

Supplementation, Food Fortification and Dietary Diversification

A three-pronged approach to reducing hidden hunger

Hidden hunger: an invisible problem with grave consequences

We automatically associate hunger with not having enough to eat. We have all seen images of acutely undernourished people in disaster areas, and almost one billion people around the world are undernourished. However, not having enough to eat is only part of the problem of hunger. What experts refer to as 'hidden hunger' attracts less attention because it does not produce dramatic images, yet while it has gone largely unnoticed, it has assumed dramatic proportions. **Two billion people** are now affected by it – almost a third of the world's population (1, 2).

This hidden form of malnutrition is caused by a **deficiency of vital micronutrients** (vitamins, minerals and trace elements) in the body. These micronutrients are essential to the mental and physical development of both children and adults. Vitamin A-deficient infants, for example, are at risk of infection, visual impairment and higher mortality rates. Anaemia caused by an iron deficiency impairs the ability of school-age children to learn and reduces adults' ability to work. The symptoms of vitamin and mineral deficiencies are still largely ignored in national health systems and in bilateral development cooperation, despite the fact that hidden hunger not only impacts on health but also comes at a high economic price.

Deficiencies of vitamin A, iodine and iron are the three forms of malnutrition prioritised by the international community; zinc deficiency is also being targeted. These problems are particularly widespread and have serious consequences. The human body needs only very small amounts of micronutrients but it cannot produce them itself; they have to be supplied through diet. Individuals become deficient in micronutrients when they do not have enough to eat or when their diet is insufficiently varied or unbalanced. A micronutrient deficiency often goes hand in hand with undernutrition and can have many causes: families may be generally poor or their spending patterns may be inappropriate, meaning that they are unable to buy food that is sufficiently rich in vitamins and minerals, to grow it, or to include it in their diet. Once individuals have a deficiency, they become more prone to illness and less able to perform well at work, rapidly establishing a link between malnutrition and poverty.

Evidence-based solutions for reducing hidden hunger

The World Health Organization has carried out research to generate **data** for individual countries about the extent of vitamin A, iodine and iron deficiency forming the basis for general recommendations for at-risk groups and the broader population. At-risk groups include women of child-bearing age, newborns and infants, and the sick and elderly. They also include those in emergency situations, such as refugees or displaced persons, who do not have reliable access to adequate nutrition (3).



A child receives a dose of vitamin A, to help boost immunity, at the health centre in the village of Savane Cabrit, near the town of Ganthier in West Department, Haiti



Fortification plant in Guatemala

There are three main types of **intervention** to prevent and combat vitamin and mineral deficiencies, which can be deployed individually or in combination: short-term supplementation; medium-term food fortification; and a long-term focus on balanced nutrition (dietary diversification).

These approaches to reducing malnutrition are complementary rather than mutually exclusive. A coherent and multi-sectoral approach including health, food security and agriculture is, therefore, of prime importance. Such an approach is already being piloted as part of German development cooperation.

I. Supplementation

Food supplements are highly concentrated vitamins and minerals produced by pharmaceutical manufacturers in the form of capsules, tablets or injections and administered as part of health care or specific nutrition campaigns (5).

Medical staff working for national health services, supported by organisations such as UNICEF, distribute vitamin capsules and iodine and iron tablets widely to infants, women of child-bearing age and women who have given birth without prior assessment of their individual needs. The World Bank (1,2) estimates that the per capita cost per unit is low: a dose of vitamin A, for example, is estimated to cost between USD 1.00 and USD 2.5 per capita. The cost of iron is put at between USD 0.5 and USD 3.17 per capita. The greatest cost-benefit effect comes from giving supplementary vitamin A to children under the age of two, because the damage caused by micronutrient deficiency in the early years of life is irreversible. The United Nations' 'Scaling Up Nutrition' (SUN) initiative refers to the unique 'window of opportunity' represented by an individual's first thousand days of life, starting from conception. However, older people, displaced persons and refugees may also suffer specific deficiencies.

II. Food fortification

The approach here is to fortify food with essential nutrients. The United Nations' Food and Agriculture Organization

recommends that governments in countries with high malnutrition rates consider fortifying food with iodine, iron and vitamin A in particular and that they regulate fortification (17, 18). The UN's Codex Alimentarius Commission lays down international food standards, which list the **basic conditions** for national fortification programmes: (1) (in)direct evidence of an appropriate rate of malnutrition; (2) identification of a food carrier (such as flour or edible oil) that is consumed by the whole of the malnourished population and whose consumption is recorded; and (3) an evidence base for minimum and maximum fortification rates (14, 15).

Food fortification is attractive because it does not require the target groups to change their diet but can be implemented by the **food industry** and because it reaches large numbers of consumers through retail. It is a particularly effective way of tackling deficiencies in densely populated urban areas. Mandatory labelling tells consumers that the food they are buying has been fortified, while accompanying 'social marketing campaigns' are often effective. As well as reliable data on malnutrition rates, national programmes need to be able to test the micronutrient content of food, which requires reliable laboratory testing and rapid mobile testing in the field.

There has been little research into the **cost** of fortification. World Bank studies suggest that the annual per capita cost of fortifying a food with vitamin A is between USD 0.69 and USD 0.98, while the cost of fortification with iron is just USD 0.12 to USD 0.22 per capita per year (1,3). Fortification is, therefore, seen as particularly cost-efficient and cost-effective.

German development cooperation's flagship project is the Strategic Alliance for the Fortification of Oil and Other Staple Foods, or **SAFO**. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is implementing the project in partnership with chemical company BASF in the framework of the developPPP programme and on behalf of the Germany Federal Ministry for Economic Cooperation and Development (BMZ). The German development cooperation has supported research, advised local partners and trained government food inspectors with a view to strengthening the effectiveness of national fortification programmes.

Fortified food is also important in **crisis situations**. In situations of fragility triggered by economic crises, natural disasters or long-term violent conflict, diet is often inadequate and unbalanced, so food fortified with vitamins or minerals is distributed to prevent malnutrition. This distribution of fortified foods in crisis situations is in line with the objectives of the United Nations. Where local markets can supply an adequate variety of food, dietary diversification can also be promoted by means of cash transfers or vouchers ('Dietary diversification'; (16)).

Recent agricultural research has highlighted the potential for reducing malnutrition through conventional agricultural **bio-fortification**. Biofortification means growing varieties that are rich in vitamins and minerals. For example, German development cooperation is encouraging farmers in Nigeria and Kenya to grow manioc and sweet potato with a higher vitamin A content. This approach, funded by BMZ through the Advisory Service on Agricultural Research for Development (BEAF) and supported by GIZ, is providing large sections of both urban and rural populations with access to micronutrient-rich food (6,7).

III. Dietary diversification

Linking cultivation of a variety of staple foods with a high vitamin and mineral content to **nutritional education can produce better consumer behaviour**, as has been demonstrated by multi-sector approaches to food security (see reference (8) for the example of a German development cooperation project in Malawi). Success relies on combining diversified crops, nutritional advice and targeted short-term nutrition intervention. The use of mass media, including nutrition information in radio and television programmes, has also proved effective. SAFO has, for example, supported the NGO partner KFI in Indonesia to produce content for media outlets. In some countries, this content has had positive effects in supporting the population to be more aware of nutritional issues when choosing food and preparing meals.

Having a balanced diet involves a number of factors and is a long-term objective, especially by contrast with dietary supplementation (4). The objective here is to diversify **food cultivation**

and making a wider selection of foods with a high vitamin and mineral content available for purchase so that consumers prepare more varied meals and have a more balanced diet.

These strategies represent complementary approaches and may form part of bilateral rural development projects. **BMZ's new 10-point programme for rural development and food security** makes explicit reference to measures to reduce undernutrition and malnutrition (point 3) and to integrate food security in bilateral development cooperation. These are particularly effective among children and mothers as an investment in the future (4, 9).

Diversification can take the form of improved agricultural production, development of vegetable plots, a good variety of foodstuffs and sound preparation methods within families, or multi-sector nutritional advice and training in schools. It can also be delivered through health services, along with food supplementation and fortification and can play a major part in helping to reduce malnutrition.

The global challenge of hidden hunger

Extreme food-price volatility, the impact of natural disasters, and long-term armed conflict have brought the need to combat hunger and malnutrition back on to the political agenda, and the problem has now been identified as a global challenge. International initiatives have been developed to tackle it: the Copenhagen Consensus (2008) in particular concluded that there was a high cost-benefit effect to combating malnutrition through food supplementation and fortification (10), proposing that investment be focused on these areas. Recent research (3, 11, 12) identifies the most effective and lowest-cost strategies for reducing hidden hunger. It also describes multi-sector approaches to food security, focusing particularly on preventive measures and targeting long-term results. The SUN initiative, with its emphasis on the first thousand days of life, identifies the importance of early intervention to reduce and prevent undernutrition and malnutrition (13). As at-risk groups, children, pregnant women and women with children also receive comprehensive health care.



A market in Uganda with plenty of diverse foods on offer

BMZ's strategy: complementary approaches to a global challenge

Reducing and preventing malnutrition requires coordinated global action. Micronutrient deficiencies usually impact on public health and affect entire populations, so action is needed at national and international level. The approaches taken by German development cooperation ...

1. include greater emphasis in **bilateral government negotiations** on the issue of food security and support appropriate multi-sector food security initiatives in individual developing countries; this approach represents a 'twin-track' approach in that it combines short-term and long-term food security initiatives.
2. support **multilateral organisations**. Within humanitarian and transitional programmes in many fragile states, they play a key role in coordinating a range of programme approaches and in integrating food interventions. For example, BMZ
3. support **international agreements and initiatives** promoting and advising initiatives such as the SUN initiative, the G8 L'Aquila Food Security Initiative, and the Comprehensive Framework for Action (CFA) of the UN High Level Task Force on the Global Food Security Crisis, as well as food intervention such as dietary supplementation and fortification at individual country level.
4. support **development partnerships** with the food industry (such as SAFO) with a view to bringing together the skills and expertise of the private sector and development bodies in a synergy with both social and economic benefits.
5. support **agricultural research** into varietal improvement and bio-fortification to help achieve food security and reduce hidden hunger.

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(2) **WHO-FAO**: Guidelines on food fortification with micronutrients. By Allen Benoist/Dary/Hurrall, 2006

(3) **DFID**: The neglected crisis of undernutrition. DFID's strategy. Evidence for action, 2009

(4) **The Lancet**: Maternal and Child Undernutrition Series, launched in London 2008

(5) **Copenhagen Consensus Center**: Micronutrient supplements for child survival. Best Practice Paper. By Horton et al., 2009

(6) **BMZ-GIZ**: International Agricultural Research. List of BMZ funded projects, 2011

(7) **CGIAR**: Agriculture for improved nutrition and health. Executive Summary. Research Programme: Proposal submitted by IFPRI, 2011

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(9) **BMZ**: 10-Punkte Programm des BMZ zur ländlichen Entwicklung und Ernährungssicherung, 2012

(10) **Copenhagen Consensus Center**: Summary – Results, 2008

(11) **Emergency Nutrition Network (ENN)**: The impact and effectiveness of emergency nutrition and nutrition-related interventions: a review of published evidence, 2004 – 2012

(12) **DFID**: SUN – Scaling Up Nutrition. The UK's position paper on undernutrition, 2011

(13) **SUN-Initiative**: Scaling Up nutrition. A framework for action, 2010

(14) **FAO/WHO Codex Alimentarius Commission**: General Principles for the Addition of Essential Nutrients to Foods, CAC/GL 09-1987 (amended 1989, 1991)

(15) **United Nations Standing Committee on Nutrition**: Fact Sheet Micronutrient Malnutrition, 2011

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(17) **United Nations Standing Committee on Nutrition**: 6th report on the world nutrition situation – Progress in nutrition, 2010

(18) **Food and Agriculture Organization of the United Nations (FAO)**: Voluntary Guidelines to support the progressive realization of the right to adequate food in the context of national food security, 2005

Published by the: Federal Ministry for Economic Cooperation and Development (BMZ), Division for public relations, information and education
BMZ, Directorate for Rural Development and Global Food Security
Edited by: Dr. Claudia Trentmann, comit GmbH | Ines Reinhard and Leonie Vierck, GIZ
Design and layout: Eva Hofmann, Anja Hasenstein, W4 Büro für Gestaltung
Printed by: Druckreif GmbH, Frankfurt am Main | Printed on FSC-certified paper.
As at: May 2012

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Edited by

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für Internationale
Zusammenarbeit (GIZ) GmbH