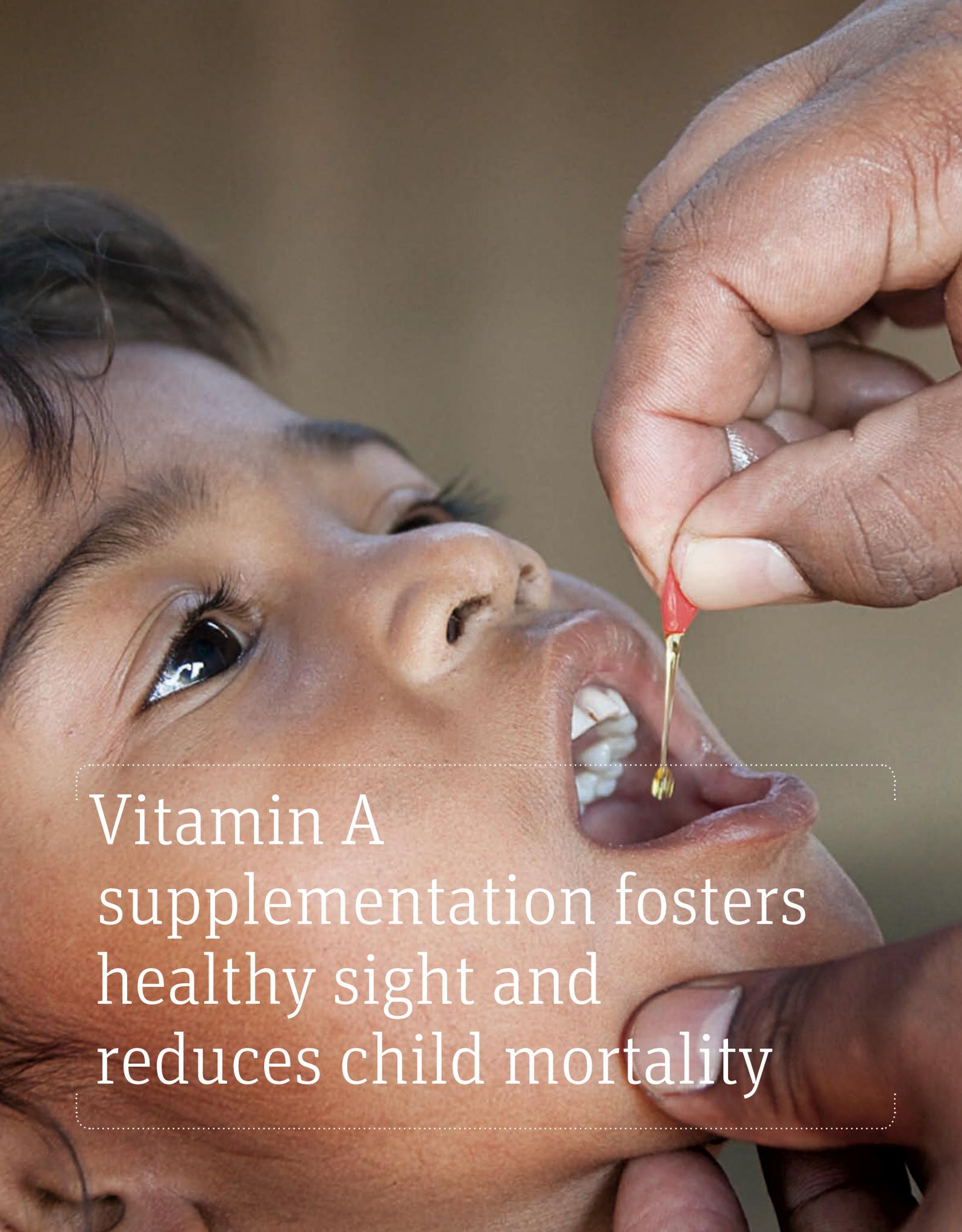




Adequate nutrition in
the first 1,000 days of life
is critical

190 million preschool
children still suffer from
vitamin A deficiency





Vitamin A
supplementation fosters
healthy sight and
reduces child mortality

Many people in the world
lack the resources to feed
themselves properly



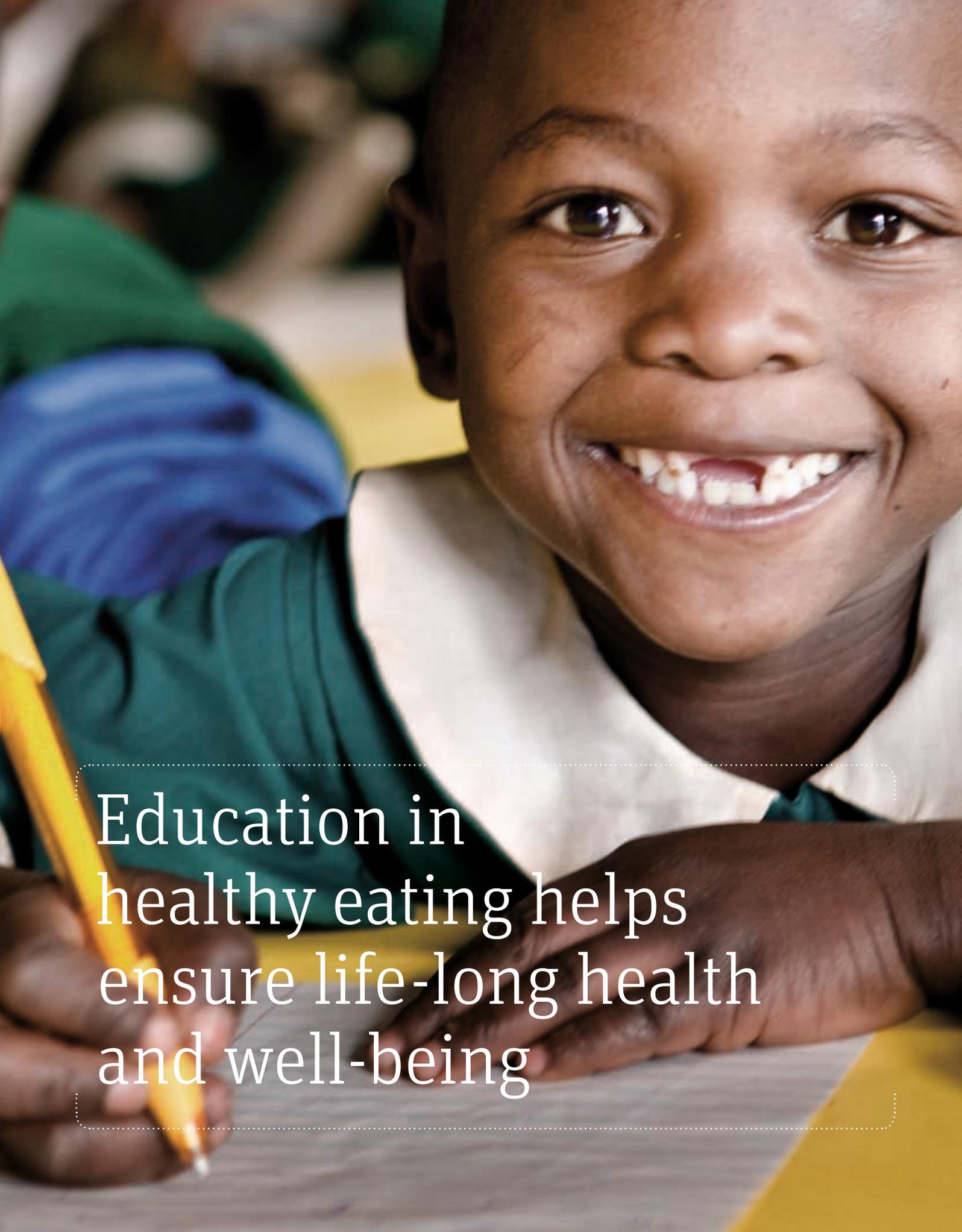


Homestead production
can help fill
the nutrition gap



Micronutrient malnutrition is not restricted to the developing world





Education in
healthy eating helps
ensure life-long health
and well-being

06 The Role of Policy-Making and Advocacy

In an article posted on 13 January 2011, Bjørn Lomborg, Director of the Copenhagen Consensus Center, examined the relationship between aid budgets and the benefits they bring. “Billions of dollars are given and spent on aid and development by individuals and companies each year,” he pointed out. “Despite this generosity, we simply do not allocate enough resources to solve all of the world’s biggest problems. In a world fraught with competing claims on human solidarity, we have a moral obligation to direct additional resources to where they can achieve the most good. And that is as true of our own small-scale charitable donations as it is of governments’ or philanthropists’ aid budgets.”

Entitled *The Best Dollar You Will Ever Spend*, the article recounted how in 2008, the Copenhagen Consensus Center asked a group of the world’s top economists to identify the ‘investments’ that could best help the planet. The experts – including five Nobel laureates – “compared ways to spend \$75 billion on more than 30 interventions aimed at reducing malnutrition, broadening educational opportunity, slowing global warming, cutting air pollution, preventing conflict, fighting disease, improving access to water and sanitation, lowering trade and immigration barriers, thwarting terrorism, and promoting gender equality.”

“Guided by their consideration of each option’s costs and benefits,” continued Prof. Lomborg, “and setting aside matters like media attention, the experts identified the best investments: those which for relatively tiny amounts of money could generate significant returns in terms of health, prosperity, and community advantages.” These included interventions such as increased immunization coverage, initiatives to reduce school dropout rates, community-based nutrition promotion, micronutrient supplementation and fortification. “This last initiative,” he concluded, “is extraordinarily cheap. Providing vitamin A for a year costs as little as \$1.20 per child, while providing zinc costs as little as \$1, and \$10 spent on vitamin A supplements would achieve more than \$170 of benefits in health and long-term prosperity.”

The analysis is startling. If providing the world’s poorest populations with essential micronutrients costs so little, why does it seem so hard to achieve? Why, in the year of *Sight and Life’s* 25th jubilee, do almost 3.5 million children a year die of diseases that could be prevented by better nutrition? And, given the fact that *Sight and Life*, like any organization, has only limited resources at its disposal, what can it do to help to ensure that this notional ‘dollar’ is indeed spent as effectively as possible?

Advocating strong policies and effective programs

Prof. Lomborg's 2011 article makes clear the importance of informed choices – choices which can lead to the creation of influential policies that can in turn shape transformational interventions.



David Pelletier

Speaking in the same year, David Pelletier, Associate Professor of Nutrition Policy at Cornell University, underlined the point, emphasizing that advocacy even in small matters can play an important part in shaping policy development. “In an ideal world, I would want to see appropriate attention given to all forms of malnutrition. There should be some sort of effective partnership among national governments, their ministries, stakeholders and external partners, so that coherent agendas are formed at the national level and everyone is growing in the same direction. Advocacy is part and parcel of this. Different organizations are advocating what they think ought to be done. This has helped to raise awareness and set agendas at a global and country level. We certainly need that. Sometimes, advocating for a particular problem or solution has benefits for policy-makers, even if the problems being called to attention are comparatively small, for these often provide window-opening opportunities. In policy-making, one should start where opportunities are ripe and build from that.”

One of *Sight and Life's* key roles is to be a strong advocate for targeted policies and effective programs that bring measurable nutritional benefits to some of the world's poorest and most disadvantaged people. It is its belief that advocacy has a defining, although often neglected, role within the field of nutrition. What does this mean?

To answer this question, we need to define what advocacy is – and what it is not. First and foremost, advocacy is not about policy-making, nor is it a matter of merely lobbying without a clear evidence base. There is a vast range of options when it comes to how we can choose to speak out on behalf of people who do not have a voice, ranging from non-involvement, or silence, at one end of the spectrum, to violent expression at the other extreme.

Between these two poles, we are faced with the choice to express passive interest or perhaps to make a difference via engagement or active involvement. While policy-making is one option, involving ourselves in the creation of rules that guide decisions and interventions to achieve outcomes, another approach, lobbying, focuses on persuasion, often with political or commercial rewards in mind. Advocacy, by contrast, is about identifying a problem, coming up with a solution to that problem, establishing strong support, campaigning for that solution and developing an effective implementation plan. As such, advocacy has a strong emphasis on information sharing and awareness as well as capacity building.

Articulacy, empathy, and understanding



Shakespeare's Portia
by Millais

One of the most famous advocates in fiction is Portia, the young heroine in the English playwright William Shakespeare's masterpiece *The Merchant of Venice*, who pleads for the life of her friend in an extraordinarily poignant speech that encapsulates the essence of effective advocacy. Portia's speech displays the attributes of a successful advocate. She is not only intelligent; she is also articulate. She demonstrates that she can see things from many points of view and that she can empathize with people. Finally, she is not only able to understand a contradictory position but also, when necessary, able to argue forcefully and clearly for a particular outcome. Today's advocates can be found not only in the law courts or the corridors of parliaments, but are part and

parcel of our day-to-day lives. An advocate may be someone who is pleading on behalf of a handicapped child, or could be the adult who speaks out on behalf of an elderly parent who is suffering from Alzheimer's disease. Advocates give a voice to people who are unable to speak on their own behalf and they actively seek to make their protégés heard.

By assuming the mantle of the advocate, *Sight and Life* is committed to fighting hidden hunger through supporting the interests of people who are suffering from micronutrient deficiency around the world – often the most vulnerable people, who have no voice. This is achieved using an array of approaches, ranging from knowledge sharing and networking, through serving as a platform for conferences and seminars, to having a thoroughly grounded understanding of the most recent scientific developments in the field of micronutrient deficiency and its alleviation, with the ultimate goal of capacity building.

***Sight and Life's* commitment**

Sight and Life is committed to fighting hidden hunger by supporting the interests of people who are suffering from micronutrient deficiencies – hidden hunger – around the world

What is advocacy?

Advocacy (first recorded usage in the 14th century): the act or process of advocating: SUPPORT

Advocacy journalism (first recorded usage in 1970): journalism that advocates a cause or expresses a viewpoint. The word advocate derives from the Latin *advocare*, meaning 'to summon' (ad + '*vocare*', to call).

Webster's Ninth New Collegiate Dictionary

Advocate

Verb

Recommend: push for something; "The travel agent advocated strongly that we not travel on Thanksgiving Day"

Preach: speak, plead, or argue in favor of; "The doctor advocated a smoking ban in the entire house"

Noun

A person who pleads for a cause or propounds an idea

A lawyer who pleads cases in court

worldnetweb.princeton.edu/perl/webwn



Advocates for
children, China

What is a lobby?

- > Anteroom: a large entrance or reception room or area
- > The people who support some common cause or business or principle or sectional interest
- > Detain in conversation by or as if by holding on to the outer garments of; as for political or economic favors
- > A group of people who try actively to influence legislation

wordnetweb.princeton.edu/perl/webwn

A framework for advocacy



Orphans in South Africa

1. Identify the issue and context. What is the problem that requires a solution?

Gather high-quality information (evidence) about the problem.

2. Decide on a goal. What is the result you want to achieve?

What should the solution to the problem look like? Narrow it down to something achievable.

3. Identify the target audience(s) and analyze them. Who are the people with decision-making power? How do they make decisions? Who do they listen to? It is often helpful to identify the people who can influence these decision-makers and include them in your plans.

4. Build support. Build alliances with other groups, organizations, or individuals who can support you and/or are in a position to influence your target audience. Cooperate closely with other groups advocating for resources.

5. Develop your message. What is the local social and political situation?

Prepare messages tailored to the target audience that define the issue, state solutions, and describe the actions that need to be taken. Support this with relevant facts and evidence that your audience will relate to.

6. Choose channels of communication. How can you or your organization get to speak to key decision-makers? Who in your organization would be best placed to do this?

7. Carry out your plan and monitor and evaluate your success.

Source: Community Eye Health Journal Volume 20. Issue 64, December 2007

Serving as facilitator and analyst

As advocates *Sight and Life* does not see its role being to directly carry out scientific research or to run interventions on the ground. *Sight and Life's* role is to be a facilitator that breaks down the silos, a linking organization that examines the science, argues for the creation of appropriate policies, reviews what is happening on the ground – and feeds this back to the appropriate scientists, if necessary, to create new science for the policy-makers. *Sight and Life's* role is to analyze what is good and what is new and to be aware of what is tried and tested, so that, from a sound evidence base, *Sight and Life* can advocate for appropriate policies and programs that make a real difference in people's lives.

As a not-for-profit humanitarian initiative, *Sight and Life* does not make policy but does advocate particular policies that it believes should be created or implemented, and shines a light on the institutional and conceptual frameworks within which *Sight and Life* believes activities should or should not be conducted. In essence, *Sight and Life* partners with organizations that are more influential than itself to advocate specific policy creation and evidence-based programs.

Supporting the achievement of the Millennium Development Goals

An example of *Sight and Life's* advocacy in action is the statement in support of actions to place nutrition high on the development agenda in order to achieve the MDGs.

Sight and Life Statement



Ban Ki-Moon (right)
with Feike Sijbesma

Sight and Life 2010 statement in support of actions to place nutrition high on the development agenda to achieve the MDGs by 2015

The world's leaders (governments, private sector and NGOs) intend to end poverty and keep the promise of the MDGs by the goal date of 2015. This was clear from the numerous, well publicized events, launches and speeches in New York during September 2010. *Sight and Life* strongly believes that the renewed commitment can only be achieved if there is a dramatic acceleration of initiatives that not only focus on food production, and women's and children's health, but also nutrition security. Micronutrients (vitamins and minerals) are the essential link between food and health – it is about ensuring that, in addition to sufficient calories to live, people have a quality diet providing the right balance of macronutrients and micronutrients, embedded in adequate care and sanitation, in order to grow and develop to their full potential and for optimal health. *Sight and Life* applauds the fact that the role of nutrition has been recognized at the highest level with the UN Secretary General Ban Ki-moon himself stating its importance. *Sight and Life* fully supports his words, “*We know what works to save women's and children's lives, and we know that women and children are critical to all of the MDGs. Today we are witnessing the kind of leadership we have long needed.*”

Sight and Life believes the time for action is NOW when a quarter of all children are chronically undernourished and given that, with immediate action on nutrition, by 2015 we could protect 88 million children from stunting. In so doing, these children's health and lives will be dramatically improved

and they will be given the opportunity to escape the poverty cycle and contribute to the upliftment of their families, communities and countries. Launched by the Secretary General at the New York summit, *The Global Strategy on Women's and Children's Health* states that addressing undernutrition in pregnant women and children leads to an increase of up to 10% in an individual's lifetime earnings.

Sight and Life is a strong supporter of the 'Road Map for SUN' that highlights investments in nutrition that will yield significant immediate and long-term returns. This further supports the 2008 Copenhagen Consensus, comprised of eminent economists who concluded that of 30 specific solutions to combat some of the world's most pressing problems, addressing micronutrient deficiency amongst children would be the single best investment. Every \$1 spent is estimated to produce \$17 in return through reduced health spending and improved economic output.

Excerpt

Important milestones in policy development

Year	Organization	Purpose	Goals	Achieved in Moving Agenda
1992	Helen Keller International; Bellagio Meeting on Vitamin A Deficiency and Childhood Mortality	The Bellagio Meeting convened scientists, health officials, and policy-makers to examine the role of vitamin A status on the health of children in developing countries via published data.	<ul style="list-style-type: none"> > Examine the role of vitamin A status on the health of children in developing countries; > To reach clear and appropriate conclusions where warranted; > To consider policy implications arising from these conclusions that might guide key stakeholders. 	Meeting participants discussed and articulated specific recommendations on the following topics as they relate to vitamin A deficiency and its control: <ul style="list-style-type: none"> > Assessment > Implementation > Monitoring and evaluation
2000	UN; Millennium Development Goals; End Poverty and Hunger	Malnutrition is caused by consuming too little food energy and/or having diets that lack essential nutrients. Raising incomes and reducing poverty is part of the solution to ending malnutrition.	<ul style="list-style-type: none"> > Halve the proportion of people who suffer from hunger between 1990 and 2015. Reduce by two thirds the under-five mortality rate. > Reduce by three quarters the maternal mortality rate. 	By the target date of 2015, the MDGs form a blueprint agreed to by all the world's countries development institutions. These efforts, which include eradication of hunger and thus malnutrition, have spurred unprecedented efforts to meet the needs of the world's poorest.

Year	Organization	Purpose	Goals	Achieved in Moving Agenda
2002	The International Vitamin A Consultative Group (IVACG) Ancey Accord	Leading the campaign against vitamin A deficiency disorders (VADD).	<ul style="list-style-type: none"> > Provide a forum to exchange new ideas, to discuss research findings and their policy implications, and share experiences with program interventions. > Provide technical guidance through state-of-the-art publications on VADD. > Collaborate with international organizations in developing and establishing policy guidelines for diagnosis, treatment, and prevention of VADD. 	Comprehensive recommendations for the assessment and control of vitamin A deficiency (VAD) were rigorously reviewed and revised by a working group and presented for discussion at the the XX International Vitamin A Consultative Group meeting in Hanoi, Vietnam.
2007	The World Bank; Report on Repositioning Nutrition as Central to Development	Provide a global framework for action and to complement the similar analyses undertaken by the World Bank's regional units for Africa and South Asia.	<ul style="list-style-type: none"> > Reinvigorate dialogue regarding what to do about malnutrition; > Encourage the development community to reevaluate the priority it gives nutrition; > Facilitate an agreement on new ways for stakeholders to work together. 	This report highlighted the burden of malnutrition and importance of addressing it, thereby justifying the increased funding for nutrition from the World Bank.
2008	Lancet Series; Maternal and Child Undernutrition	Given that that nutrition is a major risk factor for disease, the Lancet series sought to gather scientific evidence about the importance of maternal and child nutrition and aimed to fill this gap in global public health and policy action.	<ul style="list-style-type: none"> > Catalogue the long-term effects of undernutrition. > Identify proven interventions to reduce undernutrition; Call for national and international action to improve nutrition for mothers and children. 	Provided objective evidence that there are effective interventions to reduce stunting and micronutrient deficiencies and that improved governance is desperately needed to scale up nutrition interventions, monitor and evaluate those plans, and implement laws to enhance the rights of women and children.

Some important organizations in the nutritional arena

Title	About	Overall Purpose	Specialization	Additional Info
Biomarkers of Nutrition for Development (BOND)	BOND is intended to harmonize the process for discovery, development and use of nutrient biomarkers across a range of applications and to develop the necessary evidence through new research to support the use and implementation of new biomarkers utilizing state-of-the-art technologies.	BOND's mission is to create a process to identify, develop and build acceptance for implementation of micronutrient biomarkers to support and stimulate the community's research, program and policy-making activities.	BOND addresses the universal need for accurate methodologies through discovery and development of state-of-the-science biomarkers and makes recommendations applicable and relevant to multiple users, domestically and internationally, and in both the public and private sectors.	www.nichd.nih.gov/global_nutrition/programs/bond/
The Global Alliance for Improved Nutrition (GAIN)	Created in 2002 at a Session of the UN General Assembly on Children, GAIN supports public-private partnerships to increase access to the missing nutrients in diets necessary for people, communities and economies to be stronger and healthier.	GAIN's mission is to reduce malnutrition through sustainable strategies aimed at improving the health and nutrition of populations at risk.	In less than a decade, GAIN has been able to scale its operations by investing in and working alongside more than 600 companies across 36 large-scale collaborations in more than 25 countries, reaching close to 400 million people with nutritionally enhanced food products. Half of the beneficiaries are women and children. GAIN's goal is to reach more than one billion people with fortified foods that have sustainable nutritional impact.	www.gainhealth.org
Micronutrient Forum (MNF)	Established in 2006, the MNF is the successor of two scientific organizations aimed at the prevention of vitamin A and iron deficiencies, the IVACG and the INACG.	The forum seeks to generate policy-relevant science research and acts as a catalyst for mobilizing the public health community to design and implement effective programs that will address micronutrient deficiencies worldwide.	The MNF focuses on micronutrient deficiencies of public health significance, specifically vitamin A, iron, folate, iodine, and zinc; serving as the vehicle for sharing findings relevant to the management of these micronutrient deficiencies.	www.micronutrientforum.org

The World Food Programme



Martin Bloem

Implementing policy on the ground: The World Food Programme

“What distinguishes the WFP from other agencies is that we are very operational in our focus. We don’t just want to set policy or implement guidelines: we want to act. We have a can-do mentality and we want to be working on the ground where our efforts can be deployed to maximum effect. Our attitude is ‘We know what we can do, we know how it can help, and we will do it if you allow us to do it.’”

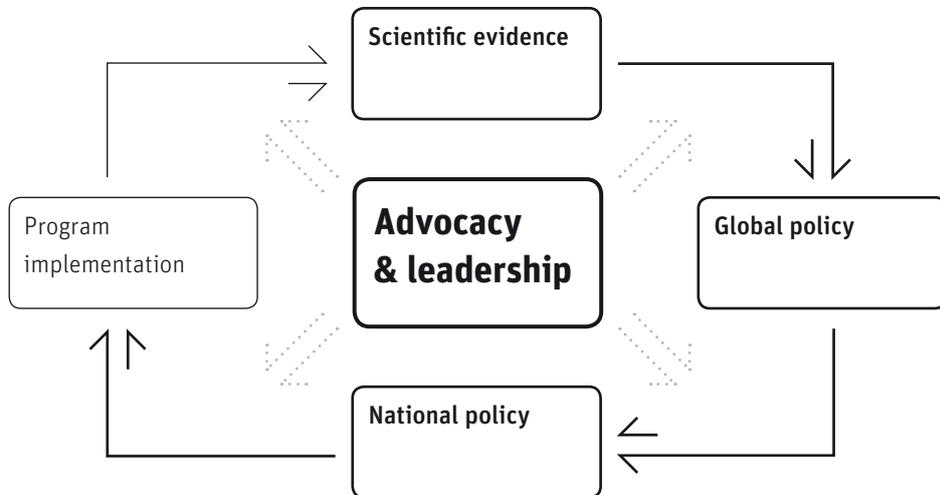
Dr Martin Bloem, Chief of Nutrition and HIV/AIDS Policy at WFP

Although the work of *Sight and Life* naturally presents huge challenges, and *Sight and Life* itself is a small team, it is passionate about what it does. Its advocacy is driven by a dedication to ensuring a sustainable and significant improvement in human nutrition, health and well-being for people throughout the developed and developing nations, and the goal of representing the poorest and most vulnerable. The team is continually motivated by its belief in the need for advocacy on behalf of people who are not as fortunate as so many of us are.

Sight and Life’s advocacy manifesto

Sight and Life is committed to fighting hidden hunger – malnutrition caused by micronutrient (vitamin and mineral) deficiencies – which is a major cause of mortality and morbidity and which negatively affects human productivity and the economic growth of developing countries. *Sight and Life’s* vision is to ensure a sustainable and significant improvement in human nutrition, health and well-being for the entire world’s people, especially the poorest and most vulnerable. *Sight and Life* champions the global fight against micronutrient deficiencies by espousing the belief that the right mix of funds, knowledge, policy, and technology will lead to the prevention of micronutrient deficiency.

Linking science to action via advocacy & leadership





Meera Shekar

“There’s a lot we know about micronutrients, but implementation of large-scale programs still lags far behind, especially since micronutrients have been identified by the Copenhagen Consensus as one of the best buys in development, not just in nutrition and public health. There is a huge gap between what we know and what we are doing at scale. One of the reasons for this gap between knowledge and implementation is capacity – we need to invest in building capacities in countries to design, implement and monitor these programs.

In addition, in thinking about scale-up, we need to focus on how we engage other sectors, such as the social safety net programs, the agricultural and rural development sector, the trade sector, the education sector and the private sector, to develop and invest in delivery strategies.”

Dr Meera Shekar, Lead Health & Nutrition Specialist, Health, Nutrition and Population, Human Development Network, World Bank



Howard Schiffer

“One third of all childhood deaths are currently attributable to undernutrition. For young children, essential nutrients help build the foundation for good health and give them the opportunity to lead meaningful and productive lives. Vitamin Angels reduces child mortality worldwide by connecting essential nutrients, especially vitamin A, with infants and children under five. In 2011, Vitamin Angels connected approximately 25 million children in 41 countries, including the US, with the essential micronutrients they need as a foundation for good health.”

Howard Schiffer, Founder, Vitamin Angels



David Nabarro

“Bad nutrition creates the conditions for so much of the suffering we see around us today. It undermines intellectual and economic potential and sets the scene for the onset of diseases such as diabetes and cardiovascular disease. Bad nutrition affects approximately one third of all children on the planet. It is the outcome of food insecurity, chronic hunger, disempowerment, inadequate water supply and poor sanitation, and it creates a handicap for life.

In striving to combat this public health scourge, we are currently seeing a collaboration never experienced before. Organizations – foundations, business, governments and civil society – have come together to support the SUN (Scaling Up Nutrition) movement and the countries that have signed up to it. This gives us hope, because by harnessing all of our strengths, we can create real and sustainable change. The SUN movement is for everyone. It’s feasible, it’s cost-effective, and it would make a positive difference to the growth of entire nations.”

Dr David Nabarro, United Nations Special Adviser on Food Security and Nutrition to the United Nations Secretary General and recipient of the inaugural *Sight and Life* Nutrition Leadership Award

07 Science Leads the Way: New Approaches to Making Change

Why funding and research drive innovative solutions



US Secretary of State
Hillary Clinton

Funding for scientific research ultimately helps communities to become sustainable in their efforts to combat micronutrient deficiency. And the research also helps to increase the levels of understanding pertaining to both the problems and the solutions.

Over the decades since micronutrients were first discovered and named, we have learnt much about these essential substances. We are able to apply that knowledge to the reality of health – both optimal and diseased; and we can use what we have learnt to provide guidance to public health policy.

The challenge we face going forward is the need to balance the evidence, critical to developing the knowledge and for shaping the interventions, with public health nutrition that turns the evidence into scaled up programs at the community level.

Indeed, in her acceptance speech on receiving the 2010 WFP Leadership Award for fighting global hunger, US Secretary of State Hillary Clinton said: “It’s important that we focus on science and research again ... to look for ways to bring about the widespread distribution of micronutrients and develop hardier, micronutrient-rich crops.” The dilemma is therefore whether to focus more on research to sharpen our knowledge of what to do and how to do it, or to focus on scaling-up of interventions at a country level so as to achieve the MDGs.



Bjørn Lomborg

“Billions of dollars are given and spent on aid and development by individuals and companies each year. Despite this generosity, we simply do not allocate enough resources to solve all of the world's biggest problems. In a world fraught with competing claims on human solidarity, we have a moral obligation to direct additional resources to where they can achieve the most good. Perhaps it is a case of ensuring that both are running in parallel and both receive adequate attention and funding – for if we neglect one for the other, we could in the future find we have missed an important piece of the puzzle.”

Bjørn Lomborg, Director, Copenhagen Consensus Centre

Public health interventions need to accommodate potential benefits and risks, and these can only be established by scientific research. Ultimately there needs to be a fine balance between political wisdom and judgment of the best available, systematically assembled evidence. The WHO in 2009 adopted a new process by which recommendations for safe and effective micronutrient interventions are developed in order to ensure the use of best practices and available evidence.

Policies aimed at combating poor nutrition need to take a wide view, and to balance the responsibility between the individual and society. It is increasingly well accepted that for policy to be effective, it is essential to identify and intervene at the most critical rate-limiting level and for the programs to be complementary, supportive and co-ordinated.

The IFPRI has investigated the potential of using four broad types of delivery platforms – health, agriculture, market-based, and social protection programs – to deliver multiple micronutrient interventions (supplementation, fortification and dietary modification), using seven criteria, namely that programs are well-targeted; include the right interventions for the problem; are used as expected by targeted beneficiaries; are implemented as planned; have an impact on expected outcomes; achieve high coverage; and are sustainable.

Critical issues

Cross-cutting issues that need to be addressed going forward when interventions are taken to scale include ensuring a strong behavior-change component, addressing the supply chain (including human resources), efficacy and impact assessment, and greater advocacy at the key program decision-maker level.

The issue of program evaluation is increasingly important in public health nutrition interventions. If the SUN concept is to grow and receive funding, then it is essential that we should be able to show that the interventions deliver the desired outcomes to the beneficiaries. Many micronutrient interventions, especially those that are home-fortification-based, require that not only program performance, but also beneficiary adherence, should be evaluated. Thus in determining if interventions lead to the desired change (behavior, nutritional status and health), we need to be open to different monitoring and evaluation designs.

So while it is important to debate how much science is required before interventions can be initiated and the efficacy and safety of our recommendations tested, it is also important for us to view addressing micronutrient deficiency from the widest perspective to learn from history, harvest what science has taught us, invest in science so we can learn still more and use this to develop practical policies and interventions that deliver quality nutrition to the most vulnerable and then measure our successes and failures and if necessary start again.

**Turning
evidence into
community
programs**

“When it comes to the field of micronutrients and public health – over the decades since micronutrients were first discovered and named, we have learnt much about micronutrients; we are able to apply that knowledge to the reality of health – both optimal and diseased; and we can use what we have learnt to provide guidance to public health policy.

“The concept of the iterative nutritional paradigm, explained by Richard D Semba, of Wilmer Eye Institute, Johns Hopkins University School of Medicine, Baltimore, USA in the paper *The historical evolution of thought regarding multiple micronutrient nutrition* links how, over time and in different parts of the world, major ideas and events have shaped the evolution of thinking towards micronutrient provision.

“It also highlights the importance of an integrated approach and how we must never stop learning because as new research comes to light, so our understanding grows and evolves, allowing us to re-shape, revise and refine the advice we give and the policies we make, towards ultimately improving the health and lives of our world’s 7 billion and growing population.

“The challenge we face going forward, however, is the need to balance the evidence, critical to forming and growing the knowledge and for continued monitoring, evaluation and fine-tuning of the interventions, with public health nutrition that turns the evidence into scaled-up programs at the community level.”

Dr Klaus Kraemer, Porto Speech, September 2010

When you have a theory, how do you test it?

Various strategies are used to control micronutrient deficiencies, with the aim of reducing their prevalence and severity, as well as their consequences for health and development. Such deficiencies are caused by the fact that intake does not meet needs. Needs may also be increased due to increased losses, often as a consequence of not only infections and helminth (worm) infestation but also menstrual losses. A combination of increasing intake and reducing needs is therefore required to close the gap. With regard to an increase in intake, a combination of approaches can be used. Some of these target specific approaches, such as supplementation, fortification of common foods (staples, condiments) or special foods (complementary foods, therapeutic foods), home-fortification and/or increased intake of naturally micronutrient-rich foods. Decreasing needs, on the other hand, entails controlling infections, helminth infestation, and malaria, among others.

Whether a program for increasing micronutrient intake has an impact on micronutrient status thus depends on whether it can sufficiently close the gap between intake and needs. This gap is a function of the composition of the commodities used or promoted, as well as their consumption by the target group, and of whether needs are under control.

Once a micronutrient deficiency control strategy is undergoing implementation, it is also important to know whether the desired changes of behavior, nutritional status and health are, in fact, occurring. If that is not the case, or if this is not happening to the desired extent, the strategy needs to be implemented better or differently.

Key steps in the general process of implementation are as follows:

- › Nothing can be tested without a solid hypothesis.
- › Basic evidence is required for the hypothesis. A trial must therefore be designed that gives the best possible chance of coming to a conclusive answer as to whether the hypothesis is true or false. In general, this takes the form of an efficacy trial with human testing; however, evidence from animal studies and associations observed in epidemiological/observational studies can also be assessed, as can mechanistic research in tissue culture and/or animals.
- › Biological plausibility must be given before testing is embarked on.

**Testing a theory:
A practical example**

The hypothesis of this example is that folic acid reduces the incidence of neural tube defects:

Step 1: This is to determine at which stage of fetal development the neural tube closes. Animal model studies would be used to determine this. What is found is that the neural tube closes very early in the life of the fetus – equivalent to 24–28 days of human pregnancy.

Step 2: The fact that folic acid is involved with the closure of the neural tube needs to be proved. Again, animal studies would show that giving folic acid helps close the neural tube.

Step 3: A human study now needs to be designed which is based on the information from Steps 1 and 2. Either the general population of women or women with an increased risk of neural tube defect based on a previous pregnancy would be involved. The study design would include two groups of women, one of which receives folic acid as a supplement before pregnancy and one of which does not. The aim of the study would be to determine which group has the better outcome, measured as the frequency of neural tube defects. It might also be necessary to check if the women complied with taking the folic acid during the study; homocysteine, a marker that is influenced by folic acid, can be used for this. If the women complied and took their supplement, their homocysteine levels would go down from what they were before the study.

Step 4: The results of the human study show that the group supplemented with folic acid before pregnancy had a lesser likelihood of having a baby with a neural tube defect. The hypothesis was therefore proved.

In essence, translating results from animal studies to humans means that the neural tube closes in 24–28 days of pregnancy. Thus, a well-designed intervention would administer folic acid to women considering pregnancy before they conceive, as opposed to giving it once pregnancy is confirmed. By then it is generally too late and often women are not even aware that they are pregnant before the neural tube closes.

Step 5: A body of evidence would therefore be built to further test and support the hypothesis, by double checking findings in other studies in other populations and by considering all elements of the biological plausibility. This will then be what is required to convince policy-makers that, for example, mandatory fortification of the staple food eaten by women should include folic acid, or that all women of childbearing age should be advised to take a folic acid supplement.



Noel Solomons
and Klaus Kraemer,
Porto 2010

To determine whether a micronutrient intervention leads to desired change, there needs to be monitoring and evaluation, as was noted by Saskia de Pee at the Second World Congress on Public Health Nutrition in Porto, September 2010.

A probability design which is used to assess efficacy of specific products or interventions and assigns treatment, including a placebo, randomly, is not appropriate for most large-scale programs. An adequacy approach focuses on program performance, i.e., provision, utilization and coverage, as well as change of outcome of interest. When all changes are in the anticipated direction, the program is regarded successful.

A plausibility approach assesses whether the change is likely caused by the intervention, by examining all other possible causes of change as well. This approach can use a number of different designs. In all situations, the implementation of the program as well as factors that could potentially affect the outcome of interest (confounders) need to be monitored.

Obtaining funding

If funding is required in order to gather evidence, it can be obtained from various sources. A number of funding agencies are available for research, and it is therefore necessary to find the one that funds the specific area of research. Examples of funding sources include the United States Department of Agriculture (USDA), the NIH and the European Commission, in addition to a range of government departments for research, private foundations (e.g. Bill & Melinda Gates Foundation) and agencies for development, such as the UK Department for International Development (DFID) or the Canadian International Development Agency (CIDA) as well as private sector.



Dr. Parul Christian
Parul Christian

“My task is to generate the scientific evidence that will influence policy-makers, who will in turn influence the shape of micronutrient support programs ... Science influences policy, policy influences programs – and programs themselves take time to exert an influence on the ground.”

Parul Christian, Professor, Department of International Health,
Center for Human Nutrition, Johns Hopkins Bloomberg School of Public Health

Source: *Sight and Life Magazine* 1/2007



Mark Manary

“The primary mechanism we have for funding research is often through public sources, through people who are at university who are trying to learn something or keep themselves going at university. There’s a disconnect between ‘what would really matter’ and ‘the potential solution.’ I think we are industry-phobic. We are concerned so much about something going wrong that we don’t avail ourselves of very extensive resources and knowledge bases that are needed to solve these problems. We need more engagement, but we also need to remove barriers.

“The best kind of research is where somebody who doesn’t know anything about something gives money to people who want to test a hypothesis ... I think there can be cooperative research projects for public good with roots in the private sector.”

Dr Mark Manary, Founder, Peanut Butter Project, from telephone interview 2010

Building relationships

As part of this process, relationships are built between researchers, and funders, beneficiaries, and the wider world. Their roles are as follows:

- › Researchers undertake research because they are interested in finding fundamental interactions in nutrition between nutrients and body function.
- › Funders, on the other hand, have specific areas of interest. The area of interest for *Sight and Life*, for example, is micronutrients, improved health and decreased disease. Different driving forces and agendas exist for funding – for example, to obtain patents, to develop a new product, with regard to humanitarian issues, or to save on healthcare costs in the longer term, etc.
- › Beneficiaries are those who want a better life for themselves and/or for their families.
- › With regard to the wider world, the aim is for a better, more sustainable environment. Issues include new markets, resources and keeping people where they are – with the goal of preventing poverty migration, providing an opportunity in the country where they live or developing them as consumers for global trade or peace.

Current thinking

As a result of research, we now have a better understanding of the nutritional needs of different groups, including children, women, adolescents and people suffering from different diseases – such as HIV, AIDS or tuberculosis – or who are at risk of disease. With regard to infants older than six months and young children in developing countries and especially in the most vulnerable groups, we now know that, generally, the traditional complementary diet made up of locally available foods, combined with continued breastfeeding until at least two years of age, will rarely provide the nutritional needs of small children, given the lack of nutrient density, the lack of variety, the lack of inclusion of animal foods, and the lack of fruit and vegetables in the diet. We need to focus our attention on developing nutrition solutions for these groups. Small children, for example, need a diet with a higher nutrient density (in other words, with more nutrients per calorie), as they cannot consume the quantity of food needed to provide all nutrients needed for growth and development, especially when living in impoverished communities. This desire for a solution has stimulated innovation and needs to be expanded and encouraged.



A case of anemia

There is also a need for recognition of the importance of nutrition, as opposed simply to an education- or one-size-fits-all-based approach, or one that is particularly for the poor who cannot achieve a healthy diet. Likewise, it is a shame to continue “business as usual” in the belief that education in and of itself will solve the problem for those who cannot afford the food required to meet their nutrition needs.

Sight and Life believes that the MDGs and evidence-based advocacy over the years, which incorporates thinking from the Lancet series and the Copenhagen Consensus, have triggered a readiness to develop and accept new or novel approaches to delivering nutrition. Another relatively new concept is the recognition that Base of the Pyramid individuals – in other words those who live at the lowest level of the world’s economic ‘pyramid’ – are a market and are consumers and do have buying power. We do, however, have to acknowledge that safety nets will always be required for the poorest of the poor. We need partnerships between market-driven approaches and governments and international organizations, so that everyone is covered, receives the nutrition they require and does not fall through the cracks. In essence, good nutrition is a basic human right.

Much innovation is being driven around the 1,000 Days initiative (www.thousanddays.org). The 1,000 Days partnership promotes targeted action and investment to improve nutrition for mothers and children in the 1,000-day period from pregnancy to age two, when better nutrition can have a life-changing impact on a child’s future. The partnership serves as a platform to encourage investment and strengthen policies to improve early nutrition in the developing world in alignment with the SUN Framework, an approach that seeks to coordinate and accelerate international efforts to combat undernutrition (www.scalingupnutrition.org). Any nutrition investment in this period of a child’s life will have the highest return in human capital – which embraces not only individuals, but also ultimately communities and nations.

In addition, many new and targeted products have been and are being developed and tested for efficacy in studies and programs that can be taken to scale, so as to positively impact on improving millions of lives. Ultimately, however, political will is now critical to make it happen and the main investors in nutrition need to be governments themselves.

Key recent product innovations

Key recent product innovations aimed at addressing micronutrient malnutrition in developing countries include:

- > Micronutrient powders (MNPs);
- > Ready-to-use therapeutic, complementary and supplementary foods; and
- > Staple-food fortification and innovative market-based approaches.

Multiple micronutrient nutrition: A history



A case of rickets

Multiple micronutrient nutrition is a concept that has been in existence for the last 70 years. In the first four decades of the twentieth century, scientists sought to separate and characterize the vitamins that were responsible for xerophthalmia, rickets, pellagra, scurvy, and beriberi.

The dietary requirements of the different micronutrients began to be established in the early 1940s. Surveys showed that multiple micronutrient deficiencies were widespread in industrialized countries, and the problem was addressed by use of cod-liver oil, iodized salt, fortified margarine, flour fortification with multiple micronutrients, and, with rising living standards, the increased availability and consumption of animal-source foods.

Following World War II surveys showed that multiple micronutrient deficiencies were widespread in developing countries. And so began the quest for the best, most cost-effective and sustainable solutions to a global challenge from which we cannot escape if we hope to uplift communities and improve the lives of the world's poorest populations.

'Scaling Up Nutrition' (SUN)

"In April 2010, the Governments of Canada and Japan, USAID, and the World Bank hosted a high-level meeting on 'Scaling Up Nutrition' (SUN) with the objective of mobilizing investment in nutrition interventions that are strongly supported by scientific evidence. **Of the 13 interventions in the framework for action, seven interventions are directly related to micronutrients:**



A child with neural tube defect – probably caused by folic acid deficiency

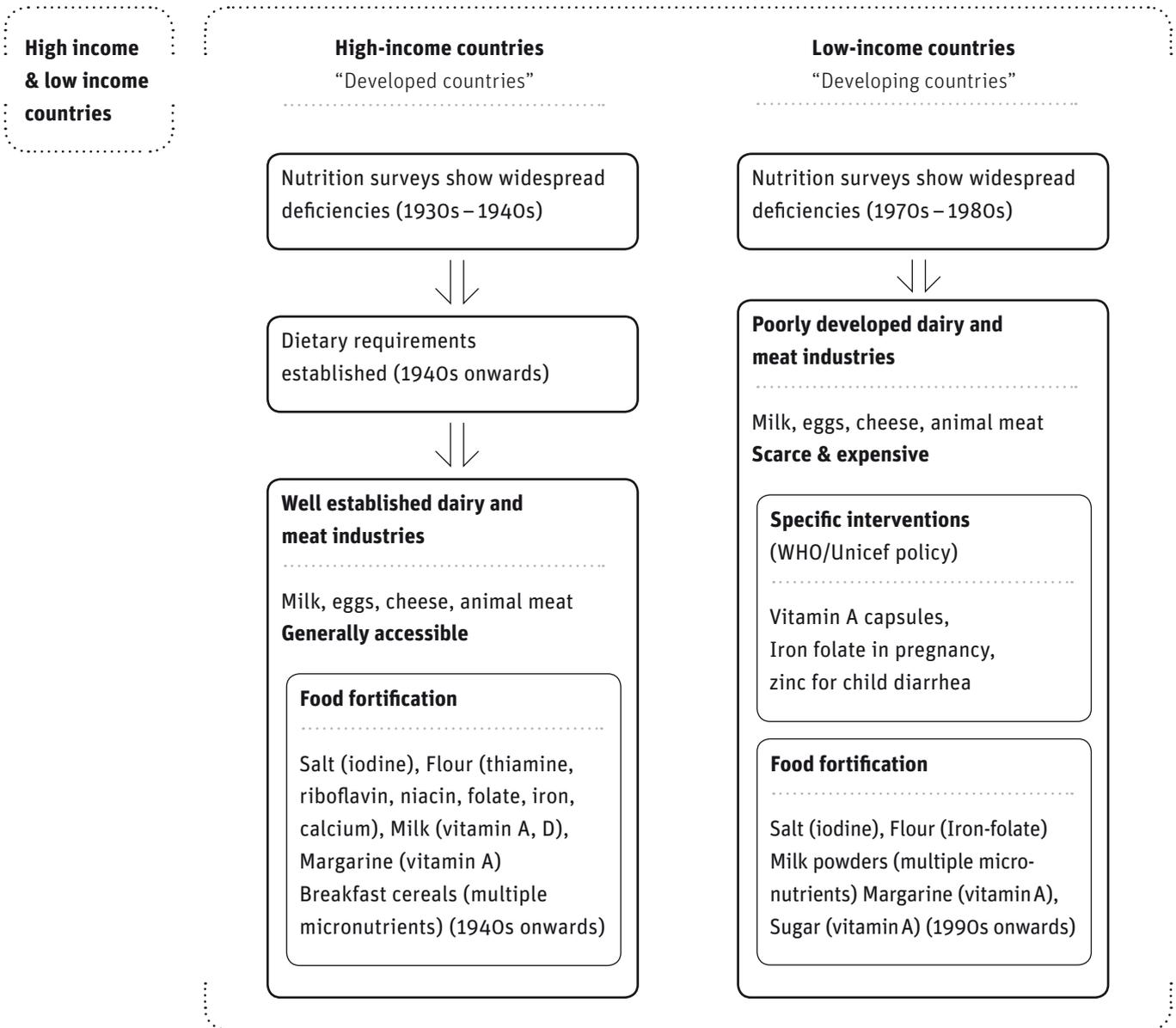
- > Periodic vitamin A supplementation
- > Therapeutic zinc supplementation for diarrhea management
- > Multiple micronutrient powders for home fortification
- > Iron-folic acid supplements for pregnant women
- > Salt iodization, and iodized oil capsules where iodized salt is not available
- > Iron fortification of staple foods.

If the package of all 13 nutrition interventions underwent full implementation, it is estimated that it would prevent one million children from dying each year."

Scaling Up Nutrition: Framework for Action

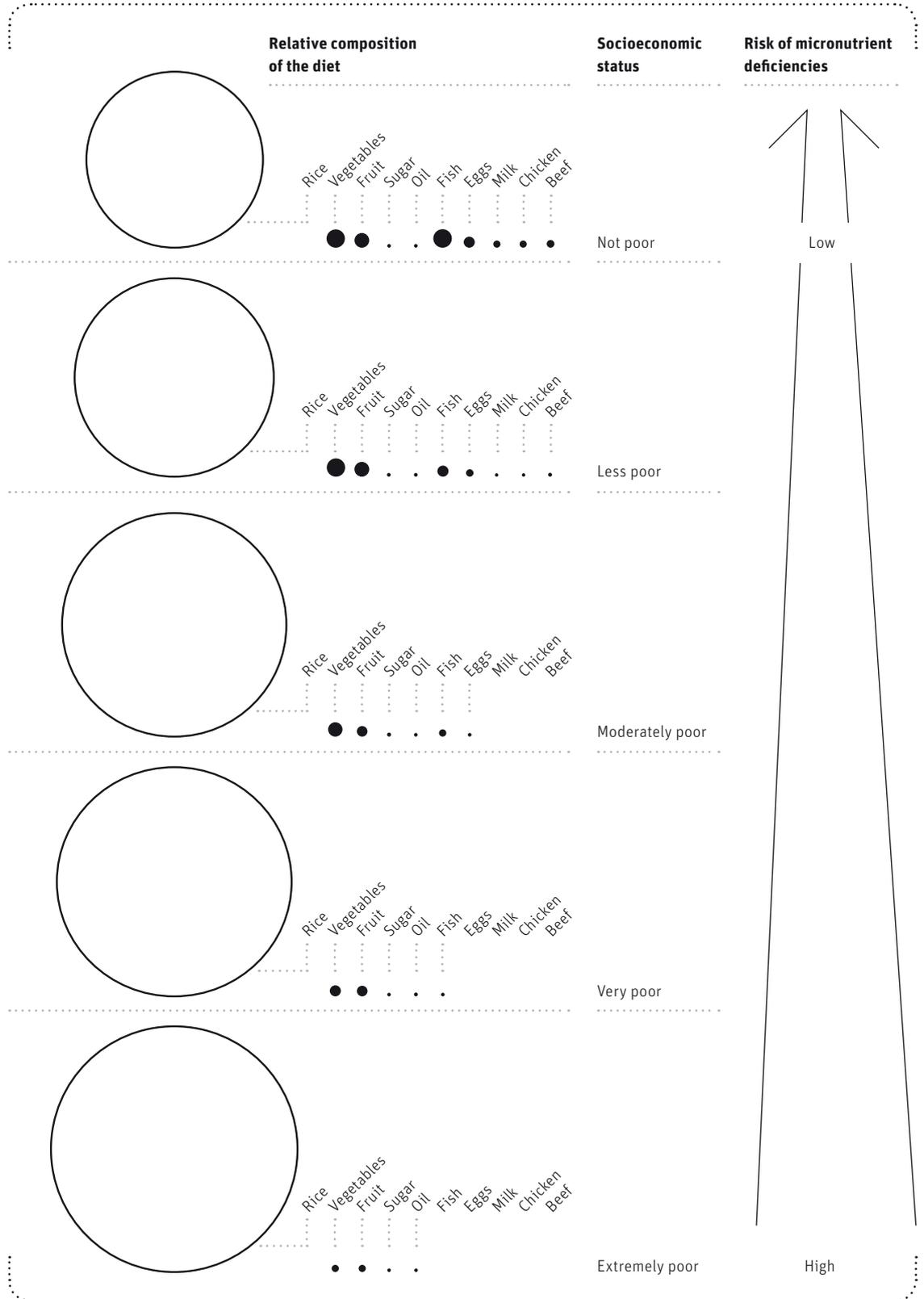
The benign circle

It would appear that there has been a cyclical nature in the way we have approached certain nutritional problems over time. The first cycle identified and largely solved multiple micronutrient deficiency in industrialized countries in the mid-twentieth century. However, with the recognition of the large disparities in health and resources between industrialized countries and the developing world, attention turned to the problems of developing countries, including reducing mortality, improving health, and among other challenges, eradicating micronutrient deficiency. The developing world became the second cycle. Now, once again, there is the recognition that we still need to be concerned about micronutrient deficiencies in the industrialized world too, and so the circle continues.



The relationship of poverty, dietary diversity, and risk of micronutrient deficiencies

(Model based upon work by Martin Bloem, Saskia de Pee, Richard Semba, and colleagues in Indonesia)



The Malawi story



Lake Malawi

The Republic of Malawi has a total population of 15 million, most of whom live in rural areas and 45% of whom are children under 14 years of age. It is also one of the world's least developed but most densely populated countries, with the 12th highest infant mortality rate in the world and a life expectancy of 50.9 years.

The 2004 Malawi Demographic and Health Survey showed that malnutrition was widespread and endemic, with 48% of children under five being stunted, 25% underweight and 5% wasted.

In addition, some 20% of the babies were born with a birth weight of less than 2.5 kg. Overall, malnutrition (directly or indirectly) accounted for 52% of child mortality. Malnutrition was also prevalent among the adult population at 25%, with 75% of the malnourished adults being HIV positive.

Micronutrient deficiencies were also common, ranging from 60% vitamin A deficiency among children under five to 50% iodine deficiency among children aged five to 10 years. In essence, in 2004 malnutrition was a universal problem in Malawi. Causes included low dietary intake; a high disease burden, including an HIV prevalence of 14.4%; persistent food insecurity from 1992 to 2004, which rendered 4.3 million Malawians food insecure; poor child-care practices – exclusive breastfeeding being as low as 53% – and suboptimal complementary feeding practices; low coverage of vitamin A supplementation, at less than 60% for children and 46% in postnatal mothers; and poor healthcare-seeking behaviors and limited access to quality healthcare and sanitary facilities.

Added to this, in 2005 Malawi conducted a nutrition profiling which revealed that it would lose \$446 million between 2006 and 2015 if stunting, nutritional anemia and iodine deficiency were not addressed. However, the country could gain \$83 million in productivity in a single year if stunting, nutritional anemia and iodine deficiencies were reduced by 30% each. This equated to a productivity cost-benefit ratio of \$1.0 : \$5.3.

In the light of this evidence, the current Malawian government declared malnutrition a silent crisis with significant negative economic, health, and social-cultural and political consequences.

Through collaboration with partners such as the WFP, the majority of Malawian children now access one nutritious meal a day via the school feeding program, and this has improved retention rates in primary schools, especially amongst orphaned and vulnerable children.

Nutritional status has also generally improved from 2004. Stunting, which was 48% in 2004, declined to 46% in the 2006 Multiple Indicator Cluster Survey and is currently being projected at 42%. Indications are that wasting has reduced from 5% to 2.5% and underweight from 25% to 15%.

Malawi's economic growth, which has averaged 7% in the past three years, has also been a strong enabler for these nutrition gains. The 2009 MDGs Assessment revealed that Malawi is likely to meet most indicators under Goal One related to the reduction of extreme poverty and hunger.

Speaking at a *Sight and Life* hosted round table discussion at the 2010 Commonwealth Health Ministers meeting in Geneva, the Deputy President of Malawi, the honorable Joyce Banda said; “The Malawi Government has demonstrated that nutrition is a priority in our economic development. Key points of success are to ensure that there is: Highest political will with clear champions and lead persons; Conducive policy environments with clear strategies, actions and resources for implementation; Harnessing of institutional and human capital development; Well-defined coordination and implementation mechanism based on clearly stated roles and responsibilities and reporting mechanisms; Development and maintenance of strong partnerships within a well-defined action framework championed by government which forms the core for resource mobilization. As a leader and as a woman allow me to insist that it is only when issues of nutrition are tackled at the highest level that we can see success sooner rather than later. This is because in our African traditions, where men eat first and best, the leaders must fully be engaged to change the mindset of the ordinary people about who should eat first and best.”

Sight and Life Magazine 2/2010



Margaret Anyango

“Every year, some 20 per cent of children born in Kenya die before their sixth birthday. These fatalities are attributed to anemia, diarrhea, pneumonia, measles, malaria, HIV/AIDS-related infections and other malnutrition-related causes.

“[The RWG believes] that a holistic approach to micronutrient deficiency is necessary. This includes improving people’s living conditions and increasing their participation in developmental initiatives.”

Margaret Anyango, Executive Secretary, Ramala Women Group (RWG), Kenya | *Sight and Life Magazine 2/2007*



Richard Semba

“The two major patterns of malnutrition/infectious disease and obesity/chronic disease are now occurring side by side in developing countries. The challenge of the double burden is complex, as the underlying causes can vary tremendously across cultures ... We are facing major and multifaceted challenges.”

Richard D Semba, W. Richard Green Professor of Ophthalmology, Johns Hopkins University School of Medicine
Sight and Life Magazine 3/2008

“Approaches based on objective science and proven applications are absolutely essential when we are dealing with nutrition, health and development.”

Dr Martin W Bloem, Chief of the Nutrition and HIV/AIDS Policy of the UN WFP | *Sight and Life Magazine* 3/2008



Tahmeed Ahmed

“How can we ensure that the findings of scientific research translate into effective progress in the field? First of all, we should look at how much coverage is being built up at a field level. If you have a particular intervention, such as vitamin A, in a population of 10 million, how many people are under coverage of vitamin A supplementation? If coverage is small, whatever research we are doing on effectiveness is not being implemented.

“[To improve this], we need identification of the problem, of people who can do the research, of the program that will implement the intervention ... Ultimately, the national government needs to be convinced of the utility and effectiveness of the intervention and there has to be a very good coordination mechanism and funding agencies who can support the program.”

Tahmeed Ahmed, International Centre for Diarrhoeal Disease Research, Bangladesh



Anna Lartey

“When we do research, it takes time to get into policy and into effective programs in the field ... One of the things that can shorten the time is that if the research addresses the need, there should also be funding to be used in that research. If you can get these three elements – need, a time limit and funding – you can shorten that period. An essential ingredient is policy-makers, the people who implement whatever the findings are, and they must be involved right from the beginning. They must understand the benefits; how to incorporate these findings into what we are doing; what the problem is; and how to address the research. They must see the benefit in health terms, and in terms of how much it will cost not to do it.

“The other element is the need for local capacity to implement the research findings. You can have findings and put them into programs, but you need local capacity. If you want to be sustainable, you want the quality and quantity of local personnel who will run or carry on the program or project you have in mind. You also want sustainability.”

Anna Lartey, Associate Professor, Department of Nutrition and Food Science, University of Ghana

Promoting
partnerships
and capacity
building.

08 From Research to the Field

As long as the research into micronutrients and their health impact and effectiveness stays within the realm of scientific circles, we will not improve the health status of the world's most vulnerable. Thus, while *Sight and Life* supports scientific research and acknowledges it as the foundation of any intervention – and very specifically supports research into the gaps in scientific knowledge that become apparent as we learn more about the micronutrients – it equally supports the fact that the research has to be turned into programs that are piloted and then scaled up at a country level. It is critical that, at all times, there must be a balance between purely academic research and program delivery.

In addition, there is now a great need for research into new, innovative approaches and offerings such as multiple micronutrient powders and fortified, nutrient-dense complementary foods. Globally, we also need to better understand impoverished populations and beneficiaries as consumers with their own aspirations, needs and wants rather than simply as recipients of food aid.

Qualitative research

One approach to understanding the needs of beneficiaries is via qualitative research. This can also be a solution to the frustration of seeing reluctance or even resistance to whatever assistance is being offered. The right research identifies not only current knowledge, attitudes and practices, but also how to gain support for change, and it can help build vital ties with local populations based on a true understanding of their culture, society and needs. Through sensitive research, we can show that we respect local cultures and are truly listening to and addressing their concerns to build programs that are suited to them and their families. Above all, the qualitative research process can deliver fascinating and relevant insights into people's lives so as to create powerful programs that are sustainable.

Through a series of articles published in its magazine in 2010, *Sight and Life* explored various aspects of qualitative research and how it can inform programs. It used the introduction of micronutrient powder (MNP) as an example to show the possible theoretical challenges a program might face, and explore the solutions that qualitative research can offer.

Introduction of specialized food commodities



Stephen Kodish
(2nd left) with
WFP staff, Kakuma
refugee camp

“The World Food Programme (WFP) is increasingly using innovative commodities such as MNP and lipid-based nutrient supplements (LNS) to improve the nutritional status of vulnerable groups such as women and children. These products are new to most populations, as well as to WFP staff. Hence, the carefully designed, culturally appropriate introduction of the product to the target population is critical for successful program implementation and to achieve anticipated benefits. Qualitative research knowledge and skills for exploring contextual factors such as traditional medical systems and local health-seeking behaviors of the target population are instrumental in program design and implementation. Most WFP staff have limited knowledge of how to elicit these types of information using qualitative data collection techniques.

“A Rapid Assessment Procedures (RAP) manual may be used in future DSM-WFP nutrition programming to assist with the culturally appropriate introduction of specialized food commodities. The RAP is a tool that aims to quickly gain sufficient understanding of a cultural setting from the community’s perspective, in order to make key decisions regarding the design and implementation of effective nutrition programming, using a mixed methods approach. Various data collection methods, such as in-depth interviews, focus group discussions, and direct observations, are critical to systematic, qualitative work using the RAP manual.”

Stephen Kodish, Joel Gittelsohn Johns Hopkins Bloomberg School of Public Health, Baltimore, USA
Source: *Sight and Life Magazine*, 2/2011

The essence of qualitative research is that it is a process of formalized listening with the aim of understanding people’s beliefs, experiences, attitudes, behaviors and interactions. It is not a survey and has no statistical basis. By structuring a series of discussions and observations, it enables the creation of an accurate picture of an environment and the people in it. Thus, a researcher will go into the field and observe, for example, how people cook for their families, how they organize mealtimes, and how they manage their children’s health. They will talk to people to find out what they believe, think and feel about health and nutrition. They will also talk to ‘experts’ in the field, whether doctors, community leaders or individuals from other successful programs, in order to find out what has worked elsewhere and what is happening at the moment and, perhaps most importantly, what hasn’t worked in the past. All the discussions are structured, but not prescriptive. The emphasis is on open-ended questions that lead to insights, not statistical analysis. The non-numerical data that is generated is categorized, so common themes emerge. Qualitative research covers the motivations behind people’s actions and choices, and the barriers behind resistance, whether social, emotional, practical or economic. Ultimately, qualitative research helps people understand the key problems and gain deep insights that are often missed in quantitative research. By asking the right questions, one can unpack the situation, and then the solutions often become self-evident.

Qualitative research is relevant to programs because often the support agencies are made up of outsiders from different cultures who can easily be perceived as prescribing a particular solution to a population from a position of ignorance, and perhaps even arrogance. By undertaking qualitative research one becomes immersed in the community and culture, one can demonstrate that one values the local population and their beliefs, at the same time as finding out how to make a program successful.

**Qualitative
research:
research and
tools**

Techniques

- › **Expert interviews:** one-to-one interviews with key stakeholders and experts in the area you want to understand.
- › **Focus groups:** a discussion within a homogenous group of 6–8 people. The session is facilitated by a trained moderator using a discussion guide. Several focus groups are undertaken to make sure that their findings are representative of a larger population.
- › **Home visits:** researcher will arrange to visit a respondent’s home to observe their domestic environment.
- › **Follow-me’s:** researcher will shadow a person to observe their daily routine and talk with them and the people they interact with.
- › **Community observations:** researcher will visit relevant public spaces and observe behaviors and interactions.

Tools

- › **Discussion guide:** a script of open-ended questions and exercises designed to stimulate debate and get to the heart of the matter.
- › **Stimulus:** material shown to respondents to aid the discussion, maybe to prompt recall, or explain a product. Could be a poster, sachets, box, logo.
- › **Concise worksheets:** worksheets for respondents to fill out, ranking different questions, often discussed in group to expand on questions. Depends on level of literacy.

Emma Bryden, *The Corporate Story* | Source: *Sight and Life Magazine* 1/2010

**Abdulahi
Sheikh
Abdulrahim:
Traveling Back
in Time?**

Sometimes good things come in small packages. At least this is the experience of Abdulahi Sheikh Abdulrahim, a 57-year-old Somali from Kakuma Refugee Camp, who attests that daily consumption of a 1g sachet of **MixMe™ multi-micronutrient powder has significantly improved his quality of life:**

“When Muslims pray, sometimes we kneel down and sometimes we stand up several times in succession. For the past several years, whenever I tried to stand during prayer, I felt sharp pain in my knees; I could not stand quickly. But after three days of using MixMe™, the joint pain ceased. Now I feel like a young man of 15 years.”

During 2009, the WFP distributed MixMe™ in Kakuma to alleviate shortfalls of several essential vitamins and minerals in the general food basket that was supplied to the refugees. Until one month ago, Abdulahi counted himself among the considerable proportion of the refugee community that resisted MixMe™ acceptance. He bought into the widespread myth that MixMe™ was a contraceptive. “Before the training, I listened to the people who said MixMe™ is family planning.”



A little girl eating food fortified with MixMe™

However, his perception was changed after attending an information session led by ‘Doctor’ Josiah Osiri (a WFP behavior change communication consultant): “Now I understand that it was all just propaganda.”

The training equipped Abdulahi with information about the benefits of MixMe™. From that time, he decided to try the product and, after experiencing benefits within a few days, he has been a regular user ever since.

“I have lived in Kakuma since 1997 and I was in another refugee camp in Mombasa before that. The life here is very difficult and leads to poor health. People tell me I used to be very nervous, but since starting MixMe™, I am calm. My [blood] pressure has come down; I am now enjoying sound sleep that I missed for a long time and my appetite has improved.”

Because of the health benefits Sheikh Abdulrahim has witnessed, he became a strong promoter of MixMe™ in his mosque and the greater Zone 5 Muslim Community.

“When I go to mosque, I tell all my friends that this MixMe™ is a good thing, so if you take it you become young and healthy. If you go to the mosque, you can ask anyone, ‘Who told you MixMe™ is good?’ They will tell you, ‘Oh, Sheikh Abdulahi.’”

He persuaded some of them to start using MixMe™, too. “At first, they said I was joking, that I don’t really use it. Then when I insisted, they speculated that the WFP was paying me to counter the propaganda in the Somali community,” he laughed. “But I’m an old man, so I can’t lie!”

The single parent of three also convinced his children to try the micronutrient powder. “My 19-year-old daughter also uses it. She told me ‘Yes, Baba, MixMe™ is very good. In Kakuma, you cannot get some vegetables, but on the box you can see that many of the same [nutrients] are in [MixMe™].’”

The eventual widespread acceptance of MixMe™ in refugee settings depends on testimony from people like Sheikh Abdulahi. “How can we address the widespread propaganda? Through what we are now doing at the mosque – telling everyone with positive experience to explain to the rest of the people.”

Especially when that message comes from “an old man who can’t lie,” people might finally change their perceptions of MixMe™.

Charles Owade, Christine Klotz, WFP

Inter-relationships

There will always be challenges in situations where there is an inter-relationship between bodies or organizations with the same ultimate goal, but different focus areas. An example of this is the implementation of micronutrient (MNP) programs in partnership with the WFP, which exists to help some of the poorest and most disadvantaged populations in the world. Since 2007, DSM has been involved in an official partnership with the WFP, providing technical and scientific expertise and developing high-nutrient products as well as financial assistance to improve the WFP food basket through the addition of essential micronutrients in innovative forms.



WFP nutrition team,
Porto 2010

At the second World Congress of Public Health Nutrition, held in Porto, Portugal in 2010, Stephen Anderson, country director of the WFP in Manila, noted that one of the main concerns of the WFP is not the quantity of food provided to those in need, but rather its quality and nutritional impact.

“Micronutrient powders may be used successfully in one context, but can be faced with all kinds of problems when deployed in another. It’s therefore extremely important to have good communication between DSM and the WFP. I’m glad to say this very much the case. DSM’s approach is very open and constructive, and the representatives of the company with whom we work are excellent, not only at providing scientific and technical expertise, but also at listening. I feel that they really do want to understand the situation on the ground and our own requirements too. By the same token, it’s very important for the WFP workers to learn from our experience and share both the positives and the negatives with DSM and understand the technical challenges that they face when developing products. This is the only way we can hope to make a real difference, because with MNPs the devil is in the detail. They are a complex product, and they are not always simple to administer in practical terms, even though the idea behind them is a very simple one.”

Multiple roles

In addition, there can be challenges where people with different skills and expertise come together, given the complexity of the issues they are addressing and the sometimes conflicting requirements they have to fulfill. For example, the WFP needs to get highly nutritious foods to those in need at the lowest possible cost and taking into consideration the logistical challenges that are often faced to reach remote areas. A company such as DSM needs to ensure that the packaging is durable, that the nutrients are stable and that the most bioavailable forms of the micronutrients are used to deliver the promised benefits. Success can, however, be achieved by drawing on the expertise and strengths of each party involved and by keeping the communication channel open and learning and listening to each other. Ideally, program managers and researchers have to collaborate and communicate – and even compromise – in the service of reaching the common, overarching objectives.

The researcher

“My work [at Johns Hopkins] falls into three main areas. The first involves conducting applied research among underserved communities of the world with the aim of improving public health. The second involves training future public health professionals through teaching, advising, and mentorship. The third part of my job involves service. Through the provision of technical expertise and consultation, I serve the wider scientific community.

“I tend not to be engaged in programs on the ground; rather, I advise on the research base for interventions and programs designed to serve the public in less developed countries. My task is to generate the scientific evidence that will influence policy-makers, who will in turn influence the shape of micronutrient support programs.

“The evidential basis for my work is very important. Science influences policy, policy influences programs – and programs themselves take time to exert an influence on the ground and change lives. At Hopkins, we engage in research that is primarily designed to do this.

“The *Sight and Life* Magazine does a very good job of bringing together program activity and research – programmers and scientists, in other words.”

Parul Christian, Professor, Department of International Health – Center for Human Nutrition, Johns Hopkins Bloomberg School of Public Health, Baltimore, USA | *Sight and Life* Magazine 1/2007

The program manager



Schoolchildren,
Kenya 2008

How can research and the programmers work together?

Ideally, research and field operations should constitute a positive feedback loop. Through research, managers and donors can gauge program effectiveness to extend the timeline of a trial program or to expand an innovative concept to a wider geographic area. However, heavy emphasis on research alone can hamper the timely implementation of a program, as a research project normally requires engagement from multiple stakeholders, a lengthy ethical review process, and analysis of results, which can delay the roll-out of subsequent steps of a phased intervention. The reality that research can be slow and costly underscores the importance of wide dissemination and new application of results from previously implemented studies; hence, regular dialog between the fields of research and programs and field operation is essential.

What is the link between evidence-gathering and program delivery?

Evidence-gathering should occur during all stages of a well-implemented program. It is the essential first step to effective program design (e.g., is the logo of a new product acceptable for a given community?) and subsequent delivery (e.g., what is the community response to mass communication about the product during distribution). A dynamic program also incorporates periodic evidence gathering throughout the project roll-out to adapt to arising challenges (e.g., should the distribution modality be changed to ease the demonstrated time constraints of busy mothers?). Gathered evidence, be-

sides being shared among humanitarian and academic communities, should also be relayed to the participant beneficiaries so that they remain motivated. Beyond fulfilling an ethical imperative, it is a litmus test for beneficiaries to ascertain the accuracy of programmers' and researchers' presented perceptions of gathered evidence.

What are the key issues for researchers today?

Programmers rely on results of field research for essential guidance in planning and implementation while researchers must keep close tabs on which emerging program ideas require a robust evidence base for validation, revision, and/or scale-up. This symbiosis necessitates meaningful engagement of key stakeholders in the research planning process like government, community-based structures, and organizations that operate within a proposed research setting. Such engagement ensures that research does not crowd out existing program delivery, leads to a richer contextualization and background for published reports, and increases the likelihood that results will be incorporated into future program design. Secondly, it is essential for researchers to report on challenges and failures to avoid costly and time-consuming repetition of design flaws. Researchers might hesitate to present results that deviate from a hypothesis, but this type of information can profoundly benefit the programming community. Conversely, programmers have to clearly voice identified gaps in the evidence base to the research community so requirements for formalized analysis can be fulfilled. Lastly, regular engagement with beneficiaries – especially in an informal context to supplement 'official' interviews and questionnaires – is a key way for researchers (and programmers) to obtain timely and meaningful insights and maintain perspective of whose needs the research should serve above all else. Community-based decisions about which issues warrant field research are a key consideration for today's researchers.



Christine Klotz

Christine Klotz, Nutritionist, South Sudan Country Office, WFP

The most effective route to progress

Above all, the ideal is a fully holistic and multi-disciplinary approach if we are truly to take interventions that research has shown to deliver benefits to scale and so improve the lives of millions – especially the most vulnerable and often thus the most exploited. In order to attain this goal, *Sight and Life* plays an active role in influencing organizations, supporting individuals and acting as an interface to connect individuals and organizations and offer platforms where robust and open discussion can take place – all leading to a significant and positive impact in the field.

In 2009, the Global Report on Vitamin and Mineral Deficiencies, entitled *Investing in the Future: A United Call to Action on Vitamin and Mineral Deficiencies* was launched by seven of the world's leading development agencies. It called on governments and other partners around the globe to demonstrate their commitment to children and families in developing countries by increasing investments in life-saving vitamins and minerals. Since then, there has been a dramatic increase in the recognition of the importance of nutrition interventions and the need for nutrition to be central in the development agenda of developing countries.

The World Health Report

The World Health Report, first published in 1995, is the WHO's leading publication. The report combines an expert assessment of global health, including statistics relating to all countries, with a focus on a specific subject each time the report is published. The main purpose of the report is to provide countries, donor agencies, international organizations and others with the information they need to help them make policy and funding decisions.

The latest report, published in 2010, focuses on health financing and raising sufficient resources and removing financial barriers to access – especially for the poor – as promoting and protecting health is essential to human welfare and sustained economic and social development. The report synthesizes new research and lessons learnt from experience into a set of possible actions that countries at all stages of development can consider and adapt to their own needs. This is critical, given that 20% to 40% of all health spending is wasted through inefficiency, and that people in most countries rate health as one of their highest priorities, only coming behind economic concerns such as unemployment, low wages and a high cost of living.

The report also reminds us that health does not stand alone. Education, housing, food and employment all impact on health; thus, redressing inequalities in these also reduces inequalities in health. Once again, there is a need to break down silos. This is equally true when it comes to providing nutrition security – countries must not only consider the scaling up of nutrition-direct interventions (such as supplementation, fortification, and dietary diversification), but must also consider nutrition-sensitive interventions in their nutrition policies and action plans (such as agriculture, gender equality, and the girl child).

The SUN rises on nutrition: the Scaling Up Nutrition movement



Refugees taking home fortified food rations

A strong call for global action towards attaining nutrition security was begun by the World Bank in 2009, when it became clear that the Millennium Development Goals would not be achieved without global coordinated action focused on nutrition. It re-emphasized that the battle against malnutrition was urgent, but could only be won if everyone came together to eliminate its scourge and ensure adequate nutrition – especially for mothers and young children. It recognized that nutrition solutions exist that offer the highest possible returns to development, but that nutrition had, for the most part, been regarded as an afterthought in development priorities and was seriously underemphasized by both donors and developing countries.

The call stressed that there was both a moral and economic imperative to engage global leaders to place nutrition high on the international political agenda and scale up effective interventions at a country level. This has resulted in the formation of a new global movement known as Scaling Up Nutrition (SUN), with the goal of reducing hunger and undernutrition to contribute to the realization of the MDGs. The SUN Framework outlines the key considerations, principles and priorities for action to address undernutrition. It serves as a tool to mobilize support for increased investment in a set of nutrition interventions across different sectors. Following from the Framework, the SUN Road

Map proposes a multi-stakeholder approach and details means through which country, regional and international stakeholders can work together to establish and pursue efforts to scale up nutrition in a coordinated and responsive manner.



David Nabarro

In the words of Dr David Nabarro, Special Advisor on Food and Nutrition Security to the UN Secretary General, who is taking the lead on SUN, “SUN is not a new institution, initiative or financial mechanism. Instead it is a movement that brings organizations together to support national plans to scale up nutrition. It helps ensure that financial and technical resources are accessible, coordinated, predictable and ready to go to scale. The main investors in SUN are national governments themselves and the SUN movement is for all countries whose populations experience undernutrition and for all stakeholders committed to providing support.”

Connecting individuals and organizations

Set up in 2007, BioAnalyt is a young spin-off of the University of Potsdam. It has developed easy-to-use vitamin A test kits for quantitative testing of vitamin A in food and blood. BioAnalyt’s test kit is based on a three-step analytical procedure: **1.** inject the sample into the ready-to-use reagent vial (iEx), **2.** shake, and **3.** measure the vitamin A content in the portable measuring unit (iCheck).

“*Sight and Life* arranged for us to test our product in cooperation with universities and another organization,” notes Dr Simone K Frey, Marketing Manager, BioAnalyt and Prof. Dr Florian J Schweigert, Founder & President, BioAnalyt. “So far, it has supported the validation of iCheck as part of a study in Kenya by the University of Wageningen, but there are also other projects at a planning phase. Moreover, *Sight and Life* supported us by providing a space at their booths at conferences. Finally, the organization knows many people and organizations, and can bring them together.”

Sight and Life was one of the first organizations to see the potential of iCheck, and that it could really help in the field to improve nutrition programs. “Klaus Kraemer and his team really believe in this, and supported us even before we had finished our research,” say Dr Frey and Dr Schweigert. “Most importantly, it has given us access to people working in the field, as well as to very important organizations. Given that we are a 10-strong company, it’s really helpful to have *Sight and Life* bringing us in touch with the players in our market.”

In May 2002, the General Assembly of the UN reemphasized that control of anemia should be one of the global Development Goals to be achieved in the early years of this new millennium. Despite this, the global prevalence of anemia has hardly declined in the past decade, although considerable programmatic experience exists and a vast amount of scientific data has been compiled on iron metabolism. Much is still unknown, however, and many new issues continue to emerge from the ongoing research, both basic and programmatic.

Effective control of anemia requires integrated solutions that are tailored to the particular needs and opportunities in each country. Components of such an approach include food fortification, micronutrient supplementa-



Michael Zimmermann

tion of vulnerable groups (particularly children and women of childbearing age), education, and dietary diversification, as well as control of diseases such as malaria, worm infections, and other chronic endemic infections. While each of these can help reduce the burden of anemia, none is capable of doing the job on its own. If the goal is the eradication of anemia, an integrated approach is vital.

In 2007, *Sight and Life* published the book *Nutritional Anemia*, edited by Dr Klaus Kraemer and Prof. Michael Zimmermann. This publication assembles some of the leading research on the topic, following a workshop on Nutritional Anemia in Barcelona, Spain in 2006 that discussed and debated the issues. The book provides the latest update on the complex causes and consequences of nutritional anemia, and the effectiveness of current control strategies, and is analyzed in greater detail in Chapter 5 of this book.

**Serving
those who
have the
least choice**



James T Morris

“International organizations, such as the WFP, depend on research in order to deliver the best possible assistance to hungry and malnourished poor people. These are the people who have least choice in their diet, and who are at tremendous risk of anemia and other micronutrient deficiencies.

“Together with partners like DSM and *Sight and Life*, we can and must do more to reduce micronutrient deficiencies such as nutritional anemia. The *Sight and Life* Nutritional Anemia book, which focuses on reducing the prevalence of nutritional anemia, is key to reducing overall hunger and malnutrition rates ...”

James T Morris, Executive Director, WFP | From: Foreword, *Nutritional Anemia*, 2007

Supporting individuals

“My job entails promotion of holistic health, disease prevention and control and prolonging life as well as building the capacity of communities and health actors,” notes Josiah Osiri, a WFP behavior change communication consultant.

Mr Osiri has been actively involved in the DSM–WFP strategic partnership, entitled *Improving Nutrition, Improving Lives*, that is aimed at addressing the high levels of nutritional anemia in emergency environments through a micronutrient supplementation initiative. He was based in Kakuma Refugee Camp, Kenya for close to two years.

“How has *Sight and Life* helped me? I obtained financial support to pursue my life’s dream – a Masters in Public Health in the UK,” he says.

“For over 15 years, I have been getting international offers of admission but was lacking the finances. I remember in one of my telephone interviews with a university that was renowned for its public health [department], the course director at the end of the interview hinted to me that the course was expensive and wondered whether I would be able to afford it.”

Sight and Life's support transformed Mr Osiri's academic and professional outlook. "With over 20 years of work experience, I had reached a dead-end in my career. I was professionally drained, but now I can see beyond the horizon," he said. "I feel I have a lot to offer in transforming the health of Kenyans and the global population. Already, I have a vision that will help to accelerate the achievement of MDGs in developing countries. I intend to use this vision as the basis for my PhD thesis."

Ultimately, "*Sight and Life's* role, in terms of supporting individuals, is as a sponsor, academic torch bearer, dream revealer, capacity builder, eye opener and development partner," Mr Osiri says. "There are many people in the developing countries who can contribute immensely to the improvement of public health nutrition but who lack the necessary resources. Three things are important in sustainable development – finances, product/ tools and capacity. It's a wise decision to support both the community projects as well as individuals."

Flexible support in times of need

"The positive thing about working with *Sight and Life* is that it is not just about receiving a grant to do a certain project. There has always been interaction and, depending on the results, the development of new ideas and projects. To get things done, very often only a small amount of funding is required and *Sight and Life* is always very flexible to provide this. It was also very helpful to get information which was not available somewhere else and presented in a much more interesting form, and more practical than scientific publications, via *Sight and Life Magazine*."

Juergen Erhardt PhD | Bandung, Indonesia

Interview with Johann C Jerling

What does *Sight and Life* mean to you in the context of the global fight against malnutrition?

"Maybe six years ago, if I heard someone talk about *Sight and Life*, I would have thought about vitamin A. Now, however, I think it is about an organization that creates awareness, faces the issues, and builds capacity. For me, the whole transition that has been undergone by *Sight and Life*, at least in my lifetime, has built that enthusiasm. This is an organization that gets all sorts of things done. Although I do not believe that there is one single organization that will ever win the battle against malnutrition, *Sight and Life* plays a really important role in the whole movement. I have great respect for it because it actually delivers.

"As for the magazine, it contains articles, inspiring stories, and news, and its content is strikingly different from what many other organizations offer. I also appreciate that it is not simply so narrowly focused that it's only interested in its own small area, perhaps because it is positioned to be fairly broadly interested in malnutrition. I get the impression that it's an organization that's genuinely interested in and committed to solving real public health issues."

Johann C Jerling (PhD)
Director Centre of Excellence for Nutrition at North-West University (Potchefstroom Campus), South Africa

Heartfelt liaison



Noel Solomons

“Having lived and worked in Guatemala since 1975, I became a co-founder of the Center for Studies in Sensory Impairment, Aging and Metabolism (CeSSIAM) in 1985. CeSSIAM had been founded within the National Committee for the Blind and Deaf of Guatemala, and we had a mandate to address issues of visual impairment. Nutritional blindness, caused by vitamin A deficiency, was an obvious point of mutual interest. Working with the IEF on bringing resources to Guatemala and with the Johns Hopkins University School of Public Health, we addressed issues of usual vitamin A intakes from food and the validity of functional diagnostic tests of vitamin A status. I first became aware of *Sight and Life* in the early International Vitamin A Consultative Group (IVACG) meetings.

“Perhaps the most heartfelt liaison with *Sight and Life* has been around the resolution of the dilemma of eradicating iron-deficiency anemia in heavily malaria-endemic regions. We are also concerned about the conundrum of a situation in which iron is needed by some segments of the population, but is hazardous to other segments of the same population. In 2007, representatives of CeSSIAM, *Sight and Life* and AkzoNobel formed a pact to support one another in actions to mitigate the dangers in providing iron in this complex environmental scenario. Meanwhile, *Sight and Life* has lent the pages of its magazine to the discussion of the iron-malaria dilemma, has joined forces with the World Food Programme to reduce the iron dose in programs of home fortification, and has made innovation in public health management of iron interventions in malarial areas the targeted focus of its challenge-grant competition for 2011.”

Noel W Solomons, MD, CeSSIAM, Guatemala

09 Local versus Global

Despite the massive effects of globalization, local factors that influence hidden hunger remain important. In many ways, the recognition of local cultures and patterns has, in fact, become more visible and salient as globalization has proceeded. *Sight and Life* operates both locally and globally.

Knowledge of local culture, behaviors and habits has proved key to the success of *Sight and Life's* endeavors – aiming to meet individuals and communities where they are and partner them on their journey is critical. In addition, knowledge of the rich diversity of cultures enables us to better understand organizational behavior and also, perhaps, to advance theory and turn it into in-country actions that change lives and improve health.

One example of this is readily demonstrated by the concept of food fortification.

***Sight and Life* and fortification**



Micronutrient powder, Nepal

Food fortification means adding specific vitamins and minerals, shown to be deficient in the diets of the general population or a specific target group of individuals within a country, to the foods most commonly eaten, in order to prevent or address deficiencies. The most obvious way to do this is by incorporating the micronutrients into staple foods such as flour, rice, salt, sugar, margarine, cooking oil or even condiments. As a result of fortification, populations benefit from a diet that contains the missing vitamins and minerals without any effort or need for any form of behavior change. Over the years, fortification has grown and, in addition to mandatory fortification programs (where governments legislate that specific micronutrients be added in a specific dose to specific foods) and voluntary fortification (where the food industry responds to a need on their own initiative by adding micronutrients to foods), we now also have the concept of home fortification. This is where single dose sachets of the critical micronutrients for the target group (for example, children aged six months to two years) in a powdered form can be added to traditionally consumed food just before eating. This means that, regardless of the food being consumed, the vitamins and minerals necessary for an individual's daily needs can be guaranteed. A big advantage is that locally grown and available foods remain the foundation, and the poorest of the poor who have little access to commercial foods can still benefit. As a way of improving health, fortification is a favorable

strategy, as it requires little or no change in dietary habits and is very cost-effective. In fact, the prestigious Copenhagen Consensus consistently ranks micronutrient fortification amongst the most cost-effective interventions to address poverty – placing it third in 2008.

Food fortification

‘Fortification is adding vitamins and minerals to food products to restore nutrients lost during production and/or to incorporate nutrients that are absent or present in low amounts in diets. As a public health strategy, food fortification should be guided by the fundamental public health principle to prevent micronutrient deficiencies effectively and safely where they exist and assure a healthful dietary intake of essential nutrients.’

Scaling Up Micronutrient Programs: What Works and What Needs More Work? The 2008 Innocenti Process

A recipe for success



Classroom education, Vietnam

Food fortification programs have demonstrated not only that both small and large corporations are interested in investing in these products, but also that they have, more importantly, shown dramatic results when global best practice is applied. They are about collaboration, ideas, innovation, drive and education. This requires governments, industry, NGOs and communities to work together. One example of such an initiative is a public-private partnership that was established in the Philippines. The Philippine Plan of Action for Nutrition (PPAN) put together a strategy comprising micronutrient supplementation through vitamin A capsules, dietary diversification and food fortification. The most commonly consumed foods in the Philippines are coconut oil, salt, rice, flour and sugar; indeed, half of the country’s pregnant and lactating women consume coconut oil. As a result, the San Pablo Manufacturing Corporation responded to the government’s calls to fortify its oil with vitamin A. After 18 months of research and development, this partnership led to demonstrated health benefits. Likewise, the mandatory fortification of maize meal and wheat flour in South Africa with a mix of vitamins and minerals including folic acid resulted in a demonstrated significant decrease in neural tube defects – a decline of 30.5 percent, or 1.41 to 0.98 per 1,000 births.

This section examines the best scenarios for achieving penetration of fortified foods to those needing them. It showcases examples such as:

- › Work on soy sauce fortification by GAIN (www.gainhealth.org/.../china-soy-sauce-fortification-project)
- › The provision of NutriRice at the Dandelion School, China (www.nutririce.com/Dat/UpFileArt.2009/2008124133645383.pdf).

Fortification for the future

One of the earliest examples of food fortification to be reported was an initiative from the Indonesian Ministry of Health. It stated that all 5 g and smaller packets of monosodium glutamate (MSG) had to be fortified with vitamin A as part of a national program. However, ultimately, the fortification of MSG proved to be unsuccessful. Fortification is growing in popularity and many countries have, or at least are investigating, mandatory fortification of key staples – fortified maize meal and wheat flour in South Africa, fortified biscuits in school feeding programs in Vietnam and fortified sugar in Guatemala. And there are other new innovations in the field of fortification with the dawn of biofortification: an example is Golden Rice.

What is the likely future of food fortification? New innovations in both biofortification and food fortification are constantly being discussed and piloted, and there is no doubt that fortification is one of the initiatives that has made and will continue to make a great contribution towards mitigating micronutrient deficiencies around the world, and so will significantly contribute towards the MDGs of improving health and alleviating poverty. At *Sight and Life*, we believe that humanitarian objectives and public health initiatives can work together with business to great effect, and perhaps even greater effect than on their own, to meet the dual goals of improving a nation's health and generating business, resulting in a win-win situation.

Iodine and folic acid fortification: a history

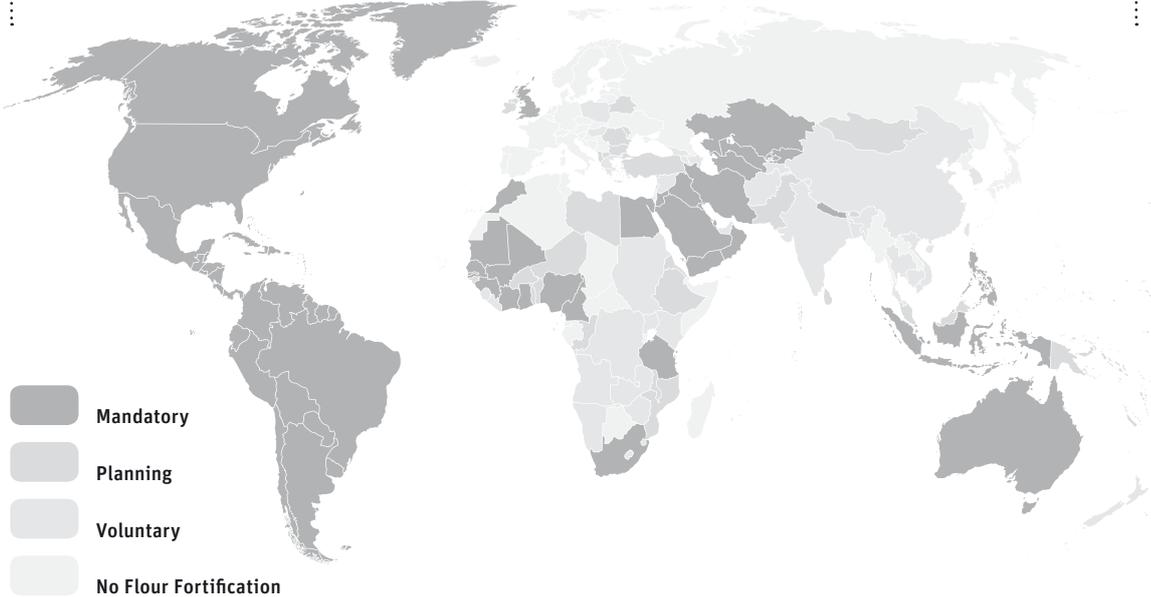
Micronutrient deficiency is a major public health problem that affects millions of people worldwide. Several strategies have been proposed to address the problem, yet food fortification remains one of the most cost-effective and feasible. It has a long history, dating back to the 1920s, when the practice became widespread in many developed countries after the First World War.

How fortification came to be

At the Second World Congress of Public Health Nutrition, Porto, Portugal in 2010, Dr Richard Semba of the Johns Hopkins University School of Medicine spoke on the historical evolution of thought regarding multiple micronutrient nutrition. According to Dr Semba, we have come far in our knowledge and understanding of micronutrients since 1918, when the United States Medical Research Council stated that, “it is now established that ... certain unidentified principles, known as accessory food factors or ‘vitamines’, must also be present in order to maintain health and prevent the occurrence of deficiency diseases.” This was followed by the formation in 1935 of a body called the League of Nations Mixed Committee on the Problem of Nutrition, and the theory that there were certain foods that were highly protective to health, others that were less protective, and still others that were non-protective. Over time, many new food and nutrition bodies have come into being. There has been a shift from the focus on individual nutrients (especially protein), and micronutrients (iodine and iron), to the importance and interactions of multiple micronutrients, and the need for an integrated approach to addressing the world's nutrition problems.

Sight and Life Magazine, 3/2010

**Progress
in global flour
fortification**



Source: Flour Fortification Initiative

Currently, food fortification practices vary from country to country. They encompass a broader concept: The process of fortification adds nutrients that have been classified as ‘missing’ or insufficient in the commonly consumed diet of the targeted group, which often includes those most at risk of deficiencies, such as women and infants and young children. The specific vitamin and minerals added and the amounts that are added also vary. They usually depend on what has been determined by science as being necessary in the specific target group in order to address public health problems, and to fill the gap between what is obtained from the food eaten and that required for optimal health. The food vehicle chosen also needs to be carefully considered to ensure not only that it is commonly consumed, but also that it is technically feasible to fortify it with the necessary nutrients. For example, oil is easily fortified with vitamin A, but may be unstable. There are a number of critical factors that have to be considered and explored when a government considers making fortification mandatory. Not only are the vitamins and minerals chosen important, as is the food vehicle, but also the levels that have to be added to ensure that the benefit is obtained. After all, many of the nutrients, in particular some of the vitamins, are destroyed by heat, oxygen and even water. It is therefore necessary to carry out a number of tests to determine how much has to be added to ensure that the required amount needed by the body is available in the product when it is finally eaten by the consumer.

For example, if micronutrients are to be added to wheat flour that is generally made into bread, it needs to be determined how much of each vitamin is lost during the process of making the bread. In addition, it is important to know how many slices of bread make up a day’s serving of bread, so that one ensures that what is needed is what is eaten. Thus, although fortification is well recognized and is documented to offer an affordable and available solution, it needs careful planning, followed by on-going monitoring to ensure that it really delivers on the promises.

Two of the major global strategies aimed at improving diet quality have been iodine and folic acid fortification intervention programs. They have been reducing, or even eradicating, these deficiencies in industrialized countries with success for many years. Following the introduction of mandatory folic acid fortification, for example, neural tube defects in the United States, Canada, and Chile decreased by more 30 percent in only five years. Similarly, iodine deficiency, the world's leading cause of preventable mental retardation and goiters, has been dramatically reduced thanks to large-scale efforts to fortify salt with iodine.

In developing countries, fortification is more recent, but also tremendously effective. Despite the fact that this has only been recently implemented, UNICEF has reported a drastic increase in the number of households in the developing world that use iodized salt. Although only a reported 20 percent of households in developing countries used iodized salt in the early 1990s, by 2000 that number had soared to 70 percent. By 2006, the WHO estimated that 120 countries were implementing salt iodization programs and noted that the prevalence of iodine deficiency disorders had decreased by one half. Likewise, a USAID-supported micronutrient fortification project in South Africa reached more than 30 million people in 2007. Following the fortification of wheat flour and maize meal, spina bifida in newborn babies declined by 40 percent and there was a reported 38 percent decline in infant deaths due to neural tube defects. Given such overwhelming success, USAID and GAIN are committed to supporting developing countries in their efforts to implement and promote food fortification to further eradicate micronutrient deficiencies. This support is critical because there is concern that progress in salt iodization has reportedly leveled off or even slid back. This highlights the importance of an on-going commitment and the need for constant awareness, monitoring and evaluation.

WHO fortification guidelines

Given the increase in interest in micronutrient malnutrition, the FAO and the WHO created guidelines for application of food fortification in the field, available at www.who.int. Drawing on several high-quality publications and program experience on the subject, information on food fortification was critically analyzed and then translated into scientifically sound guidelines for application in the field.



Lindsay Allen

According to editors Lindsay Allen, Bruno de Benoist, Omar Dary and Richard Hurrell, the guidelines' main purpose was to assist countries in the design and implementation of appropriate food fortification programs. They were intended to be a resource for governments and agencies currently implementing or considering food fortification, and a source of information for scientists, technologists and the food industry. They were written from a nutrition and public health perspective, to provide practical guidance on how food fortification should be implemented, monitored and evaluated. They were primarily intended for nutrition-related public health program managers, in addition to all those working to control micronutrient malnutrition, including the food industry.



Richard Hurrell

The document is organized into four complementary sections:

- > **Part I** introduces the concept of food fortification as a potential strategy for the control of micronutrient malnutrition.
- > **Part II** summarizes the prevalence, causes, and consequences of micronutrient deficiencies, and the public health benefits of micronutrient malnutrition control. It lays the groundwork for public health personnel to assess the magnitude of the problem and the potential benefits of fortification in their particular situation.
- > **Part III** provides technical information on the various chemical forms of micronutrients that can be used to fortify foods, and reviews prior experiences of their use in specific food vehicles.
- > **Part IV** describes the key steps involved in designing, implementing, and sustaining fortification programs. Starting with a determination of the amount of nutrients to be added to foods, this process continues with the implementation of monitoring and evaluating systems (including quality control/quality assurance procedures), followed by an estimation of cost-effectiveness and cost-benefit ratios. The importance of, and strategies for, regulation and international harmonization, communication, advocacy, consumer marketing and public education are also explained in some detail.

Micronutrient interventions are cost-effective

“These approaches are well established and validated to tackle micronutrient deficiencies in the developing countries. The Food and Agricultural Organization of the UN (FAO) and the WHO, in order to reduce the global burden of micronutrient deficiencies and related diseases, have established guidelines for food fortification. The World Bank has recognized food fortification as the most cost-effective intervention. The same holds for the Copenhagen Consensus, where a number of leading economists were assigned to assess the world’s major problems and their solutions based just on economic figures. They came to the conclusion that both micronutrient food fortification and supplementation would be the most cost-effective interventions with the highest return on investment.

“They were asked, ‘What would you do with \$75 to tackle the world’s most severe problems, including climate change, disease etc?’ and micronutrient interventions popped up very high on the solution list. Vitamin A and zinc supplementation had the best cost/benefit ratio, at 1:17; then came staple food fortification with micronutrients.

“We have the knowledge and we have the technology. We know that micronutrients are effective if they are delivered through food fortification and supplementation, but this has not been implemented everywhere. Major obstacles to progress are funding, and the question of who pays. Is this the miller, the consumer or the government? Other obstacles include other financial aspects, communication, social marketing, and not having the capacity to enforce food standards for fortification.”

Dr Klaus Kraemer, Director, *Sight and Life*

What should be done?

We know we have to build the capacity to work with governments on practical standards for food fortification and to assist with monitoring and evaluation. We can also help to carry out analyses to ensure that micronutrients are present at the desired levels, as well as education of the inspectors who go to the plant to check whether the flour is fortified or not, thereby giving them the right tools to ensure that best practice is carried out.

Through the 2000s, commitment to implementation by both establishing and enforcing fortification standards in Nigeria has been a success story, as detailed below. China, too, has been successful in fortifying soy sauce with iron, and its government and private sector are working together on implementation and advocacy, with the support of GAIN. Similar programs have been successful in the Philippines, with vitamin A oil fortification, and in Central America, where vitamin A sugar fortification program coverage exceeds 75 percent.

**Establishing
and enforcing
fortification
standards:
Nigeria 2003**

“Vitamin A deficiency, in particular, had been identified as a common problem amongst children in Nigeria. The staples that were chosen included wheat flour, edible oils, sugar and maize meal. Maize meal, however, was insignificant as Nigeria is traditionally a wheat flour- (bread-) eating country. It was decided to split the cost of fortification between three food products – as industry and the consumer ultimately pay for this fortification, this reduced the burden on any one industry.

“We carried the project out by lobbying both NAFDAC and the Nigerian Standards Authority, and, ultimately, compiling draft standards which were then collaboratively work-shopped. We used a lot of learnings from the South African food fortification experience, which, in essence, was duplicated in Nigeria. We also sensitized the industries affected soonest and obtained their buy-in, and made available social marketing and communication materials.

“The distance between Johannesburg and Lagos made the project particularly challenging – in 2003 access to Lagos was more complicated than it is now. Nigerians were still a bit suspicious of South Africans, given the political history. Not everyone in Nigeria had access to electronic communication.

“We gently adapted the project to the local environment, reassuring the local authorities that it had been done before in many other countries, with great success. We also worked closely with aid agencies in Nigeria who were trusted and acknowledged, and focused on relationship-building and establishing trust. Our aim was to prove that the health and – ultimately – economic benefits for Nigeria far outweighed the cost of fortification.

“The project was very successful and, in fact, exists to this day. Through it, we learned that countries can share experiences and learnings. However, there is a need for local adaptation and advocacy. One size does not necessarily fit all ... This is a long and intense collaborative process, which needs to include all stakeholders right from the start.”

Interview with Heidi-Lee Robertson, HNH Business Development Manager, Nutritional Products South Africa (Pty) Ltd

The implementation of micronutrient powder distribution targeting small children can also be highly effective. This, however, requires extensive education and social marketing to both those involved in the management of the program and the consumers, as it requires their active involvement in intervention. One such success story is unfolding among the poor rural population of Nepal, where single serving micronutrient powders are distributed to young children. The concept has met with a very high acceptance rate and involves female community health volunteers who assist in its implementation and in educating the mothers and caregivers. The volunteers explain the program and its benefits to the mothers, and so convince them to use the product for their children. The results, according to the mothers, are that their children are livelier, less frequently sick ... and can even be naughty!



Young children
in Nepal

This is not about nutritional science or natural science. Getting back to programs is about social science and communication. We need to change our perception and understand that the beneficiaries are consumers, no matter how poor, rather than simply beneficiaries of aid. We have to take every individual and his or her needs, wants and aspirations seriously – he or she must not merely be seen as a receiver of something that we provide for charitable reasons – if we are to fully harness the potential of people to themselves become part of the solution. We know this approach can work; however, making a program happen and become sustainable requires commitment, political will and the ability to bring stakeholders to the table and fully engage them. No one group can do it alone, and yet there is often a great mistrust amongst the stakeholders.

Control strategies



Female community
health volunteers

The ultimate aim of control strategies is to provide tools for countries to establish measures to control micronutrient deficiencies or 'hidden hunger', with the goal that the diet provides all the necessary macro- and micro-nutrients for a healthy and productive life. *Sight and Life* is fully supportive of this. After all, we wish to ensure a sustainable and significant improvement in human nutrition, health and well-being. For 25 years we have been championing the global fight against micronutrient deficiencies, espousing the belief that the right mix of funds, knowledge, policy and technology will lead to prevention. To increase micronutrient intakes, a number of strategies are available. The first and most ideal strategy is, without any doubt, to improve dietary quality, so that people have a choice of sufficient, available and affordable food of a quality and quantity that delivers all the essential macro- and micronutrients.

Unfortunately, despite the fact that globally, for decades, we have been educating people on how to improve their diets, we are still seeing an increase in both over- and undernutrition. Behavioral change is not simply a consequence of education; it is complex and individual. Education and awareness is important and the ideal entry point is, of course, schools. However, we still face the fact that, in developing countries, children are required at home for work and often also have to take care of their younger siblings. Thus, many families need to have an incentive to send their children, particularly girls, to school. In many cases, this incentive is the provision of the school snack or school lunch, which must then deliver the essential nutrients. Sadly, school meals often lack essential nutrients. Thus, although they might fill a hungry stomach, they may not provide all the child needs for optimal development. There is a definite need to improve the quality of school meals, so that children's intellectual and work capacity is enhanced – thereby improving family, community and national socioeconomic development. 200 million children under the age of five, mostly living in Sub-Saharan Africa and South Asia,

fail to reach their cognitive, motor, and social-emotional potential because of micronutrient deficiencies and inadequate stimulation. These children will probably fail at school, fail to achieve their income potential, and remain trapped in the poverty cycle. A tragic reality.

The girl effect

There are 600 million adolescent girls in developing countries, but they are largely invisible to the world at large. To ignore them is to miss the 'girl effect', which could be an unexpected answer to the global economic crisis. When a girl benefits, so does everyone in society. Girls as economic actors can bring about change for themselves, their families, and their countries. Conversely, ignoring the girl effect can cost societies billions in lost potential.

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› When a girl in the developing world receives seven or more years of education, she marries four years later, on average, and has 2.2 fewer children.

.....
- › An extra year in primary school statistically boosts girls' future wages by 10% to 20%, and every additional year a girl spends in secondary school lifts her income by 15% to 25%. The size of a country's economy is in no small part determined by the educational attainment and skill sets of its girls.

.....
- › Young women have a 90% probability of investing their earned income back into their families, while the likelihood of men doing the same is only 30% to 40%.

.....
- › A girl's school attainment is linked to her own health and well-being, as well as reduced death rates: For every additional year of schooling, a mother's mortality is significantly reduced, and the infant mortality rate of her children declines by 5% to 10%.

.....
- › If educated, girls can get loans, start businesses, employ other women, and reinvest in their families – when they're ready to have them. That means their children can also have an education.

.....

Source: www.girleffect.org



Homestead food production

Other necessary improvements include the opportunity for people to grow vegetables and fruit in their backyards or keep chickens for eggs and meat; however, this approach remains a challenge and takes time. In an urban slum, people are not often able to have a vegetable garden in their back yard, and in many rural areas people have to walk miles to access water. We have to address malnutrition in terms of the circumstances we find locally – there is no 'one size fits all' solution, and often the different strategies need to work hand in hand and re-enforce each other.

Again, the ideal solution is for everyone to be able to grow and/or buy a balanced diet, but this requires not only education but also money. Some 1.4 billion people live below the poverty line of \$1.25 per diem, and so are not able to afford an optimal diet, even if they are educated as to what this means, and motivated to achieve it.

Today, as we experience the second food crisis within three years, people have changed their dietary habits. As a coping mechanism they buy more staples, such as maize, wheat flour or rice, to fill their stomachs and stave off hunger. However, at the same time they buy smaller quantities of meat, eggs, fruit and vegetables, which are, of course, more nutrient dense. As a consequence, they have lower micronutrient intakes and so the cycle of malnutrition and poverty is perpetuated.

Fortunately, there are a number of solutions that can deliver essential micronutrients at a very low cost or, should there be another funding source, such as government, at no incremental cost. This is staple food fortification, exemplified by the fortification of flour, rice, oil, or salt with micronutrients. We cannot escape the reality that there will always be individuals and high-risk groups that will also require supplementation such as vitamin A capsules for children under the age of five years, multiple micronutrient supplements for pregnant women and zinc tablets as part of the treatment regime for diarrhea. Currently, it is estimated that globally more than 80 percent of children under five are now being provided with at least one vitamin A capsule. It has been proven that as little as two capsules a year can reduce child mortality, with under-five mortality being reduced on average by 24 percent. At *Sight and Life*, we believe that this has been the most successful public health intervention to date and has paved the way for the other strategies to gain recognition and acceptance.

Targeted interventions for women, especially women of childbearing age and pregnant and breastfeeding women, also exist, with the supplementation of folic acid and iron for pregnant women being increasingly common. We do know that folic acid reduces neural tube defects by 50 to 70 percent if it is taken before conception. However, the neural tube closes between 24 and 28 days after conception, when women do not usually know that they are pregnant. Thus, starting folic acid supplementation after this time would be too late. We therefore need to encourage supplementation, either in women of childbearing age or when planning a pregnancy, or to consider other strategies that increase intake in different ways, for example through food fortification of the foods that women commonly eat. The latter is more realistic; food fortification with folic acid is now a reality in almost 60 countries, as it is not feasible to reach all women of childbearing age with a supplement.

Food fortification

Food fortification can be mandatory or voluntary. In other words, sometimes it is required by law, but in other cases the food industry fortifies foods with one or more micronutrients on their own initiative. Mandatory fortification is usually of those staple foods most commonly eaten by the target population, for example maize meal, rice or noodles, whereas voluntary fortification is often of a wider range of foods.

Regardless of the type of fortification, the consumer needs to understand why fortified food offers benefits. This makes social marketing and a clear communication strategy using a wide range of communication channels that reach the desired consumer critically important.

Biofortification is another approach to adding the essential micronutrients to the diet and is made up of two approaches. One is traditional planned breeding, for example orange-flesh sweet potato containing β -carotene, which is a precursor for vitamin A, or β -carotene-rich yellow maize. The other approach is to apply biotechnology to insert the required micronutrient. A popular example is Golden Rice, where the gene from daffodils has

been inserted into rice, expressing β -carotene as a precursor for vitamin A. Although biofortification is certainly important, and cannot be neglected when looking at innovative opportunities to prevent malnutrition, it cannot tackle multiple micronutrient deficiencies with one staple. It also often receives a bad press, as part of the genetically modified controversy.

**The
Sprinkles™
Global Health
Initiative**



Stanley Zlotkin

“The drive to solve the global problem of iron deficiency anemia in children was the initial trigger for Ray Yip and myself to be involved in the Sprinkles™ story. I happened to work for an organization that allowed me to research an evidence-based approach to address childhood anemia. In the late 1990s, there was no evidence that any program had been successful and we knew we needed to address this critical public health issue. I came up with the idea of what has become known as home fortification - a simple single sachet that would be delivered to families in the developing world to sprinkle on their food that would provide them with the micronutrients missing from the traditional diet.

When I presented this to UNICEF, they highlighted four challenges: **(1)** We needed research to demonstrate that it worked and that the nutritional status of children would improve; **(2)** they needed proof that families – primarily mothers and caregivers – would give it to the children; **(3)** that we would be able to engage private sector partners who could make it in the large volumes that would potentially be needed; and **(4)** to come up with a distribution model that was feasible and cost effective and reached the most vulnerable.

I devoted the next seven to eight years of my life to this project, after which we were able to convince the international community that home fortification was a strategy that could work. The wonderful thing is that the organizations which had the capacity to begin distribution, such as the UN High Commissioner for Refugees (UNHCR), WHO and large non-governmental organizations (NGOs) such as World Vision, were willing to take home fortification on as a project and bear responsibility for distribution. I think it is an outstanding example of public-private sector collaboration, with academia, the private sector, the UN, NGOs and local governments all being actively involved. Sprinkles™, as the original home fortification sachets became named, shows how partnerships can work and how innovation can be transferred and implemented to improve lives.

I think the Sprinkles™ initiative has now reached a tipping point. I believe that more and more children will receive micronutrient powders (MNPs) – this could grow from the current 10–12 million portions that are used per annum to 60 million, or even more. There are home fortification programs in Central and South America, South East Asia and I believe there are scaling-up programs in at least 14 programs in Africa. The prognosis is good.

I continue to do research on the concept of using MNPs to deliver vitamins and minerals to young children. I am currently looking at calcium and continuing to work to improve and innovate around Sprinkles™ as an intervention strategy. My role continues to be research, advocacy and knowledge translation around this exciting concept.”

Stanley Zlotkin CM, MD, PhD, FRCPC, VP Medical and Academic Affairs,
Hospital for Sick Children, Professor, Paediatrics, Nutritional Sciences and Dalla Lana School of Public Health,
University of Toronto. Senior Scientist, Research Institute, Hospital for Sick Children

The story of Golden Rice



Eating rice

Golden Rice is a prime example of the development of a nutrient-enhanced crop. The first Golden Rice prototype was the result of a concerted seven-year effort, by way of collaboration between Ingo Potrykus, Professor Emeritus of the Institute of Plant Sciences of the Swiss Federal Institute of Technology and Prof. Peter Beyer of the Center for Applied Biosciences, of the University of Freiburg, Germany, which culminated in 1999.

Their ambitious goal was to re-engineer the biosynthetic machinery of the rice grain to produce and accumulate β -carotene pigment (a pre-cursor of vitamin A) found in the green tissues of rice but not in the grain. Despite skepticism from their peers, the inventors relied on recent advances in the fields of genetic transformation and the understanding of carotenoid biosynthesis to achieve their goal.

“From the onset, Golden Rice was conceived as a humanitarian project to alleviate malnutrition in developing countries by improving the vitamin A intake of populations eating rice as their main staple food,” says Ingo Potrykus. “Patenting of the technology was key to accessing a number of ancillary key technologies used in the production of Golden Rice. The patent paved the way for a public-private partnership with Syngenta and provided access to free humanitarian-user licenses to technologies from various sources.”

“Moving Golden Rice from the laboratory to the field is challenging and is being carried out under the strategic guidance of a Humanitarian Board comprised of a group of international experts from reputed institutions, and in collaboration with a network of national institutions participating in the development and distribution of locally adapted varieties. To date, the Golden Rice Network includes 16 national institutions in Bangladesh, China, India, Indonesia, Nepal, the Philippines, and Vietnam.

“Worldwide, there is plenty of goodwill in both the public and in the private sectors to exploit the potential of green biotechnology for the benefit of the poor but these new technologies often generate concerns that need to be overcome if the benefits are to be reaped.”

MNP supplementation in Nepal's food insecure districts



Siti Halati

Under the Protracted Relief and Recovery Operation (PRRO), the WFP is addressing short-term food insecurity among those most in need, and is providing opportunities for asset and livelihood creation through short-term labor opportunities. To this extent, the WFP provides food and cash to individuals from vulnerable households in return for participation. Since 2009, MNP supplementation has been provided to more than 122,000 children aged six to 59 months from households participating in Food/Cash for Assets in 17 food insecure districts. The program's objective is to improve the nutritional quality of their food.

An MNP baseline survey carried out by WFP found that the prevalence of anemia among children under five was 45.4%. There was sufficient dietary diversity among only 13.3% of children aged six to 23 months in hill districts, and 15.5% in mountain districts. The study observed that the diets of breast-fed children were equally poor, with only 11.1% of children aged six to eight months and 19.5% of those aged nine to 23 months having an acceptable diet. These findings reflect the poor quality of their diet.

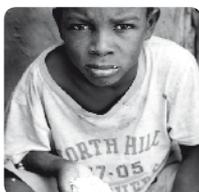
Awareness and training

Prior to the distribution of MNP, awareness and training activities were carried out. District officials and community leaders were made aware of the intervention, and of the benefits of MNP. Training was provided to female community health volunteers (FCHVs), maternal and child health workers (MCHWs), village health workers (VHWs) and the staff of WFP partners. The FCHVs conducted group meetings with mothers and caregivers on infant and young child feeding practices; hygienic food preparation; hygiene and sanitation; and MNP benefits, preparation, use and key messages. The aim of this approach was for children to consume the MNP and, at the same time, for changes in knowledge and practices leading to improved child nutrition to take place. The mothers and caregivers received MNP for their children via food distribution by NGO partners, or at Mother Group meetings conducted by the FCHV.

A valuable lesson for scaling up

Most project areas are in the remotest areas in Nepal and are difficult to reach – which is very challenging for project implementation. However, the experience with distributing circa 36 million sachets of MNP (locally known as Vita Mishran and donated by DSM) has shown that a concerted effort, involving many partners, enables the program to achieve very high coverage, as does informing people thoroughly about its benefits and use. The latter was achieved by an intensive social marketing campaign and a thorough training program, involving approximately 6,000 people from the Government of Nepal and partner staff, as well as the FCHVs. MNP supplementation reached the remotest areas of the country, where population exposure to health and nutrition education was limited.

This initiative not only focused on the supplementation of vitamins and minerals but also gave the population access to basic health and nutrition education which would otherwise have been unavailable. MNP supplementation will become a national program. The experience of implementing MNP supplementation in food insecure areas and the monitoring and evaluation findings will provide a valuable lesson for national scaling-up.



Young boy with rice

Siti Halati Programme Officer UN World Food Programme, Nepal

The Beijing Dandelion school

Of the 2.5 billion people who rely on rice for their daily staple, one third of them live in China. According to Prof. Junshi Chen, Head, National Institute for Nutrition and Food Safety, Chinese Centre for Disease Control and Prevention, malnutrition rates are going down in China, and in the past 20 to 30 years the nutrition status of Chinese people has been significantly improved. However, micronutrient deficiencies still exist, with no signs of significant improvement.



Children at the Beijing Dandelion School

DSM and NutriRice™ recently partnered the Chinese Center of Disease Control and Prevention in a program aimed at improving the nutritional status of children. The program was based at the Dandelion Middle School, near Beijing – the only non-profit organization in the city to serve the needs of some 650 children of poor migrant workers from across China. Located in a heavily polluted industrial section on the outskirts of Beijing, the Dandelion School tripled both its student population and programs in its brief three-year history. However, the Dandelion School is determined to provide quality education to the most disfranchised community in this vast city. It is a fine example of a local initiative that has generated global interest in its approach.

“With the wonderful support of *Sight and Life* and DSM, we donated NutriRice™ to the school for a period of eight months,” said Mr David Townsend, General Manager, Wuxi NutriRice™ Co Ltd. The results of this multi-nutrient intervention were astonishing. According to Prof. Chen, the mid-term assessment showed a significant reduction in the anemia rate and an improvement in physical growth, as well as mental development and learning abilities.

A wider impact of the fortification was observed by those who interact with the children on a daily basis. Dr Hong Zheng, the headmistress of the Dandelion School, noted that its impact was dramatic. “You can tell by reading the statistics from the CDC. But, as teachers, we see the children here every day ... They are happier, they are growing taller. Their weight is growing and they have a greater ability to concentrate.”

Source: www.youtube.com

The MixMe™ story



Woman using MixMe™

MixMe™ is a home fortification concept designed specifically to address the micronutrient needs of children between six months and five years of age.

For 70 years, micronutrients have been added during food processing on an industrial basis, in order to create a fortified end product. Based on the nutritional needs of children who have little or no access to industrially produced fortified products, in 2008 DSM created a multiple micronutrient powder concept called MixMe™. The concept aimed to address the reality of many developing countries where people use locally available wheat or maize as the basis of the food prepared in their homes. Thus, in order to fill the micronutrient gap it is important to find a way to provide them with the missing or lacking micronutrients that are essential in children for healthy growth and development. This is particularly important when small children are involved, as they generally can't be given tablets or capsules. The MixMe™ brand includes a range of different micronutri-



Georg Steiger

ent powder formulations, each designed for a specific target group, that can be used in the home by the mother for her child.

MixMe™ MNP powder is packed in single-serving sachets, so that it is convenient and all the mother has to do is add the contents to the child's food (often porridge), stir it in, and give it to her child to eat. Neither the color nor the taste of the food is altered. The only thing to change is the child's micronutrient status, which research shows improves within two to three months. Before the mother's eyes, her child becomes more active, grows quicker, and suffers from fewer illnesses.

Each MixMe™ sachet requires high-quality packaging. This is because MixMe™ is normally used in emergency situations, under some of the worst imaginable conditions, such as high temperatures and humidity. Most vitamins are sensitive to oxygen, humidity, light, and temperature, and the packaging has to protect them from exposure to these influences.

Georg Steiger | Head of Product and Technology Development, NIP, DSM

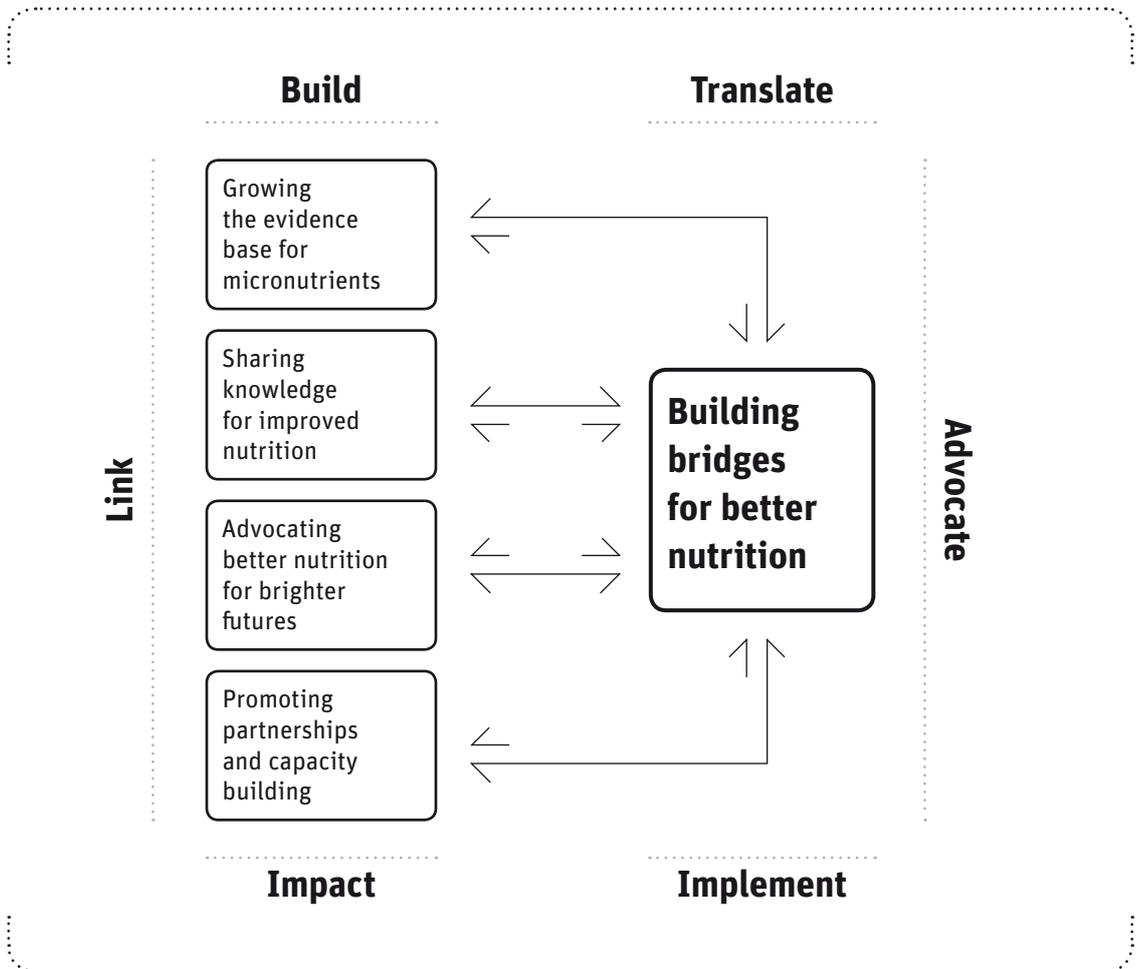
Advocating
better nutrition
for brighter
futures.

10

Sustainable Solutions

Sight and Life has, over its 25 years of existence, been involved with a number of projects around the world that have improved our knowledge and understanding of micronutrients. These projects have delivered innovative solutions to the vulnerable and poor; built capacity amongst those who ultimately have to deliver the solutions and driven the processes in the countries most in need. They have also led to an increased awareness and acceptance of the need to address nutrition security together with food security if we are to improve millions of lives. *Sight and Life's* strategic approach has different meanings at different levels.

Sight and Life's strategic approach



***Sight and Life* directly supports the education of professionals in the nutrition and public health fields through:**

- > Supporting grants towards bachelor's/master's and PhD studies
- > Internship programs with, for example, Tufts University and Johns Hopkins University
- > Grants to attend specific meetings, congresses and forums
- > Support of the ANLP
- > Scientific publications such as manuals, magazines, journal supplements and web-based training.

Sight and Life has, however, taken this a stage further, as the organization also aims to assist at the beneficiary level. It believes in a comprehensive approach, not just to academics but also to providing the tools for reaching directly to the beneficiaries.

Sight and Life is about more than education as a process of simply imparting and receiving information, based on the understanding that this does not necessarily create results for the beneficiary. *Sight and Life* is about education in the broadest sense – and, in particular, about behavior change communication.

Communication to support change



Kakuma refugee camp, Kenya

In the field of nutrition, behavior change communication is a critical component of any community intervention, as it encourages the implementation of healthy behaviors and the empowerment of vulnerable populations to make healthy food choices. Recognizing this, *Sight and Life* has increasingly been involved with providing information to beneficiaries of the programs it supports. The objective is to inform and educate in a manner that leads to behavior change and more sustainable interventions for lifelong changes and improvements in health. It is a challenge and a journey but the challenge needs to be confronted and the journey to be undertaken if we are to achieve the success we dream of – an end to malnutrition throughout the world.

Despite increasingly being a global village, the world remains a mix of diverse cultures, each with its challenges and opportunities and each to be valued and learnt from. It is critical to accept that the 'one size fits all' approach has time and time again been shown not to work, and *Sight and Life* experienced this in a project in partnership with WFP aimed at introducing MixMe™ in Kakuma refugee camp in Kenya. All materials, from the product packaging to the messages and posters and other educational materials, have had to be adapted to the specific culture, beliefs, knowledge, attitudes and aspirations of beneficiaries. Although the basic messages may be the same across the world, the delivery of the messages must be tailored and tested within each specific group. They need to be part of the project from its inception.

***Sight and Life's* strategy on education and communication**

Education, experience and empowerment are critical to *Sight and Life's* strategic approach but these have different meanings at different levels. *Sight and Life* not only directly supports the education of professionals in the nutrition and public health field, but also goes further, as in addition we aim to assist at the beneficiary level. We believe in a comprehensive approach, not just reaching out to academics but also providing the tools for those reaching out directly to beneficiaries. As a result, *Sight*

and Life is talking about more than education – which can, in essence, be seen as simply imparting or receiving information. Such education does not necessarily result in any action by the receiver.

Our focus is on behavior change communication which, in the field of nutrition, encourages the implementation of healthy behaviors and the empowerment of vulnerable populations to make healthy food choices. It provides information to the target audience on how to make smart decisions about their health and the foods that they eat and the lifestyles that they live.

For such behavior change communication to be successful, it is critical to understand the knowledge, attitudes and perceptions of the target group. Three elements are critical for behavior change to work:

1. The individual must have an opportunity to execute the new behavior;
2. The individual must have the ability to execute the new behavior; and
3. The individual must be motivated to execute the new behavior.

We at *Sight and Life* assist projects and programs addressing wider behavior change communication, mainly by offering technical and knowledge support and facilitating linkages between those working within the field of behavior change communication.

Of course it is critical to not only address the demand (behavior change) side of the equation but also to address the supply component in making healthier options accessible, available and affordable and *Sight and Life* also works in this area in its promotion of public-private partnerships to reach those at the Base of the Pyramid.

Jane Badham, Communications Consultant, *Sight and Life*



Jane Badham

A day in the life of Klaus Kraemer

Director, *Sight and Life*



Young children,
Bangladesh

Sight and Life Magazine's Day in the Life column was introduced in 2006 with the aim of presenting the many facets – and faces – of those working in the field of micronutrients, from research to on-the-ground programs. To date, interviews have included such key figures as Johann Jerling, professor and researcher in South Africa and organizer of the African Nutrition Leadership Programme; Martin Bloem, Chief of Nutrition and HIV/AIDS Policy at the WFP; and Richard D Semba, Professor of Ophthalmology at the Wilmer Eye Institute, Johns Hopkins University, Feike Sijbesma, CEO and Chairman of Royal DSM, among many others. **Here, for the first time, we shine a light on a typical day in the life of the director of *Sight and Life*:**

Do you have a typical day's work?

Klaus Kraemer (KK): I don't have a typical day; there are two different types of day – at the office or traveling. If I am spending the day in the office, I usually start the day at 7.30 am and begin by reading some 50 to 100 e-mails. My schedule of meetings kicks off at 8 am, with several short meetings in the morning and again in the afternoon. Between meetings, I also field phone calls. Sometimes, I have the impression that people sense I am back in the office – even when they are on the other side of the world! In between meetings and calls, I try to get other work done. I usually finish at around 7 pm, but sometimes I leave earlier and work from home in the evening as I often need to speak to people working in different time-zones and I can also focus my attention without interruptions.



Klaus Kraemer,
South India

On other days, I am travelling. I usually spend up to 100 days a year out of the office, visiting projects or participating in conferences and meetings, which are ideal networking occasions and allow for me to meet with colleagues from around the world from a variety of fields. I primarily meet with the nutrition community, including people from academia, non-governmental organizations, the UN, governments and private-sector companies. Some meetings are technical, while others are in the advocacy arena, with people at the decision-making level. My mission then is to talk about what is required to reduce the burden of global malnutrition, with a focus on discussing solutions and how we can work together and break down the silos we are so often trapped in. Right now, nutrition is receiving more attention than ever on a global scale, particularly since the first food price crisis in 2008 and the tragic events unfolding in the Horn of Africa. This highlights the need not only to improve food production and food security, but also to consider the quality of the food that people receive so that we feed their growth and development as well as filling their tummies. We need food and nutrition security and the two must go hand in hand. These are exciting times for nutrition, with the SUN and 1,000 Days initiatives – people are more receptive, and more financial support is now being committed and hopefully also allocated to both carrying out and scaling up nutrition interventions.

What is your role at *Sight and Life*?

KK: My role in *Sight and Life* is largely focused on developing and implementing *Sight and Life's* strategy and being the direct liaison to both the outside world and our partners as well as internally within DSM as our parent organization. Our visibility is largely through direct interaction with people at all levels of organizations and in all the countries where we work and via our website and publications, the flagship of which is the *Sight and Life* Magazine that reaches into many places where few other nutrition communication and information tools reach.

What motivates your work in this field?

KK: My background is in human nutrition, with some insights also into animal nutrition that have been helpful in understanding cost-effective solutions to malnutrition. I have always been concerned about the humanitarian issues around malnutrition that largely affect the most vulnerable populations in developing countries. *Sight and Life* provides me with an ideal platform, where I can combine my knowledge of nutrition science and relevant, practical and increasingly innovative solutions to malnutrition in order to ultimately prevent human suffering and to ensure development of human capital – starting with individuals.

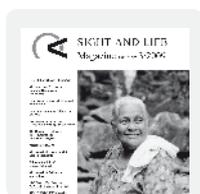


Sight and Life
Newsletter
– the early days

One of my most memorable experiences took place when I spent a weekend at a refugee camp in southernmost Bangladesh in 2008. On the Friday afternoon, a local holiday, I went to the beach at Cox's Bazaar. A young girl wanted to sell me a bracelet made of shells and I tried to explain that I could not take it back home with me and gave her a small donation, instead. She wanted to say thank you, in her way, and offered me all of her necklaces. When I refused, for obvious reasons, she bought me a coconut, which of course used up a great deal of the money I had just given her. This was an incredibly emotional and rewarding experience and is a fine example of what is best about human nature. She was very poor, and not well-nourished, but she chose to share and give to me. I will always remember her ... Basically, giving is very rewarding. You give and you get something in return – there is nothing as warm-hearted and sincere as a child's smile.

How big is the *Sight and Life* team?

KK: My team is small, but efficient, and I am proud of it. It includes Jee Rah, a nutrition scientist working primarily on nutrition programming within the WFP partnership, and Anne-Catherine Frey and Svenia Sayer, who work part-time on many aspects of administration, our website and publications. My communication consultant from South Africa is nutritionist Jane Badham, and our editorial team from The Corporate Story includes Jonathan Steffen, Emma Bryden and Susie Lunt. This is not about sheer size or the available resources, it's about the commitment and leadership to move the nutrition agenda forward so as to positively change lives.



Sight and Life
Magazine, 2009

Sight and Life's activities are always guided by a steering committee. This includes Stephan Tanda, a member of the DSM Managing Board, and other DSM executives. We are indeed fortunate to have the DSM-WFP global humanitarian partnership, where *Sight and Life* plays an important role, contributing nutrition science and co-chairing the partnership. This partnership provides us with valuable insights into the nutrition needs and aspirations of WFP beneficiaries and so allows us to develop nutrition solutions that mitigate nutrition deficiencies. A real benefit is that we can pilot new innovations in different settings such as in emergency and refugee settings so we can learn valuable lessons and hopefully positively influence outcomes.

How do you see *Sight and Life's* role?

KK: My expectation is that *Sight and Life* will continue to evolve as one of the leading organizations in the global fight against malnutrition – being the voice of the so-often neglected and forgotten. We will continue to leverage our strength in closing knowledge gaps, reviewing and assessing the latest evidence, communicating it and carrying out the advocacy to develop nutrition policies for program implementation at all levels. We actively seek to build bridges and break down the silos that many of us have functioned in – nutrition, agriculture, development, education, social security. In particular, we believe there is an urgent need to increase the capacity in developing countries to make nutrition programs sustainable. It is critical that there are people on the ground who are both knowledgeable and capable of working with local stakeholders and the government, so that we get the

local endorsement and support that is required. We have to tailor our information to the needs of these kinds of multipliers so they feel empowered with the tools they need – they are our primary target group.

I also strongly believe that we have to assist in developing the right tools for social marketing and communication that have been, and still are, often neglected. We have to take into account the beneficiaries and consumers – particularly women and children – whom we aim to help and to meet their needs and aspirations. All humans have aspirations but amongst the most vulnerable we see even stronger dreams and aspirations for their children. When we talk to children in a village somewhere in remote Nepal, for example, they tell us that they would like to become doctors... It's our task to help them reach their full potential to be able to make that desire a reality. And our contribution is to improve their nutritional status and assist them in accessing and choosing the foods that ensure better nutrition and thus give them a real chance at a better life. It's my conviction that better nutrition is a cornerstone required to break out of the poverty cycle. Improved nutrition leads to improved cognitive development and so to better cognitive performance that in turn leads to improved academic success in school, and ultimately to greater personal and societal development.

However, we should not be too bold. We have to acknowledge what we can achieve and where we can contribute and recognize that it has to be part of an overall strategy to improve lives in many ways.



Sight and Life
Magazine, 2011

As a small organization, we work “in between.” Our boundaries are set by the size of our organization and resources, but we can serve as a convener for others who are required to reduce malnutrition in order to meet and develop strategies and joint implementation programs. Alone none of us can change the world but together I do not doubt that we can. What we require is representation and commitment from all sectors, global and local, small and large NGOs, academia, the UN organizations, government, and the private sector. Mainstreaming nutrition needs to go beyond our nutrition circles. It should even be part of leisure, education, and agricultural production – considering the quality of the food crops produced, in addition to the quantity. All these are interwoven and need to come together and work together for the good of all.

Where next?

KK: In 1986, *Sight and Life* started off by providing vitamin A capsules and information to people who found it difficult to obtain this kind of support. Over the years, *Sight and Life*'s focus has increasingly shifted towards addressing all forms of micronutrient deficiency. This partially followed developments in the science of nutrition and micronutrients. However, it also followed the insight that deficiency in one single micronutrient is rare, as well as an understanding of micronutrient interactions and the realization that a comprehensive approach, using multiple micronutrients, is more cost effective and yields better outcomes. More recently, we have also recognized that we can gain more leverage in reducing malnutrition not only through science but through strong communication and advocacy. There is so much still to be done and to learn but nutrition has never been better placed.

With the attention that nutrition is receiving today, and having SUN in place, I am confident that, by working together, we can significantly reduce malnutrition over the coming years. However, we will not achieve the MDG goals in all regions of the world. And as attaining the MDGs is vital for the most vulnerable and neglected, we must unceasingly continue our efforts to fight malnutrition in all its forms. We can win the battle if there is an effective global and regional governance structure in nutrition. There must also be the required political will

and funding, which is less about the individual and more about global agendas. We need effective, scaled-up and sustainable nutrition policies, rather than politics, and we should keep the big picture at the forefront. Furthermore, civil society leadership that provides a strong voice for those who cannot speak up is needed to keep everyone involved focused, so that the goals can be achieved even if it is not by the target date – we cannot stop as we strive to improve and save lives to ensure the world is a better place.

Our approach to malnutrition is through evidence-based advocacy, informed by the translation of the science into direct nutrition interventions and nutrition-sensitive interventions. The ultimate goal is capacity building at all levels that leads to a sustainable improvement in nutrition and health of people all over the world, but especially in developing countries.

Interview with Klaus Kraemer, Director *Sight and Life* | Switzerland, 2011

**Financial
and funding
data**

Funds allocated: \$36 million (1989–2009)

Activities allocated to regions:

30% Africa, 60% Asia, 10% Americas

Supported projects: *Sight and Life* supported 128 projects in 26 countries in 2009.

Support included:

- > 63 vitamin A capsule donations;
- > 7 research grants;
- > 4 technical support grants;
- > 12 training and education grants;
- > 42 courses and congresses.

Since 1986, *Sight and Life* has supported nearly 3,350 projects in more than 80 countries and donated 80 million vitamin A capsules, mainly for children aged 6 months to 5 years – the critical development period of the lifecycle.

Since 2007, *Sight and Life* has partnered the WFP, as part of a larger global humanitarian partnership of its parent company, DSM.

Sight and Life produces three issues of the Magazine a year, with a total circulation of ~9,500/issue

***Sight and Life's* focus**

Sight and Life's current areas of focus are hidden hunger, which refers to a lack, or loss, of dietary quality that leaves individuals or populations with deficiencies of essential micronutrients which negatively impact on health, cognition, function, survival and economic potential; and nutritional anemia, which affects approximately two billion people worldwide – especially in the developing world – and so has significant negative consequences if left unaddressed.

In addition, *Sight and Life's* spotlight is also on the double burden of malnutrition – the concurrent and increasing presence of undernutrition together with overnutrition within a population. We now know that much of the overnutrition being seen in developing countries is a direct result of undernutrition in utero and into the childhood years – stunted children are more likely to become obese and diabetic adults. We have to be looking at the big picture and develop strategies that address multiple issues – we can no longer afford to be blinkered.

Sight and Life aims to combat these disorders through advocacy, knowledge creation and dissemination, and provision of micronutrients, as well as by supporting social innovation initiatives and capacity building. The objective is to produce and distribute public health goods and services in a more equitable, effective and efficient way, so as to meet the nutritional needs of marginalized and vulnerable communities.

Sight and Life oversees the scientific aspects related to the design, implementation, monitoring and evaluation of large-scale micronutrient powder programs in many countries and many settings working largely with the WFP, who have great experience, expertise and capacity on the ground.

Sight and Life facilitates human studies designed to improve the nutritional well-being of those living at the Base of the Pyramid – in other words, the 2.5 billion people around the world who live on less than \$2.50 a day and form its most numerous but poorest socio-economic group. This includes, for example, studies to assess the efficacy of innovative products such as fortified rice and the addition of phytase to micronutrient powder to further enhance its efficacy.



Award ceremony,
Beijing

Recognition for *Sight and Life's* achievements

In April 2007, during the First Meeting of the Micronutrient Forum held in Istanbul, Turkey, *Sight and Life* was recognized for 20 years of support to the field of vitamin A and, more recently, its support of micronutrients in general and the eradication of micronutrient malnutrition.

In March 2008, during the Oxygen Club of California (OCC) conference, *Sight and Life* was honored with the OCC's Frontiers Science and Humanity Award for its dedication to eradicating nutrient deficiencies and improving child health and development.

For *Sight and Life's* director Klaus Kraemer, these awards are a great stimulus to continue the work: "*Sight and Life* will do everything in its power to ensure that the eradication of hidden hunger is high on the global development agenda," he said. "Our resources are limited and we rely to a large extent on our partnerships with stakeholders in academia, non-governmental organizations, UN agencies and industry, but by leveraging these partnerships, we can achieve a great deal and we will continue our work driven by our passion to improve human life."

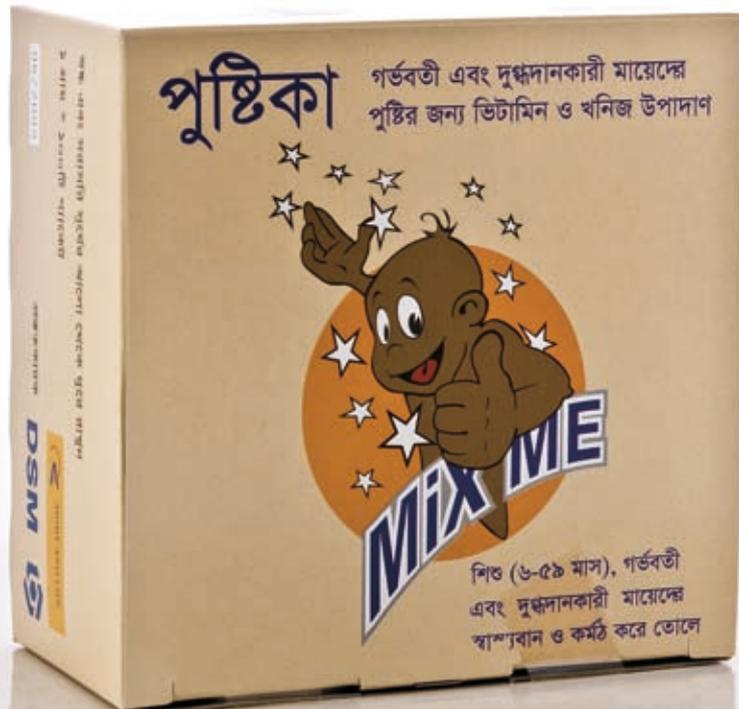
1 Vita-Mix-It

2 MixMe™

1



2



- 3 Vitamin and Mineral Supplement
- 4 Micronutrient powder, Nepal

3



4



**From farming
to becoming
a nutrition
technician**



Philippe Bani Mora,
Benin

The story of *Sight and Life* beneficiary Philippe Bani Mora

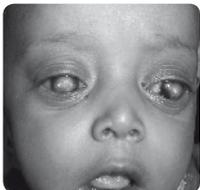
One of five children, Philippe Bani Mora was born in 1974 to a farmer and housewife, in Parakou, Benin. He worked in the fields between schoolwork, and as an auxiliary nurse. Following several failed attempts at the BEPC, the school-leaving exams, he entered the Bembéréké Hospital's training school for auxiliary nurses. This internal qualification gave him the opportunity to earn a living while continuing his training. After two years, he passed his BEPC, enabling him to continue his studies to become a nurse. He then went to Niamey in Niger, to the National School of Public Health, the result of a contract agreed with his hospital.

On his return to the country, he became aware of the presence of malnutrition in cases observed while on duty, and so decided to study to become a nutritionist. He made contact with *Sight and Life* which, after examining his case, decided to grant him a scholarship to the Niamey Public Health Institute. He was placed under the care of a minister and was able to work in the hospital and in its clinics, providing him with the means to earn a living.

Philippe went on to study for the BTS, a vocational training certificate in public health, with an option in human nutrition. At that time, he became aware of nutritional surveys, quality control in microbiology laboratories, the development of questionnaires, and the prescription of diets, etc. During his placements, he worked with *Medécins Sans Frontières* (MSF), the Red Cross and other NGOs looking after malnourished people. During a placement at the Regional Department for Health in Zinder, Niger, he developed a program on the planning of community nutrition and wrote a paper entitled *Causes and prevalence of night blindness among children and pregnant women in Foulan Koira*. The village of Foulan Koira is part of the urban community of Niamey and is Fula in origin. It had a population of 22,509 inhabitants, 22% of whom were women of childbearing age and 21% children under five. The vast majority of the population lived beneath the poverty threshold, believed to be below \$1 a day. Hygiene was poor, with just one public latrine.

Having identified the causes of night blindness amongst which vitamin A deficiency was most prominent, Philippe formulated recommendations to reduce it among the population. His paper, and the exemplary results obtained during his three years of training, enabled him to obtain his diploma with distinction, and thus embark on a course of higher education. This further study was made possible by the ongoing support of *Sight and Life*, both financially through a scholarship and practically, by providing him with books and other educational material. In addition, by maintaining ongoing correspondence with him, *Sight and Life* lent Philippe the moral support he needed to keep going and keep focused.

Philippe Bani Mora's journey has taken him from the rural world to that of healthcare professional. Thanks to his dual skills as nurse and nutrition technician, he can now devote his professional life to his fellow citizens to improve their nutritional state and manage in the best possible way the recurrent crises of famine or food shortages in the Sahel.



A young child with
xerophthalmia

Currently the manager of the I-Domarou Health Centre, Gogonou, Benin, Philippe is now able to devote his life to improving the nutritional status of the people of Benin, providing optimum management of the recurrent famines and food shortages. He has gone from farming the fields to becoming a nutrition technician, and feeding and educating his fellow citizens – leading and making a real difference from where he stands.

The importance of *Sight and Life Magazine's* opinion piece

“I believe the importance of the Opinion Piece in *Sight and Life Magazine* is to draw to the attention of the readership a nutritional subject of topical interest and usually of public health importance. Frequently, we select a manuscript that has only recently been published, so may not yet be available to readers because of journal embargoes. If it is a technical subject, I try to explain the methodology so that most readers will be able to understand the principles, if not the practice. If the results in the paper are novel or surprising, I explore the implications. I do not hesitate to be controversial if the subject demands it. Nutrition is constantly raising unexpected results, as so often we believe we know the answers before doing the experiment. When experiments do not give us the ‘right’ answers, we often blame the subjects or volunteers for poor cooperation and not the original hypothesis. When experiments give us the ‘right’ (i.e., expected) answer, so often the experimenter assumes that the procedure will be of global application. I think it is important to challenge accepted dogmas and examine alternative explanations.

“I explored one such topic in issue 1/2010. Three studies in Asian countries had shown that neonatal mortality was lower after neonates were given 50,000 IU vitamin A orally, soon after birth. There were global pressures to expand neonatal dosing policy into other developing countries. Before this was done, however, results emerged from two African countries where no reduction in neonatal mortality was found following intervention with vitamin A. These situations provided an ideal topic for discussion in *Sight and Life* and an opportunity to explore alternative ideas to explain the results.

“Other topics we have discussed have been obesity and iron metabolism, organic foods, increase in HIV after vitamin A dosing, interpretation of nutritional status in the presence of inflammation and the effects of iron fortification on gut microbiota etc. One aspect that the opinion pieces will continue to return to is the influence of infection and inflammation on nutrition. Infection is so ingrained in the lives of people in developing countries that its impact on their nutrition will provide a constant source of inspiration for debates in nutritional science for many years to come. We hope these discussions will assist workers in the field to better understand their own results and assist them in improving the nutritional situation in the communities around them.”

David I Thurnham | Independent Consultant at University of Ulster

Afterword



Klaus Kraemer

Sight and Life came into existence 25 years ago in response to a humanitarian crisis – the famines caused by the Ethiopian War during the 1980s, which affected some 8 million people and caused the death of approximately 1 million.

As this book goes to press late in 2011, drought in the Horn of Africa, coupled with military conflict in Somalia, is affecting over 13 million people in the region. Humanitarian organizations are doing their best to provide support, as they have in the face of so many man-made and natural disasters of the past quarter-century, but the scale of the challenge is enormous.

Who would have dreamt, when the Task Force *Sight and Life* was founded in 1986, that a director of the organization would be obliged to write such lines 25 years later? This book pays tribute to the many people involved with *Sight and Life* over the years who have helped to alleviate suffering and prevent sickness in some of the world's poorest and most vulnerable populations. There can be no talk of celebration, however. The task still before us is too vast.

2011 – the year of our 25th anniversary – is a milestone in the existence of *Sight and Life*. It is also a milestone in the evolution of mankind. During this year, the population of the globe reached 7 billion. Our world is divided into the rich who have more than they can ever consume and the poor who do not have enough to meet their most basic needs: one in seven people is born hungry, and nearly a billion people go hungry to bed each night. At a time when our understanding of health, nutrition and food production is more sophisticated than ever before, the size of the world's population places unprecedented pressure on the planet's resources. The global food crisis of the early 21st century has been followed by a financial crisis that is still affecting the economies of the world as this book goes to print. In a world that was at peace, feeding every mouth would be a challenge. In a world scarred by war and the increasingly intense struggle to control natural resources, that challenge can seem insurmountable.

Clearly the scale of the current complex of crises is too great for an organization such as *Sight and Life* to tackle alone. It is too great for any organization to tackle single-handed. But a crisis – a word which comes from the Greek *krisis*, meaning decision – is an opportunity to decide on a new way forward. If we have learnt anything in the past 25 years, it is that all relevant stakeholders must work together to solve the problems of our hungry world – scientists and researchers, visionaries and policymakers, governments and non-governmental organizations, public and private sector.

The *Sight and Life* team cares about the world's most vulnerable populations. As we go forward, we will continue to build on the work of the past 25 years, guiding original nutrition research, disseminating its findings and facilitating dialog between the people and organizations that can bring about positive change. We believe that this can be brought about if we have the courage to think in new ways, and the confidence to work together. And we remain absolutely committed to improving the nutritional status of the poorest people in this hungry world of ours.

Acknowledgements



The *Sight and Life* 25th anniversary book was conceived as an accessible introduction to the life and work of this organization – a nutrition think tank which is committed to fighting micronutrient malnutrition.

Founded in 1986 to promote vitamin A and its link to preventing blindness in children in the developing world, *Sight and Life* has evolved considerably over time to reflect the changing world in which we operate. Today, we also reflect new scientific developments in the field of micronutrients. Our focus has moved from “sight”, a single condition, a single vitamin focus, to “life” itself. We embrace an all-encompassing approach to micronutrients, and their broader role in promoting health and well-being, and preventing disease, disability and death.

Above all, it is our hope that the 25th anniversary book reflects the above and, indeed, serves to encapsulate the unique spirit of *Sight and Life*. In so doing, we would like to take this opportunity to acknowledge the great depth of support we have received from leaders and academics in the field of nutrition and, of course, their dedicated teams who support their research, as well as the contributions of non-governmental organizations, ranging from global bodies such as the World Food Programme to small-scale start-ups in the developing world. Last but not least, we are enormously grateful for the input of those often unsung heroes who devote themselves to working in the field, around the globe, and who have allowed us a window into their lives.

A book such as the *Sight and Life* anniversary *Festschrift* not only draws on the latest scientific research and expert insights, but benefits greatly from the work of previous generations. This makes it almost impossible to acknowledge all those who have contributed their expertise to the *Sight and Life* book, in a multitude of shapes and forms. However, we wish to extend our heartfelt thanks to all of our contributors for their commitment to this project, for giving us their time and for sharing their insights and wisdom. Over the last couple of years, a great number of people from all walks of life have found space in their busy careers and travel schedules to conduct interviews, contribute their expertise and recommend fresh and valuable sources of information.

In addition, the authors have had the great good luck to be able to draw on a wealth of data from the *Sight and Life* archives, as well as the resources of Royal DSM. Other key data includes, among others, policy statements, bulletins, working papers, press releases, fact sheets, journals, guides, reference books, websites, studies, frameworks for action, and reports, and – of course – the rich mine of nutrition data and research to be found in *Sight and Life Magazine* itself.

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