

# Third Hidden Hunger Congress in Stuttgart, Germany

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Hidden Hunger is a widely-used expression but not a specifically defined concept. It came to prominence in the late 1980s as international public health nutrition of UN agencies, national governments and academia shifted their attention from protein and energy to micronutrients. The term was codified in 1994 in an article by Maberly et al.<sup>1</sup>

Exploration of this concept has been the task of a series of conferences in Stuttgart, Germany, hosted by Hohenheim University and organized by Prof. Hans Konrad Biesalski. The first Hidden Hunger Congress was held in 2013, and was dedicated to the causes and consequences of micronutrient malnutrition and to possible solutions. The second was held under the same auspices in 2015, and addressed the problem in the context of pregnancy and the first two years of life. In March 2017, more than 400 professionals and students from more than 30 countries gathered in the convention center of the Moevenpick Hotel at Stuttgart Airport, Germany for the third conference. This was subtitled: “Post-2015 Agenda and Sustainable Development Goals: Where are we now? Strategies to improve nutrition quality and combat hidden hunger.” Financing came almost exclusively from the German government, with a contribution from DSM Nutritional Products for a reception and dinner on the main campus of Hohenheim University.

The inaugural session of the Congress featured 30-minute presentations by speakers from multiple organizations and sectors, including the World Food Programme of Rome, Italy, and the Bill & Melinda Gates Foundation of Seattle, WA, USA, as well

as various agencies of the German Federal government: the Federal Office of Agriculture and Food (BLE); the Ministry of Food and Agriculture (BMEL); and the Ministry for Economic Cooperation and Development (BMZ). The keynote address was given by Her Excellency Mme Dominique Ouattara, the First Lady of the Republic of the Ivory Coast, in her role as founder and president of the Children of Africa Foundation.

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### Congress theme: Sustainability

Guided by the subtitle’s key word of “Sustainable,” the majority of presentations, especially in the program of 15-minute case-studies, focused on holistic approaches to ensure food security through nutrient-sensitive food systems. This was focused toward the smallholders who still produce 80 percent of the food in low- and middle-income countries. The terms “food security” or “food-insecure” were frequently mentioned, but without any consensus as to criteria or definition. There was an emphasis on the “quality diet” – broadly conceived as one in which the density of all essential micronutrients was sufficient to meet requirements within the energy consumed. Recognition of the advance of overweight and obesity across the lifespan and the paradox of the “double burden” of malnutrition was reflected both in the theoretical constructs and the on-the-ground agricultural programming. Topics such as women’s empowerment, land tenure and the environmental



Thomas Silbernagel, Parliamentary State Secretary, Federal Ministry for Economic Cooperation and Development (BMZ) addresses a plenary session at the third Hidden Hunger Congress, which attracted over 400 delegates from over 30 countries.

integrity of land, forest and water resources were the focus of the majority of projects presented from Africa and Asia. Latin America was virtually invisible in terms of the practical experience narrative.

### The views of nutritional and agricultural economists

Consistent with the focus on food systems and security, there were four presentations from economists. Joachim von Braun of the University of Bonn spoke on the imperative for economic and political innovation for success in nutrition. He saw the concept “innovation” essentially in terms of “making things better rather than making better things.” A prominent focus was nutrition policy in the domains of technology, behavior change and food systems and ecology.

Lawrence Haddad, Executive Director of the Global Alliance for Improved Nutrition (GAIN), gave two presentations. In the first, he focused on how we can make food systems deliver a quality diet. Agricultural activities including the production of food, fodder, fuel and fiber across the globe account for 40 percent of worldwide income. One in 14 people on earth is directly involved as a food producer. Where the agricultural activity involves a non-nutritional food, such as cocoa beans, issues of fairness throughout the system, including fair trade, emerge. In his second talk, Dr Haddad focused on how businesses and the public sector can work together to improve people’s nutritional status. His observations focused on production and trade, using cocoa production as an example, in terms of nutritional status related to body size, rather than micronutrient status.

“Academic speakers provided 30-minute presentations in the areas of basic, clinical and epidemiological sciences”

Finally, Martin Qaim of the University of Göttingen, Germany, spoke on the topic of the linkage between production diversity and dietary quality in smallholder households. He explored the paradoxical situation whereby the ability to generate or have monetary income was more determinant of diversity of intake than is the diversity of the foods cultivated on the plots of smallholder households. For Dr Qaim, it is nutrition-sensitive agriculture with food-system diversity that is needed for a quality diet.

### Scientific insights into Hidden Hunger

Seven invited speakers dedicated to academic research provided 30-minute presentations in the areas of basic, clinical and epidemiological sciences. Robert Black of Johns Hopkins School of Public Health, Baltimore, MD, USA, outlined the current global status of all forms of malnutrition, both under- and overnutrition, and especially their relationship to morbidity and mortality of young children. The importance of prenatal determinants for adequate fetal growth related to prematurity and intrauterine growth failure was emphasized.

Howarth Bouis, founding Director of the HarvestPlus program of the International Food Policy Research Institute (IFPRI), Washington DC, USA, was the 2016 Laureate of the prestigious World Food Prize, awarded for demonstration of the viability of biofortification of food crops. Dr Bouis reviewed the plant hybridization processes and global progress toward developing of varieties enriched with provitamin A sources, folates, iron and zinc. Sweet potatoes, rice, maize, wheat and legumes are the staples currently involved in biofortification initiatives.

Keith West Jr of Johns Hopkins School of Public Health, Baltimore, MD, USA, addressed the issue of micronutrient deficiencies in the context of pregnancy in underprivileged regions of the world. In such settings, multiple micronutrient deficiencies would be the rule, making multiple micronutrient (MMN) supplements a more rational prescription for prenatal care than simply iron and folic acid. Dr West cited evidence that modest impact



Delegates listen attentively at the third Hidden Hunger Congress, held in Germany under the auspices of the University of Hohenheim-Stuttgart, March 20–22, 2017.

**Box 1: Pertinent parallel sessions****New approaches to monitor dietary intakes and their relation to health****Chaired by Hans Konrad Biesalski***Sponsored by the Sabri Ülkler Food Research Foundation of Turkey***Hans K Biesalski** Hidden and neglected – Nutrition gaps! Why do we need assessment?**Mirjana Gurinović** New technologies for dietary intake assessment**Burcu Arkoy** Self-Check Programme: Impact on nutrition on health**Rationale for public health to address emerging micronutrients in Hidden Hunger: Vitamin D, vitamin K, vitamin E, essential fatty acids, amino acids****Co-chaired by Klaus Kraemer and Noel W Solomons***Sponsored by Sight and Life***Kevin D Cashman** Vitamins D and K: Micronutrient deficiencies of public health significance or hype?**Keith P West, Jr** Vitamin E deficiency: Global burden and consequence**C Marius Smuts** Essential fatty acids in the first 1,000 days**Shibani Ghosh** The role of protein and amino acids in infant and young child nutrition and relationship with growth

on fetal growth and infant health have been documented in the controlled trials of MMN across the world.

Jack Winkler of London Metropolitan University, UK, addressed the paradoxes surrounding achieving satisfaction of the recommended long-chain omega-3 amino acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). The conventional source is marine fish. Another source is the algae upon which the fish feed. The most conservative recommendation for daily combined intake for adult is 250 mg. The two salient points were: **1)** few individuals are currently achieving their recommended long-chain omega-3 intake; and **2)** we do not have sufficient food sources available to cover this intake globally.

Three major presentations focused on function and health of the gastrointestinal tract. The author of this report spoke on features of evolutionary biology that govern the uptake and internal metabolism and utilization of the trace elements iron and zinc. Using the detailed understanding of molecular and cellular biology, Dr Solomons illustrated the constraints for high-dose administration of the nutrients to be safe and effective in public health intervention; with iron and zinc, there are inherent issues in their efficiency of absorption, the completeness of their retention and the extent of their biological utilization that may confound the intent of the intervention. Moreover, exposure of the unabsorbed trace elements to the microbial flora of the large intestine can have adverse (iron) or beneficial (zinc) effects on bowel health.

Irwin Rosenberg of the Friedman School of Nutrition Science and Policy of Tufts University in Boston, MA, USA, is credited with modernizing the concept of tropical enteropathy of the 1970s to an entity known as “environmental enteric dysfunction” (EED) as a potential mediator of poor growth and undernutrition. The pathological changes for the intestine are presumed to have consequences for nutrient absorption and local and systemic inflammation.

Tahmeed Ahmed of the International Center on Diarrheal Disease Research in Dhaka, Bangladesh, examined the interaction of the human microbiome and human nutritional status. Dr Ahmed cited studies relating the intestinal microbiota to nutritional status that are available from Malawi and Bangladesh, but these currently relate more to growth in height and weight than to any specific micronutrient(s).

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**The impact and challenge of food fortification**

Chaired and moderated by Prof. Biesalski, four distinguished experts, each with a different perspective, were tasked with predicting the priorities for food fortification over the coming three decades. Howarth Bouis emphasized the diverse possibilities of increasing the number of micronutrients and the number of crops and edible plants that might be engaged going forward. Rolf Klemm of Helen Keller International, New York, NY, USA, offered an optimistic view concerning some of the micronutrients currently addressed by periodic supplementation programs as evidence of the safety and effectiveness of food fortification.

Michael Krawinkel of the University of Giessen, Germany, urged dietary diversification using locally produced foods, includ-



Speakers and co-chairs from the parallel session “Rationale for public health to address emerging micronutrients in Hidden Hunger” (from left to right): Shibani Gosh (Tufts University, USA); Klaus Kraemer (co-chair, *Sight and Life*, Switzerland); Noel Solomons (co-chair, CeSSIAM, Guatemala); Kevin Cashman (University College Cork, Ireland); Keith West (Johns Hopkins Bloomberg School of Public Health, USA); and Marius Smuts (Northwest University, South Africa)

ing the restoring of indigenous foods that are no longer cultivated/ consumed on a large scale, to minimize environmental impacts.

Irwin Rosenberg of Tufts University raised concerns regarding the rationalizing of fortification policies to avoid excessive intakes among the relative “over-consumers” of fortified items. Issues raised were the degree to which the targeted populations need to be made aware of the addition of micronutrients to their food supply, and how appropriate salt and sugar are as vehicles for nutrient fortification.

#### Intimacy of new insights within the parallel session format

Three parallel sessions ran concurrently with the afternoon plenary sessions under the sponsorship of specific organizations. The first and last of these (see **Box 1**) provided substantive contributions regarding the technical and scientific aspects of hidden hunger. They were held in a break-out auditorium which seated 60 participants, so congress delegates could get an intimate interaction around these themes of interest.

In the first session, sponsored by the Sabri Ülkler Food Research Foundation of Istanbul, Turkey, the Congress President, Hans Konrad Biesalski, gave a talk on evidence of gaps between the estimated intakes of many micronutrients and the recommended amounts to be consumed (see **Box 1**, upper panel). Pos-

sible implications for widespread public health impacts were enumerated. The technical contribution in the second session outlined a series of emerging digital- and video-based measures that allow quantitative estimates of intake for the previous 24 hours or the frequency of items consumed in the recent past. In Turkey, an online, self-administered “self-check” program allows clients to file a report on their own intake and receive an individualized interpretation and recommendations for dietary improvements. Some 1,500 respondents have been registered on the website since it was inaugurated in 2015. Analysis of these data, albeit from this self-selected and health-interested group of respondents, reveals numerous patterns of deficiency, including low intakes of calcium. A comment from a member of the audience was that estimates of low dietary intake without measurement of nutrient status limit the reliability of consumption information for identifying true micronutrient deficiencies.

The third parallel session of the meeting, which was sponsored by *Sight and Life*, examined the relevance of five micronutrients which currently have nil or only limited projection into public health policy and programs (see **Box 1**, lower panel). Evidence of insufficient dietary intakes of both vitamin D and vitamin K in child and/or adult populations of Europe was presented, along with the findings of low 25-OH vitamin D levels

in this high-income setting. This was bolstered by observations of low-circulating  $\alpha$ -tocopherol levels from Nepal and Bangladesh in South Asia, along with functional responses to oral vitamin E supplementation, which suggest that deficiencies in this fat-soluble vitamin are a public health issue in the region. Vulnerability to deficient intakes and inadequate status of the omega-3 essential fatty acids EPA and DHA were documented in infants and adults from diverse geographical areas of the developing world.

Finally, the emerging evidence that the essential amino acids we consume have a significance beyond their contribution to the quality of dietary protein was addressed – that is, the previously unappreciated magnitude of the participation of specific amino acids in diverse functional roles in metabolism and regulation – suggesting their consideration as micronutrients in their own right.

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**Conclusion**

The third Hidden Hunger Congress was an important meeting for global public health; in many respects, it was more contemplative and reflective than other meetings on micronutrients. This

third meeting in the series examined the medium- and long-term future toward 2030 and beyond, and drew on the spirit of the UN Sustainable Development Goals. It focused on actions for both the health of humanity and the well-being of the earth’s environment and resources, including water and land. The proposals were constrained by a realization of intrinsic trade-offs in the interventions to increase micronutrient security. Achieving this latter goal was viewed more integrally and holistically, it was seen as more tied to food security in general and to the food systems we carry forth into the 21<sup>st</sup> century than to the immediate outreach and coverage of vulnerable populations with micronutrient fortification and supplementation. Put another way, the systems and contexts by which food is produced, distributed and consumed across the globe are as essential to the fight against hidden hunger as are specific interventions with micronutrients.

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