4th International Congress Hidden Hunger

Hidden hunger and the transformation of food systems: How to combat the double burden of malnutrition?

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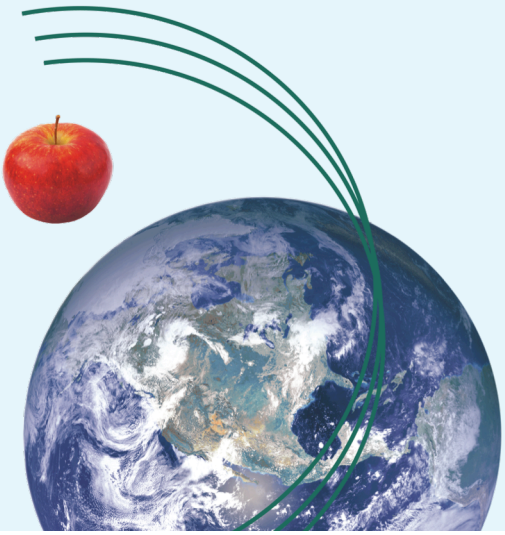

Abstracts – Keynote Presentations

(IN ALPHABETICAL ORDER OF PRESENTERS AND WHITHOUT ACADEMIC TITLES)

Urgency of a protein transition for food and nutrition security

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Meeting the UN Sustainable Development Goals regarding food security and sustainability requires a fast societal transition. Obviously, a multidisciplinary perspective is required to sketch why a transition from diets based primarily on animal proteins towards diets based primarily on plant proteins products is extremely urgent for food and nutrition security world wide.
This lecture delineates the dual challenge of **doubling** the output of crops plus **quartering** the impacts per ton **within three decades**. First, it is argued that protein supply is underlying and linking the top-3 of anthropogenic impacts based on the planetary boundaries concept, i.e. 1) biodiversity loss, 2) nitrogen cycle acceleration, and 3) carbon cycle acceleration (resulting in climate change). These ecological impacts associated with Western-style diets need to be reduced urgently. Second, so do the health impacts of over– and undernutrition.
Since health and environmental impacts are largely in sync, these issues may – and should – be addressed in combination. In order to address the inefficiencies inherent to current dietary patterns, therefore, a ranked list of more sustainable options is proposed, based on their order of magnitude. Primarily, a diet transition from primarily animal towards plant protein products is urgently required. Fortunately, new nutrition guidelines are increasingly taking sustainability into account and the contours of a dual protein transition are slowly emerging. Increasing protein supply in developing countries and decreasing caloric intake in developed countries are prerequisite. Such would benefit food and nutrition security, as well as biodiversity and climate. The barriers are plenty, but the benefits are overwhelming.

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Why has international agricultural research neglected fruits and vegetables?

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Fruits and vegetables may play an important role in combatting the problem of the double burden of malnutrition. Agricultural research can help to increase the productivity and the resource-use efficiency of fruit and vegetable production and, thus, reduce the prices at which these commodities can become more available to poor households. However, the international agricultural research system known as the CGIAR has, so far, concentrated mainly on staple grains and starchy food crops, while largely neglecting fruits and vegetables. As an indication, none of the CGIAR Centers is currently dedicated to fruits and vegetables.

The presentation analyzes in a historical perspective why the CGIAR has neglected fruits and vegetables. The early emphasis on food staple crops was motivated by the perception that the hunger problems of the era were primarily deficiencies in food energy. The success of the Green Revolution, in which international agricultural research played a key role, stimulated further emphasis on increasing the productivity of staple grains as the major strategy to combat hunger, not only in Asia, but also in other regions of the world. In the 1970s, nutritional concerns beyond food energy began to emerge in the CGIAR, but the focus was then placed on protein. Grain legumes were added to the mandate crops of the CGIAR, and breeding efforts were dedicated to increase the protein content and quality of maize and coarse grains. The awareness about the problem of micro-nutrient deficiency stimulated efforts in bio-fortification of major staple foods, most notably under the HarvestPlus program, which started in the early 2000s.

Fruits and vegetables, however, received limited attention. In the 1990s, new centers were added to the CGIAR system, but this opportunity was not used to create a dedicated center for fruits and vegetables. The Asian Vegetable Research and Development Center (AVRDC, now World Vegetable Center) was considered to be a candidate, but its location in Taiwan (a location not recognized by China) proved to be an obstacle. The World Vegetable Center received an annual budget of approximately 18 million US$[1], whereas the CGIAR system, which includes 15 centers, has an annual budget of more than 900 million US$.[2] The International Board for Bananas and Plantains (INIBAP) became a CGIAR research center of its own between 1991 and 1994, but was then merged with the International Plant Genetic Resources Institute (IPGRI), which later became the Bioversity center. Some informal activities to conduct research on fruits and vegetables also took place in several other CGIAR centers as part of farming systems research, based on the recognition that fruits and vegetables are a small but important elements of many farming systems in the developing world. Still, the fact that the CGIAR centers have specified “mandate crops” limited the opportunity to conduct research on fruits and vegetables within the existing centers.

Based on the analysis of the reasons why the CGIAR system has neglected fruits and vegetables, the paper presents an assessment of possible future strategies to better integrate these neglected commodities into international agricultural research efforts. The assessment shows that genetic improvement might best be left to the private sector, while international agricultural research could focus on developing strategies for integrated pest management, biological pest control and improved water use efficiency, as these are areas where private companies have limited incentives to invest. Moreover, publicly funded research could help to find low-cost solutions for post-harvest handling and storage (e.g., cooling and drying), where renewable energy sources have substantial potential. These efforts could reduce the costs at which fruits and vegetables become available to low-income households, thus helping to confront the burdens of malnutrition.

[1] See https://avrdc.org/about-avrdc/quic-facts/.
[2] See CGIAR. (2016). Innovations for Global Food Security - CGIAR 2016 Annual Report. Montpellier: CGIAR System Organization, p. 24.

Food Insecurity, Social Inequality and Sustainability

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The evolutionary history of the concepts of Food Security (FS) and Sustainability have run in parallel for many years. After the food crisis of 2008 Stability was added to definition of FS as a short term time dimension to express the ability to withstand shocks to the food system caused by natural (financial) or man-made disasters. We have proposed that Sustainability be added as a fifth long term time dimension, thus bringing together Food Security and Sustainability. We have developed a Global Nutrition Index to describe nutritional status with regard to the three dimensions of malnutrition – undernutrition, micronutrient deficiency (hidden hunger) and obesity – all of which are problems of people with food insecurity and of low socio-economic status. In 2015, the United Nations described the seventeen sustainable development goals. We believe that FS involves nearly *all* of these goals to a greater or lesser extent. The challenge ahead is to build and integrate food security on the sustainability agenda and *vice versa*. The final common pathway for all these efforts is for countries to develop their most appropriate Sustainable Food Systems. The Mediterranean diet pattern has the most scientific evidence for health benefits and also an excellent profile regarding environmental impact. The presentation will discuss the practical steps involved in building sustainable food systems, from production to consumption and involving all stakeholders along the value chain.

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Impact of the Food Environment on School-age Children and Adolescents in Low- and Middle-Income Countries

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Today, many food environments promote access to unhealthy foods, influencing individuals' preferences and demands for foods with poor nutritional quality. This has contributed to the rise in obesity and non-communicable diseases globally, especially in low- and middle- income countries (LMICs). In response, the **UN Standing Committee on Nutrition and the Food and Agricultural Organization Committee on World Food Security** conducted a review of current links between the SDGs and nutrition at the 2018 UN-High-level Political Forum on Sustainable Development.

Though there has been great political momentum, the forum identified a "food systems" approach was necessary to support healthy diets moving forward. This has also been echoed by the recent The **EAT-Lancet Commission** on Food, Planet, Health. For school-age children and adolescents, this has equated to increased exposure and desirability for nutrient-poor and ultra-processed foods and beverages. Importantly, adolescents, but especially school-children, may not have full autonomy and choice over what is made available to them and what they consume. These include: what is available in their home or school and what their parents or providers can afford. Unfortunately, there is paucity within the literature on components of the food environment, and how these interact and impact school-age children and adolescents in LMICs. Furthermore, from a research perspective in LMICs, there is a lack of validated food environment indicators and food environment interventions, which challenges our capacity to monitor and evaluate food environments in relation to functional outcomes, both anthropometric and diet-related in school-age children and adolescents.

This presentation will include key findings from two recent systmemtic reviews exploring the dietary intake and food patterns of school-age children and young adolescents in LMICs, and thre relationship of the food environment with health and Nutrition outcomes in LMICs.

Strategies For Improving Dietary Quality

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The fundamental underlying cause of mineral and vitamin deficiencies in developing countries is that non-staple foods – vegetables, fruits, pulses, and especially animal products which are rich in bioavailable minerals and vitamins – are not affordable by the poor. Moreover, prices for these non-staple food have risen significantly relative to staple foods over the past several decades. Strategies to increase intakes of minerals and vitamins may be classified into a two-by-two matrix – with the two rows being staple and non-staple foods and the two columns being interventions that rely on indirect behavior change (profit incentive, household incomes and food prices) and direct behavior change (encouraging changes in food consumed and farm produced on-farm). Biofortification operates across the food staple row both for indirect (invisible, tasteless iron/zinc) and direct (visible orange/yellow provitamin A) behavior changes. Productivity increases for non-staple foods would lower these prices (indirect behavior changes), while home gardening is an example of the director behavior change along the non-staple row.

Impact of global development pathways on food security and diet quality: Results of a global economic model

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After a period in which the number of food insecure people have been decreasing, the FAO observed a turnaround in 2017/18. In addition, the prevalence of malnourished people suffering from an inadequate diet with insufficient amounts of vitamins and minerals have been increasing. Malnutrition is not only caused by insufficient energy intake, but also by overconsumption of unhealthy food products. The future availability of nutritious food is affected by the development of food demand, food supply and also the integration of international markets.
Forecasts reveal that the global population will grow from around 6 billion people in 2011 to around 9 billion in 2050 which leads to increasing demand for food. In addition, diets are expected to shift with future economic growth. While agricultural productivity continues to increase, the increase happens at much lower rates compared to a decade ago and is expected to further decline. Among the challenges that the agricultural sector faces are e.g., scarcity of natural resources such as water and phosphate rock and climate change that leads to problems such as desertification and a higher risk of extreme whether events. Globalization considerably affected the availability of food commodities and thus diets across the globe. An advantage is e.g., that international trade can act as a buffer against local food shortages and increases diversity of foods available. However, international trade also appears to create price patterns which promote nutritionally unbalanced diets.

Specifically, concerns arise around questions such as:

- How can we feed the world in 2050 and beyond by not only taking energy intake into account, but also diet quality?
- How do different global development pathways affect the outcome?
- Which role plays international trade?

This study applies a global computable general equilibrium that provides a detailed representation of the economy, by depicting the interlinkages between downstream and upstream sectors covering farming, food processing, manufacturing and services as well as the link with factor markets. World market effects are included by depicting international trade using bilateral trade and protection matrices. To contribute to answering the questions raised above, we simulate a set of scenarios considering different assumptions about the global development until 2050 and their impact on food security and diet quality on the global, regional and country level.

How to put livestock derived foods on the plates of people who need them most in a sustainable manner

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Different livestock species provide different functions at both household and societal level. While most of the species directly contribute towards food security, some livestock such as donkeys, horses and oxen contribute indirectly through providing draught power in an agile manner, which is much needed for crop production in difficult-to-reach terrain. In Sub-Saharan Africa, food remains the main socio-economic function that livestock provide. In this regard, livestock derived food does not only contribute to food security but also alleviates and mitigates hidden hunger through the provision of such elements as zinc, vitamin B12 and other essential amino acids to the diet. These elements are vital for human development and may not be readily available from other food sources.

Apart from low animal productivity which affects sustainable availability of livestock derived foods, there are situations when cultural barriers, consumption stigma, financial limitations, incoherent livestock development policies and inappropriate animal breeding strategies prohibit uptake of such foods.

Using case studies and examples from Sub-Saharan Africa, this paper discusses barriers, and challenges to uptake of livestock derived foods; and explores the different pathways that could be utilised in order to put livestock derived foods on the plates of people who need them most in a sustainable manner.

Changing diets and the impact of the Double Burden of malnutrition

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Despite significant improvements in health and nutrition of the past fifty years, the risks of overweight/obesity and persistent undernutrition (the Double Burden) are affecting and affected by social, economic and environmental well being of individuals and populations. The common drivers of poor nutrition and health can be found in changing food patterns, food systems and sedentary lifestyles. Recent reviews have identified several key risk factors including the widespread availability and consumption of ultra-processed, low cost, desirable foods and beverages increasingly produced and marketed by politically influential companies. To understand the double burden, its drivers, risks, outcomes, and actionable policies and programs, it is useful to see these as part of complex systems changing the Anthropocene epoch.

The need is to move from treating and preventing specific nutrient deficiencies (the reductionist approach) to a more holistic set of actions incorporating the complex interactions of a sustainable environment including biodiversity and climate, economic growth, individual and population health, and integrated policy. We need to rethink business models, food systems, and human health interactions to tackle obesity, undernutrition, and environmental degradation. While challenging to do this from a conceptual, methodological and political perspective, we need to better understand and model these complex food systems to provide scenarios to guide policy and action for healthier populations and an ethical and sustainable economy, food system and planet.

Opticourses, from research to real life intervention: improving the nutritional quality for price ratio of food purchases of socio-economically disadvantaged households

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Context: Healthy diets are generally more expensive than unhealthy diets, explaining why socially disadvantaged individuals perceive food prices as a barrier to improving their diets. It is thus crucial to develop strategies enabling the achievement of good nutritional quality with a small budget. An intervention targeting socially disadvantaged populations must take into account their actual beliefs and expectations. A co-construction approach is thus recommended, involving participants at each step of the intervention to maximize its impact.

Small history of the program: The « Opticourses » program was launched in 2010 with a feasibility study[3], followed by an interventional research in 2012-2014[4], which showed that the participatory workshops of the Opticourses program have the capacity to improve the food purchasing behavior of populations with budgetary constraints[5]. A transferability study was then conducted in 2015-2016[6]. Since 2017, Opticourses is spreading in several regions of France, in particular within a nation-wide child obesity prevention program named VIF[7].

Principles of the program: By focusing on food purchasing (a daily activity that most adults are familiar with and feel able to handle), the Opticourses program is engaging and pragmatic, in accordance with the principles of health promotion. Participants were involved in the elaboration of the intervention, in order to implement a nonbinding, playful intervention tailored to the target population. This co-construction approach was applied to develop the protocol and the tools of the intervention and evaluation process.

Content of the program: Opticourses's workshops (8 to 12 people) include different activities displayed in four 2h sessions around real food purchases of participants, and games and exchanges aimed at promoting food and food choices of good nutritional quality for their price. Opticourses activities are generally divided into 4 sessions:

- The 1st session aims at presenting the program and building confidence with participants. They exchange with each together about their food purchases. They are asked to collect for 1 month their household food purchase receipts in order to get feedback from the workshops facilitators.
- The 2nd session is made up with discussions about the classification of foods and their nutritional profile, and the notion of food with good nutritional for their price is introduced.
- In the 3rd session, a specific tool designed to guide participants when purchasing foods: the fair price booklet[8]. This booklet is easy to put in a bag and lists foods with both good nutritional quality and fair price. For each food in the booklet, a fair price, defined as the price below which the food can be considered relatively inexpensive, is presented.
- The 4th session addresses the food beliefs of participants, especially about discount brands and products. During this session, the workshops facilitators provide individual feedbacks to participants about their household food purchases.

Perspectives: From a research point of view, getting access to new food purchasing data will allow a continuous refinement and innovation in the improvement of the diet for people with budgetary constraints[9].

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Market driven food fortification to address dietary needs

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Food fortification is a cost-effective and sustainable strategy to reduce the risks related with micronutrient deficiencies. By increasing the nutrient density of a diet which lacks food diversity food fortification helps reducing inadequate micronutrient intake. Voluntary Fortification can contribute to meeting nutritional requirements in targeted and untargeted populations as long as they use specific food vehicles and address specific consumers' demands. Fortified foods should be chosen that are consumed regularly as with fortified complementary feeding and widely as shown in the example of bouillons cubes. Two other objectives that also need to be addressed are their contribution to a healthy diet and their affordability to reach the population in need.

How to identify foods that are nutrient-rich, affordable, accessible, and appealing: Metrics and measures

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The next generation foods will need to be nutrient-rich, affordable, accessible, and appealing. Foods will also need to be culturally acceptable and sparing of natural resources and the environment. Each of those domains has its own measures and metrics. Foods' nutrient density is measured using nutrient profiling (NP) models that separate energy dense foods from those that are nutrient rich. The Nutrient Rich Foods (NRF) family of scores captures the food's nutritional value by balancing its content of shortfall nutrients (micronutrients and high quality protein) against the often overconsumed fat, sugar and salt. The Food Affordability Index, applied to different food groups, has measured both calories and nutrients per penny (Kcal/$). Metrics of physical access to foods include density and distance to food sources, as well as food activity spaces measuring using geo-positioning (GPS) tracking devices. Cultural acceptance can vary depending on geography, religion, and culture. Environmental impact of individual foods and composite food patterns has been measured in terms of land, water, and energy use. Greenhouse gas emissions (GHGEs) asses the carbon footprint of agricultural food production, processing, and retail. The present metrics, mostly developed and tested in rich countries should be applied to assessing nutrient density and affordability of the food supply and food consumption patterns in low and middle-income countries (LMIC). Optimization models can identify those foods and those food patterns that produce affordable nutrition for vulnerable groups. Food technology can help in creating some of those foods.

Perspectives on energy / nutrient density – too high and too low

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On behalf of the Gesellschaft für angewandte Vitaminforschung (GVF)

The «Gesellschaft für angewandte Vitaminforschung (GVF)» is a scientific institution which aims to promote research on the role of vitamins in human health. GVF is also engaged to provide fact-based information on vitamins, to stimulate new research projects and to foster the scientific interaction in the field.
One of the current challenges and opportunities in many countries (including the industrialized countries) is to support a healthy diet providing all macro- and micronutrients according to recommendations for a healthy life and healthy ageing. Humankind's most remarkable achievement is increased life expectancy. In the German population, life expectancy increased to 78.2 years for men and 83.0 years for woman (2017); however, the healthy life expectance is 10.1 years lower for men and 12.2 years lower for women than overall life expectancy. We face an issue with overweight and obesity. In parallel, many people have an inadequate intake and insufficient status of one or more of the essential vitamins and minerals. The World Health Organization has found evidence to link high consumption of energy-dense and low-nutrient foods to overweight, obesity and non-communicable diseases like osteoporosis, diabetes, cardio-vascular diseases, and others.
The opportunity is to communicate the way how nutrition modulates health and advocate for healthy diets adequate in the ratio of energy and essential nutrients. Examples for Germany and other countries will be presented.

“Fit for life” – German perspectives on how to tackle the double burden of malnutrition

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The sooner the better: Pregnancy and early childhood are decisive phases and strongly affect the health status of mother and child - short, medium and long term. The birth of a child is characterized by large uncertainties but also by a flood of (sometimes contradictory) information, especially with regard to a healthy diet during pregnancy and childhood. Certain vulnerable groups, such as people with a low socioeconomic status, are at special risk for an unbalanced diet and food insecurity, which might result in unfavourable health outcomes. Additionally, these groups are hard to reach with preventive measures and usually have a low food and health literacy.
In Germany, for example, the prevalence of maternal and childhood obesity is high, and highest in people with a low socioeconomic status. Moreover, women with a low socioeconomic status are less likely to breastfeed or continue breastfeeding.
This is where the German-wide network “Healthy Start – Young Family Network” comes in: Medical and scientific societies, professional organizations, and further professionally oriented institutions combined into a nationwide network with the aim to support parents by providing consistent information on a healthy lifestyle which are based on current scientific knowledge. The network was founded in 2009 as a project and has been institutionalized in 2016. Since 2017 it has been part of the Federal Centre for Nutrition at the Federal Office for Agriculture and Food.
The network has published uniform nationwide recommendations on nutrition and physical activity during pregnancy and childhood. It implements the following activities: face-to-face training of health professionals, development and distribution of easy-to-understand materials and media such as flyer, sticker, poster, and apps, as well as an extensive PR work. In order to reach also vulnerable groups, the network applies an *indirect* approach via health professionals who are in close contact to young families by using existing health care structures such as statutory medical check-ups and screenings.
In order to learn from good practices or similar activities in different contexts, an international exchange is indispensable. Between 2015 and 2017, the network was engaged in the EU-wide “Joint Action on Nutrition and Physical Activity (JANPA)”. JANPA not only focused on a healthy start in life, but also on healthy environments in schools and pre- schools, on the economic evaluation of the cost of childhood obesity and on specific tools to promote a healthy diet and improve the consumers information. Thus, JANPA pursued a multilevel and a life-course approach to halting the rise of overweight and obesity in children and adolescents.
Since 2017, the network has also been part of the research project “Becoming Breastfeeding Friendly”. The breastfeeding rates in Germany are comparatively low, especially in women with a low socioeconomic status. Moreover, due to the federal structure of Germany an overview of existing structures, actors and initiatives in the field of breastfeeding is lacking. The aim of the two-year project is to evaluate the current situation regarding the promotion of breastfeeding and to develop evidence-based and sustainable measures and campaigns to protect and promote breastfeeding in the future. An eight-gear wheel model, the ’Breastfeeding Gear Model’ from Yale School of Public Health serves as basis and reflects all fields of action in terms of breastfeeding promotion like Advocacy (social approval), Political Will, Legislation & Policies, Funding & Resources, Training & Program Delivery, Promotion, Research & Evaluation, and Coordination, Goals & Monitoring. The project has been initiated by the Federal Ministry of Food and Agriculture (BMEL). All relevant stakeholders and decision makers are involved to ensure the later transfer of key findings into national strategies and action plans.
In any case, a targeted, constructive and continuous cooperation between science, practice, politics, media, and any other actors who are in close contact to young families is inevitable. From this “health in all policies approach”, we expect to find a way to address pregnant women and young families socially equitable and successfully promote changes towards a healthy lifestyle.

Diets undone: hype or healthy?

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Food is personal, is part of our identity, a means to socialize with others. It reflects our culture, values and lifestyle. Nowadays, people are interested in food and health more than on a basic level. They are attracted to ingredients that are locally sourced and environmentally sustainable. They want food that is truthful, honest, and unmediated, food that is natural, traditional and local. They also want products and foods that fit them, they seek convinience, but not at the expense of health of sustainability. But to make the right choices, they need to be informed.

We currently live in a swirling nightmare of information quicksand where the sheer availability of information challenges our capacity to absorb it meaningfully. Mobile devices, the Internet and social media open the doors for a direct dialogue with consumers and allows everyone to be a source of information. Emotional discussions start replacing fact-based debates, sensationalist media headlines with diet hypes get prominence and uncredentialed sources of information succeed in undermining trust in science. This increases the uncertainty and complexity of consumer decision making, but also has the potential on resulting in ill-health, when what we need is the opposite.

Translating the science of food and health into an understandable way to the public is a shared responsibility, and more needs to be done by different actors, scientists, civil society, science communicators, government, industry and the media to deliver accurate and consistent messages that are easy to understand and actionable. In parallel, we need to empower and engage consumers on the basis of mutual trust, transparency and understanding.

One way EUFIC does that is by looking at what are the issues consumers are interested in or concerned with in social media (like top diet hypes) to then deliver information pieces bringing the science behind these hypes, addressing their emotions and concerns to inform the public.

About EUFIC:

EUFIC - The European Food Information Council, is a non-profit organisation established in 1995, whose mission is to offer accessible, appealing and actionable science based information on food and health to inspire and empower people to make better decisions about diet and lifestyle.

At EUFIC, we are a group of passionate science and communication experts who believe in the power of informed consumers and in a world where people choose to live healthily because they know how to. To know more visit www.eufic.org

Reference:

The association between exaggeration in health related science news and academic press releases: retrospective observational study. Petroc Sumner et al., 2014. BMJ; 349 doi: https://doi.org/10.1136/bmj.g7015 (Published 10 December 2014)

What can we learn from using different dietary and nutrition assessment tools? Insights from rural Kenya

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Malnutrition in all its forms is a universal problem, which has been described and measured in many different ways. Multiple indicators and assessment tools exist to measure and describe diets, food insecurity and the double burden of malnutrition. Each indicator has a somewhat different focus, definition, and interpretation, but eventually, all of them are used to measure how well people are nourished. Hence, a positive correlation and similar results would be expected. But is this really true? Most studies eventually rely on one approach, often depending on data availability and feasibility, so it is unclear how closely results match when different tools and definitions are used in the same context. Analysing six dietary and nutrition assessment tools, we calculated and correlated different indicators for food access (energy consumption, household dietary diversity scores), dietary quality (individual dietary diversity scores, micronutrient intakes), and nutrition (anthropometric indicators) to evaluate associations. Additionally, we determined and compared seven different definitions for the double burden of malnutrition, using data on food intake and anthropometric measurements from 874 male and female adults, and 184 children (<5 years) from Western Kenya.
We found food access and dietary quality to be positively correlated at individual level. Dietary indicators are positively correlated at household- and individual-level. Based on these findings, we conclude that dietary indicators from 7-day food consumption recalls at the household-level can be used as proxies of individual dietary quality for children and male and female adults. Individual dietary diversity scores are good proxies for micronutrient intakes. On the other hand, the prevalence rates of the double burden of malnutrition strongly depend on the measurements and definition of indicators.

The long shadow of undernutrition during pregnancy: The quasi-experiment of Ramadan in utero and a trial in Bangladesh covering the full 1000 days

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The first nine months, from conception to birth, is the most vulnerable period in human life as growth is extremely rapid and body systems are developing. Malnutrition in utero can lead to adverse outcomes visible at birth, such as growth retardation and spina bifida. In addition, it can have delayed negative effects, e.g. through epigenetic impacts on the immune system and on metabolic pathways.
To advance our understanding of the Developmental Origins of Health and Disease (DOHaD), experimental designs are crucial as they can separate nutritional effects from other factors. Most famously, prenatal exposure to the Dutch Hunger Winter 1944/45 has been linked to a range of chronic diseases in adult life. In my talk, I will present another natural experiment, the Muslim practice of day-time fasting during the holy month of Ramadan, and a randomized controlled trial to examine the effects of undernutrition during pregnancy. Prenatal exposure to Ramadan has previously been shown to influence adult weight and height, school and work performance.
We studied the impact of Ramadan exposure in utero on under-five mortality in rural Burkina Faso, a setting with high malnutrition and infectious disease mortality. We analyzed longitudinal data from the Nouna Health and Demographic Surveillance System on 41,025 children born between 1993 and 2012, using proportional hazards regression with difference-in-differences. Children of Muslim mothers whose early pregnancy overlapped with Ramadan were about 30% more likely to die before age five than non-Muslim children born at the same time. Among children not exposed to Ramadan, there was no difference in child mortality between Muslims and non-Muslims.
The ongoing “Food and Agricultural Approaches to Reducing Malnutrition” (FAARM) cluster-randomized controlled trial in rural Bangladesh evaluates the impact of a homestead food production program on undernutrition in women and children. FAARM recruited 2700 young women before pregnancy, so their children could potentially benefit from a more diverse diet already in utero, thus covering the full first 1000 days. We measure anthropometry at birth and at endline, blood micronutrient levels, diets of women and children, gastrointestinal infections and microbiome, and child development. In addition to nutritional factors, we assess the impact of prenatal exposure to mycotoxins and arsenic on birth outcomes.

Public-private approaches to alleviate the double burden: What works?

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The private sector is culpable in generating the triple burden of malnutrition. But when looking for solutions to the triple burden, the private sector cannot be ignored or only engaged in a punitive way. It must be incentivised in a positive way too. This talk gives some examples of how those incentives may be operationalised.

The multiple burdens of malnutrition: what we know and what we need to know more about

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This presentation will share the assessment of the 2018 Global Nutrition Report on the nature of the multiple burdens of malnutrition. It will share findings such as:

- Of the 141 countries analysed, 88% (124 countries) experience more than one form of malnutrition, with 29% (41 countries) having high levels of all three forms.
- Children can also experience multiple forms of malnutrition: 3.62% of children under five (15.95 million children) are both stunted and wasted, while 1.87% of under-fives globally (8.23 million children) experience both stunting and overweight.
- Multiple forms of malnutrition are also found in fragile states and situations of conflict

Despite this new knowledge, there remain important gaps in data and analysis. This presentation will highlight these gaps. It will end by providing insights for policy and practice to address the multiple burdens of malnutrition, such as through “double duty actions.”

The role of food systems and diets in addressing malnutrition – a FAO perspective

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Theoretically, there is enough food to feed the entire world population. Yet the number of undernourished people has risen for a third year in a row, reaching 821 million people. Micronutrient deficiencies of iron, zinc, vitamin A, folate, vitamin B12, and iodine affect more than 2 billion people, in particular in areas where diets are not sufficiently diverse. At the same time, overweight and obesity and associated non-communicable diseases have turned into a global health crisis with enormous economic costs. The extent to which countries are struggling with these multiple forms of malnutrition is illustrated in the 2018 Global Nutrition Report, according to which of the 141 countries analysed, 88% (124 countries) experience more than one form of malnutrition, while 29% (41 countries) have high levels of all three forms.

Addressing the challenges of hunger, food insecurity and malnutrition in all its forms features prominently in the Sustainable Development Goals (SDG), and, in particular, in SDG 2 that calls for ensuring access to safe, nutritious and sufficient food for all (target 2.1) and eliminating all forms of malnutrition (target 2.2). At the 2nd International Conference on Nutrition organized by FAO and WHO in November 2014, countries committed to enhance food systems by developing coherent public policies from production to consumption across sectors to promote safe and diversified diets. Policy makers committed to tackle malnutrition in all its forms through a profound transformation of food systems – the ways in which food is produced, processed, distributed and consumed.

This presentation provides an overview of initiatives currently underway at international level to support a transformation of food systems in order to enhance healthy diets and improved nutrition. It further explores policies, strategies and measures that can effectively support such transformations and outlines how international organizations can assist countries in their efforts to promote healthy diets through sustainable food systems for improved nutrition.

Key words: Food systems, healthy diets, nutrition

The Danish tax on saturated fats

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Denmark has a long tradition for 'green taxes' and subsidies with the dual aim to incentivize certain behaviors (e.g. in the environmental domain) and (for taxes) to generate tax revenues to contribute to financing the country's public sector. For decades, such tools have included taxes on sugar, candy, chocolate, soft drinks, alcoholic drinks, tobacco etc., which have been relatively unnoticed internationally. In 2011, however, Denmark became internationally known as the first country in the world to introduce a tax on saturated fat in food products - a tax that was introduced upon recommendation from a governmentally appointed disease prevention commission, but which was repealed again after only 15 months in action. The saturated fat tax was levied on most food products containing saturated fats, and with a tax rate proportional to the saturated fat content. The tax scheme was challenged on several grounds, including administrative burdens for the industry associated with the tax, concerns for cross-border trade, general opposition from the food industry and lack of consensus and support from public health organisations and experts. The introduction - and repeal - of the Danish saturated fat tax has provided a 'natural experiment' with unique and useful data to assess the effects of such tax introductions. A number of studies on the consumption effects of the saturated fat tax introduction have been conducted. The presentation reviews some of the experiences from Danish food taxation, and in particular the experiences and research findings regarding the 'fat tax', and puts the experiences into a broader perspective - internationally and commodity-wise.

Knowledge, Nudge or Nanny -- A triple opportunity for civil society's response to the triple burden of malnutrition

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Obesity is a growing public health burden, not just in affluent countries but in many developing nations, yet many civil society and NGO programs have traditionally focused on improving child and maternal undernutrition in low and middle income countries (LMIC). With increases in economic development and urbanization existing alongside extreme poverty, rises in childhood overweight and obesity have raised concern about short- and long-term health and development implications of both under- and over-nutrition. The co-existence of stunting and overweight in many LMICs has heightened the need for NGOs to address both conditions simultaneously and promote “healthy growth”, so that undernutrition is eliminated without contributing to obesity and increasing the risk of nutrition-related chronic diseases. But what role should NGOs play? This presentation will examine opportunities and challenges for NGOs in shaping the behavior change communications (Knowledge), food environment and food systems (Nudge) and food policies (Nanny) drawing on lessons learned from HKI's programs.

The double burden calls for better diet quality worldwide

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Not just the SDGs but the double burden of malnutrition itself call for a global approach as diets lacking micronutrients and providing excess food energy are a global challenge.

- Diet quality doesn't depend on food and nutrient resources only but on knowledge and awareness of consumers and families.
- Breastfeeding and locally adapted, diverse as well as sufficiently frequent complementary feeding are the basis.
- Increasing dietary diversity in the field of fruits and vegetables is mandatory for providing not just all nutrients, but bioactive compounds for improved physiological function and preventing non-communicable diseases.
- Utilization of local resources empowers people to eat divers diets. Not just considering availability of and access to food is required, but awareness and knowledge too.
- In order to reduce the risks of nutrition-related non-communicable diseases adjusting sugar, salt, and fat intake are inevitable.

The challenge of the double burden of malnutrition is divers in different countries and regions of the world, but the principles of tackling this challenge are similar and require political, educational, and nutritional action.

Farming for food and conservation: how small-scale farmers, food processing, and a business partner can restore a landscape

Lewis, Dale[1]
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178,000 small-scale farmers in Zambia sign and abide by a conservation pledge to be eligible to sell their crops at top prevailing market prices to a company called COMACO (Community Markets for Conservation). From this relationship has come the formation of 81 farmer cooperatives that have helped create a cost-effective value-chain of commercial food products sold under the brand *It's Wild!*. The commercial pull of these products have increased the adoption of healthy legume crops and has made sustainable farming without costly chemical inputs a more profitable way for smallholder farmers to farm and to honor their conservation pledge of protecting forests, wildlife and soils.

To enhance farmer commitment to the pledge and the conservation story for marketing the brand, the company pays cooperatives a conservation dividend if an annual audit of their compliance to the pledge meets required conservation standards. Such an incentive helps to drive adoption of farming practices that support additional market opportunities from reduced CO2 emissions and organic certification. In 2017, for example, 9 of the 74 chiefdoms that have partnered with COMACO earned USD 489,369.70 in carbon revenues that provided a range of benefits to small-scale farmers residing in these chiefdoms. A second such transaction is planned for 2019.

COMACO has shown that farming can be much more than farming for food and nutrition when integrated as a more holistic way of managing and protecting landscapes for added market benefits. Its approach contributes to an annual planting of over 25 million tree seedlings for scaling agroforestry solutions to soil regeneration, a more diverse and rotational crop system incentivized by value-added products that help add over $2 million to the local economy, over 1 million hectares of community protected forests supporting over 15,000 beehives and an emerging wild mushroom market, and annual household incomes that have grown on average over 3-fold since COMACO's early beginning in 2003.

Hidden hunger and the transformation of food systems: How to combat the double burden of malnutrition?

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Trends of malnutrition are worrying, with obesity, overweight and associated non-communicable diseases on the rise everywhere and with relatively slow progress on stunting and hidden hunger (Global Nutrition Report, 2018). Efforts to reverse the trend of increasing obesity have been largely ineffective (Swinburn et al., 2019).

In low- and middle-income countries (LMICs), food systems are transforming rapidly, associated with rising incomes and urbanization. While there are global influences, most food system policies and interventions occur at national level – adapted to national and sub-national development plans and contexts. The presentation will review initial experiences in national food systems research in four countries – Bangladesh, Ethiopia, Nigeria and Vietnam.

From a food system perspective, improving diet quality is the common strategy for reducing all forms of malnutrition. The factors Influencing diet quality are complex, with multiple drivers influencing food supply, food environment and consumer behavior. Most policies and actions in LMICs largely consider food supply, from a focus on food security in low-income countries to efforts at developing a more diverse and higher-value food supply through improved logistics, processing, storage and markets in middle-income countries. Consideration of food environments and consumer behavior are new. Despite decades of relative inaction, there seems to be a greater sense of urgency to foster both sustainable and healthier food systems. This will require a more coordinated, whole-of-society approach, negotiated and supported by government, civil society, companies and academia.

The hidden and not-so-hidden public health epidemic in India

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India emerged relatively unscathed by the global recession of a decade ago, averaging growth rates of per capita GDP of over 7 percent per year. However, hidden hunger and its manifestations continue to be a public health problem. Stunting and underweight among children and thinness among adults has declined, but has not been eliminated, even in states with relatively good health infrastructure. Levels of anemia have remained high and impervious to change. At the same time, the incidence of overweight and obesity has shown a dramatic increase over a relatively short period of time, in both rural and urban areas. There is a distinct geographical pattern to this dual burden of malnutrition.

A dual burden is also evident within households. Contrary to the experience of several Latin American countries, the characteristics associated with it differ; further, the nature of the intra-household dual burden may also be undergoing a rapid change in urban India.

The pathways to achieving improvements in hidden hunger are complex and mediated by several behavioural factors. For example, as far as undernutrtion is concerned, food fortification is increasing in coverage. But potentially worrisome is the evidence (albeit limited) that suggests that oil and sugar are added to fortified foods meant for young children to increase palatability. There is also new evidence to suggest the risk of inadequate intakes of iron in the population is significantly lower than previously thought; and that use of multiple food vehicles for iron fortification may increase the risk of crossing upper limits of safe intake. At the overnutrition end of the malnutrition spectrum, effecting changes to relative prices, say of oils and sugar, are one option. An analysis of an edible oil subsidy suggests that it induces a shift in consumption to the cheaper oil, but does not affect the overall magnitude of oil intake. Overweight is also strongly associated with occupational choices.

Water – Food – Energy – Nexus: Case Study Burundi

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Water, food and energy are essential for human well-being, poverty reduction and sustainable development. Due to population growth, but also economic development, metropolisation, technological and cultural changes and diversifying diets the demand for food, energy and freshwater will increase significantly over the next decades. To guarantee food security in 2050 60 % more food will need to be produced. Therefore the global water withdrawals will increase by 10 % and global energy consumption is projected to grow by up to 50 % already until 2035 (IEA 2010). Even today Agriculture is the largest user of freshwater with approximately 70% of total global freshwater withdrawals. At the same time, the food production and supply chain actually consumes about 30 % of total energy consumed globally (FAO 2011).

In developing countries and there especially in peripheral rural areas, the Water, Food and Energy Nexus is particularly relevant for a sustainable development.

The central African state of Burundi is, in principle, water-sufficient. However, due to a couple of factors, Burundi is a typical example for a country with economic water scarcity. Major reasons are one of the world's highest population growth rate, a very low level of education and a high poverty rate. As a consequence, Burundi lacks know how and financial resources to improve water quality, supply and distribution, as well as sewage systems. As one of the least developed countries in the world, Burundi's agriculture is to a major part depending on small scale farming. In combination with population growth and a rising energy demand, this is progressively leading to a self-reinforcing downward spiral. The high deforestation rates for new farmland as well as wood as the dominant energy source lead to considerable erosion rates. Erosion causes decreasing soil fertility and may lead to the complete abandonment of the eroded surfaces, at last partly eroded up to the bare rocks. At the same time, massive erosion also results in decreasing water availability, because a lower infiltration rate is given. This in turn exacerbates the problems of ensuring sufficient access to food and energy. Political instability and the effects of climate change exacerbate the aforementioned problems. While there are some potential strategies to at least help alleviate the water and energy problems, they cannot be easily put into practice due to the above mentioned political and institutional issues.

The role of demand creation across the food system in addressing the double burden of malnutrition – setting the scene

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Increasing knowledge often does not increase demand or change people's behaviour. The presentation will explore how to move beyond simply giving information and instead look at how to create promises and exchanges, drawing on the theory of exchange and discount factor, and based on your target audiences' values and beliefs. The presentation will explore two case examples where these principles have been used to develop effective messages and interventions to increase demand and change behaviour.

Food security in Burundi: Challenges related to the socio-economic context

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With an estimated population of 11.4 million and a GDP per capita of US $ 297 in 201, Burundi is one of the poorest countries in the world. Population growth is 3.7%.
The density is of the order of 437 inhabitants / km2 in 2018. The country ranks 180th out of 184 countries for the Human Development Index (HDI) (2014). GDP grew to USD 3.09 billion in 2014. Inflation fell by 9% to 6.7% between 2013 and 2014, but rose again with the current crisis. Since 2010, economic growth has been around 4%, but has been slowed by recent security events..
Poverty affects an average of 67% of the population: 69% in rural areas and 34% in urban areas. About 3 million people are food insecure, 170,000 children under five are at risk of acute malnutrition, and 500,000 pregnant women are in need of nutritional support (International Food Policy Research Institute (IFPRI), 2017). Environmental degradation and land fragmentation threaten to further weaken an economy already hobbled by primary sector dependency
However, Burundi has comparative advantages, among other things, the Tanganyika lake that is a major asset in term s of transport, constituting a strategic access to the entire central and southern Africa region.
The scientific research in food security related fields, the cooperation between different stakholders and partners and the capacity building of the population could positively influence agricultural sector and help to reduce food insecurity.

Programming towards improved nutrition: WHH´s approach to the prevention of malnutrition – in all its forms

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Hunger and all forms of malnutrition are in particular a result of social injustice and poor policy frameworks at all levels. Purely technical solutions would therefore not go far enough. With its work in 38 partner countries, Welthungerhilfe wants to continue to make a significant contribution to achieving the SDG target of eradicating hunger and all forms of malnutrition by 2030. In order to achieve this, WHH has strengthened its strategic approach. “Programming Towards Improved Nutrition (PtIN)” is Welthungerhilfe’s initiative to improve nutrition among children, women and men of vulnerable households. PtIN is an integrated, intersectoral system approach which considers the multiple causes of malnutrition and identifies the enabling factors that contribute to reaching food and nutrition security. PtIN consists of four pillars:

1. A rights-based approach puts the most vulnerable population groups as rights holders into the centre of all efforts. Women and men, girls and boys with whom we work must become rights holders rather than merely the beneficiaries of aid.
2. A twin-track approach to link humanitarian and development interventions to fight malnutrition and strengthen resilience in a comprehensive way.
3. Context-specific nutrition programming approaches help to capture holistically the magnitude, severity and the causes of food and nutrition insecurity within a population of a country. This supports the design of effective strategies and interventions at sub-national level.
4. A multi-stakeholder approach refers to the fact that only joint measures by all relevant actors concerned can bring about a lasting end to all forms of malnutrition. PtIN calls on governments to ensure the appropriate legal framework and supports the empowerment of citizens and civil society organisations in partner countries to participate in the design, implementation and monitoring of policies and programmes.

Though undernutrition is the most pressing nutritional problem in WHH partner countries, PtiN is tackling all forms of malnutrition within Welthungerhilfe’s projects and programmes. PtiN is designed to improve systemic analysis and systems thinking across sectors and to implement nutrition sensitive interventions in WHH´s key thematic working areas such agriculture, WASH, economic development, resilience, food systems strengthening and promotion of social behaviour change and care practices as well as strengthening of civil society actors for coordinated action on nutrition outcomes.

Chef's Manifesto - leveraging chefs to create demand for healthier foods

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With one in three people around the world suffering from malnutrition, the world cannot continue business as usual if we are to end all forms of malnutrition by 2030. New voices must be brought into nutrition conversations that are struggling to reach their target audience. As food influencers and the bridge between farm and fork, chefs have an important role to play in helping us to rethink food- what we eat and how its produced- with conversations that prioritize taste and language that inspires action. Present in our schools, neighborhood gardens, community projects and businesses, chefs can speak to farmers, consumers, politicians and communities alike with a message of sustainable, nutritious food for all to deliver the Sustainable Development Goals by 2030. Adding greater food diversity to our plates is a first step in making Agenda 2030 a reality as biodiversity not only adds nutritional value to our diets but also strengthens food systems and builds climate resilience.

Farm household vulnerability and food security challenge in Burundi

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The global agricultural conditions are changing rapidly and vulnerability among smallholder farmers is increasing steadily. As consequence, households adapt their livelihood strategies over time in order to respond to evolving pressures and prevailing opportunities. Yet, many farm households suffer from poverty and food insecurity, especially in developing countries. The main reasons for this are the depleting natural resources, the variability in climatic conditions triggering variability in yields and food availability, and the unreliable market for both agricultural input and output, leading to farmer's risk-averse behaviour. This study focuses on the relationship between the production environment and agricultural practices to assess their consequences on household food security in subsistence-oriented farming communities of Burundi. A mathematical programming model based on Monte Carlo simulations is applied to four different farm types in order to predict optimal production practices for farmers to achieve the household year-round food security. Two model variants are developed; (1) a model without risk and (2) a risk-bound model. The findings show that risk in farming is among the main drivers of activity choices and practices with their subsequent impact on the household food security. Farmers adopt multiple cropping systems to minimize yield variability while the model predictions suggest a limited number of crops in a more optimal combination for rural households to achieve sound food security. The model results highlight also the impact of basic storage infrastructure on improving the food availability.

Key words: small-scale agriculture, production conditions, farm practices, market infrastructure, food security, Burundi

The European Commission's comparative advantage in addressing the double burden of malnutrition

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Beyond its purse, reach and political voice, the European Commission (EC) sees that it brings specific added value to efforts to combat the double burden of malnutrition through its programming in nutrition-sensitive sectors, using different aid modalities, and its efforts to bridge stubborn divides such as across the humanitarian and development domains. A number of important challenges need to be overcome to secure the coherence and connectivities that are vital to lasting success. Looking forward to the next programming period (2021-2027), the EC plans to overhaul its policy framework for nutrition to take account of all forms of malnutrition; secure healthy diets through investments in sustainable food systems; and strengthen its partnerships with countries, and most crucially with EU Member States to ensure that all EU assistance is aligned and coherent and thereby maximise its impact. The EC welcomes the advice, engagement and support of all colleagues concerned with tackling Hidden Hunger, to contribute to its next era in the post-2020 programming phase.

Tackling Issues of Food and Nutrition Security in the Context of Devolution, a Case of Kenya

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The promulgation of the Kenya Constitution 2010 brought about changes in the structure and operation of the government. This resulted into the formation of national and county governments. Consequently, various government departments were affected with regard to the delivery of their mandates to the citizens. The main objective of this presentation is to highlight the challenges that have been brought about by devolution in the agriculture sector and generally on food and nutrition security. Interventions are subsequently underscored to show how the Ministry is tackling the challenges of a devolved system of government. The prediction is that identified interventions will be key to improving the food and nutrition security status of the Kenyan people despite the changes in government functioning.

Strategies to combat the double burden: What works where and why?

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In many developing countries, despite economic progress in the past few decades, regional inequalities and food insecurities in the form of undernutrition persist. Simultaneously, there has been a rising trend in overweight and obesity in many of these countries. The co-existence of undernutrition with overweight and obesity within a population, among members of the same households or at the individual level (overweight but micronutrient deficient) characterize the double burden of malnutrition. This presentation seeks to understand the nature of economic development that leads to the prevalence of the double burden and the policy options for the future that is essential to address it. Agriculture and nutrition are closely linked as it determines the availability of food, influences the real cost of food and that it also provides livelihood and incomes for a majority of the world's poor. Traditionally, achieving food security meant ensuring the availability of sufficient calories for a given population and this led to a policy emphasis to increase staple grain production. We argue for a nutrition-sensitive food system which goes beyond staple grain productivity and places emphasis on the consumption of micronutrient-rich nonstaples. A nutrition-sensitive approach not only considers policies related to macro level availability and access to nutritious food, but it also focuses on household and individual-level determinants of improved nutrition. Therefore, in addition to agriculture, intra-household equity, behavior change, food safety, and access to clean water and sanitation are integral components of the approach. We make a case for building a nutrition-sensitive agricultural sector using the experience of India and the future trajectory the country needs to take to build a nutrition secure future as it becomes the world's most populous nation by the year 2030. From an economic perspective, this presentation provides a detailed view of a) the multisectoral pathways through which agriculture influences nutrition; b) the policies that have influenced agricultural growth trajectories and safety-net programs in India to highlight the major challenges and disconnects in agriculture and nutrition policy and c) the problems in identifying and implementing food and nutrition policies that can address concerns of the double burden. Lessons from the Indian experience are generalizable to many developing countries in their fight against the burden of malnutrition.

Transformation of food value chains and the double burden of malnutrition

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While undernutrition and micronutrient malnutrition are still widespread problems in many developing countries, rates of overweight and obesity are also on the rise. In other words, many developing countries are suffering from a double burden or even a triple burden of malnutrition. At the same time, agri-food systems in developing countries are undergoing a rapid transformation, which can affect the different forms of malnutrition in various ways. The agri-food system transformation is characterized by a modernization of food supply chains, with higher-value products, new types of standards, and vertical coordination mechanisms gaining in importance. These trends may affect the welfare and nutrition of smallholder farm households in rural areas. Consumer household nutrition in urban areas may also be influenced through changing food environments, as traditional retailers are more and more replaced by modern supermarkets and hypermarkets. This lecture provides an overview of some of these trends and their dietary and nutrition implications for rural and urban households. Different empirical studies are reviewed with a particular focus on Africa.

CIMI - An Android App for a rapid assessment of micronutrient deficits

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Known methods for large scaled monitoring of micronutrient intake in rural subsistence populations often either are very resource demanding (dietary intake recall methods) or provide imprecise results (Dietary Diversity Scores, projections from crop production statistics...). Our newly developed android App CIMI (Calculating Inadequate Micronutrient Intake) combines the advantages of both interview based approaches and provides a detailed quantitative assessment of a person's micronutrient intake based on a food-group based interview which takes significantly less time than conventional 24h dietary intake interviews. In addition, CIMI has a result screen, displaying the percentage of recommended intake (by respondents individual gender/age cluster) for each nutrient right after finishing the interview which makes the software a valuable tool for consultancy work in health extension structures. When connected to the internet, the app synchronizes to a central database where collected data can be viewed in aggregation and/or downloaded for further analysis. Validation studies from 5 countries (Indonesia, Kenya, Tanzania, Ghana and Ethiopia) have shown that results gained with CIMI are as precise as those recorded by regular 24h dietary intake surveys and calculated by Nutri Survey. CIMI is highly flexible, all variables such as food items, food groups, nutrient profiles, local measurement units, vessels etc. are configurable with a single excel file, making the software suitable for the use in highly different environments. We are presenting the software, a pilot study from Ethiopia, possible chances and limitations of the concept.

Nutrition education and healthy diet practices through Participatory Learning and Action as instrument to enhance dietary diversity of women: Key findings of a mid-line study in Madhya Pradesh, India

Sarkar, Archana[1]; Chakrabarty, Hena[2]; Bader, Nadine[1]; Qualitz, Gerrit[1]
[1]GIZ Food and Nutrition Security & Enhanced Resilience project, [2]Ernst & Young

Objectives: As part of BMZ's Special Initiative "One World, No Hunger", GIZ is implementing Global Programme on "Food and Nutrition Security, Enhanced Resilience" in 11 countries including India. To improve the nutrition situation of women in reproductive age (15-49 years) with low socio-economic status and infants (6-23 months) in two districts of Madhya Pradesh, India, a Participatory Learning Action (PLA) cascade approach of nutrition education is applied. It comprises 20 structured sessions delivered by trained frontline workers. So far, 126,000 women attended PLA sessions. Kitchen gardens, water availability and cooking demonstrations were also initiated. A midline assessment was undertaken in mid-2018 to assess the effect of this intervention on nutrition relevant knowledge and practices.
Methods: A mixed methods design comprising quantitative and qualitative survey and observation methods was applied. The study sample (randomised) for mid-line evaluation comprised 600 women and 100 frontline workers in 100 villages of Chhatarpur and Sheopur District, Madhya Pradesh, India.
Results: Almost two thirds (61 %) of women reported that it is important to consume food from ≥ 5 food groups in their daily diets. The knowledge level on the number of food groups in a diversified diet was better in Sheopur (69%) compared to Chhatarpur (54%). 93% of frontline workers reported the importance of ≥ 5 food groups per day by families. Knowledge of early initiation of breastfeeding among women was almost universal with 91%, same for frontline workers (99%). The awareness was much higher among tribal women in Sheopur (94%) despite almost 50% of them have no education. The prevalence of commonly consumed food groups among women were 99% grains, white roots and tubers, followed by 77% pulses and 66% other vegetables. Very few women consumed dark green leafy vegetables (18%) and vitamin A rich fruits and vegetables (13%). The consumption of other fruits was 39%. About 50% of the women consumed milk and milk products, meat, poultry and fish (5%) and eggs (2%) were very low. The kitchen garden initiatives improved knowledge among women, however, it did not contribute to improve dietary diversity scores among women.
Conclusion: Structured and continuous sessions on nutrition education and capacity building of frontline workers improved knowledge of good nutrition practices and dietary diversity among women.

Influence of Socio-demographic Inequalities on Dietary Diversity and Household Food Insecurity: An in-depth Nutrition Baseline Survey conducted in Madhya Pradesh

Sarkar, Archana[1]; Sabharwal, Vandana[2]; Qualitz, Gerrit[1]
[1]GIZ Food and Nutrition Security & Enhanced Resilience project, [2]Delhi University

Objectives: As part of BMZ's Special Initiative "One World, No Hunger", GIZ is implementing Global Programme on "Food and Nutrition Security, Enhanced Resilience" in 11 countries including India. An international Nutrition Baseline Survey (NBS) was conducted to understand the underlying mechanism of socio-demographic factors, behavioural practices and access to services affecting the dietary diversity and food availability among women and infants (6-23 months) in the intervention districts Sheopur and Chhatarpur in Madhya Pradesh, India.
Methods: The NBS was conducted using a structured questionnaire among women of reproductive age (15-49 years). Dietary diversity was assessed using Minimum Acceptable Diet (MAD) scores for children and Individual Dietary Diversity Scores (IDDS) for women whereas data on household food security was collected using household food insecurity experience scale. Chi-square tests have been applied to understand the impact of caste, education and income on IDDS, MAD and household food insecurity status. Multivariate logistic regression analysis has been run to understand the effect of vulnerability factors on dietary diversity.
Results: Overall, only 16.2% of infants had achieved MAD and 19.9% of the women were able to consume the recommended ≥ 5 food groups. Half of the households (50.1%) were categorised as food secure, with 3.9% falling into the severe food insecure category. When disaggregated by caste status, women who belonged to the scheduled tribes (marginalised group) had a significantly lower value for the IDDS compared to women belonging to the general category (29.5% vs. 9%; χ^2=20.294; p<0.001). Households having a stable income source were more food secure than those having a marginally stable source. Women who received nutrition counselling were more likely to have higher IDDS irrespective of factors such as religion, caste, income and education level (OR=1.679; p=0.007). Infants are more likely to receive adequate food if their mothers have received nutrition counselling (OR=1.5; p=0.04), know how to enhance porridge (OR=1.323; p=0.001) and have been made aware about hygiene practices (OR=1.8; p=0.002).
Conclusion: The study indicated that women and infants in the study area faced burden of malnutrition due to belonging to lower socio-economic and demographic conditions with lower access to information and services. Hence, nutrition education activities need to be scaled up and address demographic factors especially.

Nutrition Labelling for Foods

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Nutrition labeling policies can encompass nutrient declaration, supplementary nutrition information used on the principal display panel (PDP), and nutrition-related claims. The objective of this presentation is to identify principles for development of nutrition labeling that address public health priorities and important factors to consider in implementing a nutrition labeling approach.

Nutrition labeling is a tool for educating consumers about food choice that can enable consumers to judge whether a product is high or low in a particular nutrient, allows product comparison at the point of purchase, and increases the likelihood that nutrition information is used in purchasing decisions. In addition, effective nutrition labeling can provide an incentive to reformulate products to be more healthful and can be used to reinforce public health priorities.

To determine which nutrients are most useful in a labeling program, some knowledge of public health issues and priorities is necessary. For example, as prevalence of noncommunicable diseases (NCDs) has increased in populations, providing information on nutrients to limit such as saturated fatty acids, trans fatty acids, and sodium as well as the primary sources of energy, such as carbohydrates, including sugars, and total fats, might by prioritized. Nutrition labeling can also highlight nutrients whose intake should be encouraged because of the prevalence of inadequate intake in the population. Understanding of nutrients to encourage requires knowledge of food and nutrient intakes within a population. Although nutrients to limit that are associated with NCDs are likely to be common among various populations, nutrients to encourage are more likely to vary according to dietary patterns.

The traditional approach to nutrition labeling has required that information be provided in a tabular format on the information panel of the food package. Many countries currently mandate such information on most packaged foods and may also specify the format for display of the information. However, many countries consider nutrition labeling voluntary unless a nutrition-related claim is made. While this voluntary approach to nutrition labeling is consistent with *Codex Alimentarius* guidelines, newer guidance from Codex has encouraged countries to mandate information and set standards for legibility of the information. More recent labeling initiatives have proposed using the PDP to provide supplemental nutrition information. Typically referred to as front of pack labeling (FOPL), it aims to make nutrition information more prominent and concise, encourage the purchase of healthier choices, provide a quicker reference point, balance nutrition and health claims, and improve the ability of individuals with low literacy to make better choices. Use of FOPL is typically associated with public health efforts to reduce risk of NCDs and a variety of approaches have been developed and studied for consumer understanding and effectiveness.

Unlocking the hidden hunger crises: the power of public-private partnership

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Micronutrient deficiencies affect about two billion people worldwide. While their signs are not always visible, their consequences for health, productivity and cognitive development are lethal and long-lasting. By committing to the Agenda 2030, the world has committed to eradicating all forms of malnutrition by 2030. However, the pace of progress is slow, and the current trends indicate that we are off-track to reach the nutrition targets set out in the Sustainable Development Goal (SDG). If we don't tackle hidden hunger, we will fail to achieve the Agenda 2030. No single sector– neither public, nor private – will be able to solve this problem alone. Public-private partnerships are vital to scale up the implementation, integration, coverage and quality of proven, cost-effective micronutrient interventions. Governments and private sector play a key role within the food systems to ensure that healthy diets are available, affordable and acceptable to all.

This intervention will provide examples of how private-public sectors collaborate towards the elimination of hidden hunger. They do it for example by injecting nutritional inputs along the food supply chain (the Vitamino Micro-Nutrient powder in Sudan/Rice fortification in Bangladesh and in India); by improving the external food environments and impacting consumers' conducts (Good Food Logo in Zambia/ Obaasima Seal in Ghana); by mobilizing business to invest and innovate in responsible and sustainable actions and operations (SUN Business Network). Solving hidden hunger will not be simple. But possible. To adequately address it a comprehensive approach is needed; both the public and private sectors own part of the solutions and should collaborate joining the same "nutrition" table.

Nutrition and Health Communication Education Programme and For Accurate Science Project of Sabri Ülker Foundation: Implementations from Turkey

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In the last decades, interest for food and health issues has not ceased to increase globally. Consumers typically obtain information on issues related to food, nutrition and health via a wide variety of media channels including TV, radio, newspapers, internet and social media. Those media play thus a critical role in how people receive messages and has the potential to affect their views and food choices. Unfortunately, the messages that reach consumers through the different channels can be conflicting, inaccurate or confusing.

"For Accurate Science Platform" of Sabri Ülker Food Research Foundation as a worldwide best practice that aims to disseminate the current and reliable information to public about health and nutrition. Sabri Ülker Food Research Foundation is also organizing a two-day education programme named as "Nutrition and Health Education Programme" since 2017 with the aim to educate and provide a better understanding of nutrition science and science communication to the participanats from media and the influencers who are interested in nutrition and health area. This programme is also accredited by Society of Nutrition and Food Science (SNFS) as an international nutrition communication training programme. This year the theme of the programme was "Popular Diets: Health Effects and Effective Communication". Popular diets is one of the biggest hot topic in nutrition communication, read by millions of people, and where the information available is not always fact-based.

A recent meta-analysis by the British Medical Journal on the role of food in weight-management found that no particular dietary method has been shown to achieve superior results in terms of long-term weight maintenance.[1] Furthermore, there is no evidence that any single food can increase or decrease our risk of weight gain and obesity, our overall diet and level of physical activity are the main factors in determining weight loss or weight gain! So, the evidence is clear, there is no miracoulous diet for weight loss, nor are there particular foods that can manage weight on their own. Many popular diets limit food groups and/or nutrients to reach results faster. However, these limitations might cause vitamin and mineral deficiencies and lead to Hidden Hunger in short and long term. Thus, inaccurate and non-scientific news about popular diets can affect worldwide burden of Hidden Hunger negatively.

Nutrition and Health Communication Programme focused on the health effects of some popular diets, Low Carb, Gluten-Free, Paleo and Mediteranean. It will look at the way those diets are communicated in the media, discuss solutions for better communication and share some best practice.

The role of legume grains in meat-reduced diets (regardless of labels)

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When looking at our current food systems, several main, interlinked challenges arise: 1) changed demographics and population growth; 2) diets that are too rich in fat, refined carbohydrates, salt and animal protein having impacts on health (*e.g.* increased risk of heart disease); 3) monotonous regimes (75% of our food relies on 12 crops and five animals); 4) insufficient food recovery and redistribution, not integrated in circular, resource efficient systems; 5) food production that is surpassing environmental targets, driving climate change and biodiversity loss. In fact, the way the 7.6 billion people on our planet feed today, particularly in developed countries, has been particularly damaging. A change in food behaviour that favours high protein plant food sources that are rich in fibre and resistant starches is needed, and here legume grains may have a major role to play. It is now scientifically clear that legumes have remarkable health benefits. Still, although possessing a valuable nutritional composition, legumes are oftentimes rejected by farmers, consumers, public and private caterers, large retailers, and are subdued in health and environmental policies. In order for legumes to play an actual role in any dietary transition (regardless of flexitarian, demitarian, vegetarian, vegan, or “planetary” labels), a transdisciplinary approach must be created that implements concrete actions at multiple levels. In the shift towards sustainable diets, thinking must be given to the multi-dimensional continuum of food systems, and to breaking down hurdles all along the supply and value chains, including cultural aspects. Here we will focus on our current knowledge on the role that legumes have in traditional and modern diets, for different age groups and in different cultural backgrounds. We also present recent evidence on their health benefits, strategies for increased intake, as well as known barriers in doing so. So, the question is: *have you had your share of beans today (and I don´t mean coffee)?*

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Improving Children Health and Cognition: Evidence from School-Based Nutrition Intervention in India

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We present experimental evidence on the impact of delivering double-fortified salt (DFS), salt fortified with iron and iodine, through the Indian school-feeding program called “mid-day meal” on anemia, cognition, and math and reading outcomes of primary school children. We conducted a field experiment that randomly provided a one-year supply of DFS at a subsidized price to public primary schools in one of the poorest regions of India. The DFS treatment had significantly positive impacts on hemoglobin levels and reduced the prevalence of any form of anemia by 20 percent but these health gains did not translate into statistically significant impacts on cognition and test scores. While exploring the heterogeneity in effects, we find that treatment had statistically significant gains in anemia and test scores among children with higher treatment compliance. We further estimate that the intervention was very cost effective and can potentially be scaled up rather easily.

JEL Codes: C93, I15, O11.

Keywords: Double-fortified salt, education, anemia, school feeding, India, and randomized controlled trial.

The dual burden of malnutrition and childbirth: stunting, obesity and the risk of cesarean delivery

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Despite substantial medical progress, complications of childbirth remain a major source of maternal ill-health worldwide. In particular, obstructed labour accounts for 12% of global maternal mortality, and imposes a huge burden of maternal morbidity, in particular through debilitating birth injuries. A much-cited evolutionary hypothesis from the 1960s attributed human birth complications to an 'obstetric dilemma', proposed to result from antagonistic selective pressures acting on maternal pelvic dimensions and fetal brain growth during hominin evolution. In individual women, the 'obstetrical dilemma' refers to the tight fit between maternal pelvic dimensions and neonatal size at delivery. Contemporary populations, however, manifest substantial variability in the incidence of cephalo-pelvic disproportion, obstructed labour and cesarean section. Such variability is very poorly understood, making it difficult to know, for example, whether cesarean sections are inadequately available in a given population, or used excessively relative to medical need. A little-explored issue is whether variability in childbirth complications relates to secular changes in maternal phenotype, driven by ecological trends such as the global nutrition transition. In many populations, high levels of child stunting contribute to a high frequency of short stature in adult women, while maternal overweight and obesity are also becoming more common in every global region. The combination of short maternal stature and maternal overweight/obesity may substantially increase the risk of cesarean delivery. Using data from two large Indian health surveys from 2005-6 and 2015-2016, we tested associations of maternal somatic phenotype (short stature, overweight) with the risk of cesarean delivery, adjusting for confounding factors such as maternal age, birth order, rural/urban location, wealth and offspring sex. Secular trends in maternal body mass index between surveys were greater than trends in height. Maternal short stature and overweight both increased the risk of cesarean delivery, most strongly when jointly present within individual women. Maternal diabetes also increased the risk of caesarean delivery. These associations were independent of birth order, wealth, maternal age and rural/urban location. Secular increases in maternal phenotype over 10 years explained 18% of the secular increase in cesarean rate. Similar associations were found in a range of other low-/middle-income countries. Collectively, these results highlight how the emerging dual burden of malnutrition is likely to impact childbirth in low and middle-income countries. Such nutritional influences are furthermore sensitive to social values relating to issues such as gender inequality and age at marriage. Efforts to resolve the global burden of maternal mortality and morbidity should address the dual burden of malnutrition. Increased understanding of the linkages described here may help identify new opportunities for preventing unnecessary cesarean deliveries, and may lead to greater appreciation of the full health burden associated with the dual burden of malnutrition in women.

Identifying opportunities to increase supply and demand for nutritious foods – the Fill the Nutrient Gap assessment of the food system

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The Fill the Nutrient Gap (FNG) situation analysis for decision making identifies context-specific barriers and entry points for food, health and social protection systems to improve nutrition through increasing availability, access, affordability and choice of healthy, safe, nutritious foods. It is applied across the spectrum of malnutrition, including undernutrition, micronutrient deficiencies and overweight/obesity, and is designed to contribute to national policy formulation and revision, in particular of nutrition and social protection, and to programme planning cycles.

The analysis consists of two components: review and analysis of secondary sources of information on access to and availability of nutritious foods, and Cost of the Diet analyses and modeling to assess affordability of a nutritious diet and possible improvements thereof. In different country contexts, models might include improved access to fresh nutritious foods or fortified foods, but also decreased consumption of unhealthy snack foods. These results are combined with findings from the literature review, which may highlight barriers stemming from poor market access or agricultural production that is not sufficiently diverse.

Throughout the analytical process, stakeholders are engaged from multiple sectors across the food system, such as health, agriculture, food processing, and different actors in marketing, retail, and social and behavior change communication. Based on the FNG results, they identify nutrition-specific and nutrition-sensitive interventions to overcome barriers to good nutrition. Stakeholders then formulate recommendations around opportunities to improve nutrient intake, including stimulating supply of and demand for nutritious foods, tied to specific FNG findings and national entry points.

Micronutrient Deficiencies: A Singular Burden in a Double-burdened World

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Micronutrient deficiencies (MNDs) exist as a public health problem where diets are chronically inadequate in diversity, nutrient density or total intake of nutritious foods. The number and severity of coexisting MNDs and health consequences can vary by region, season and life stage, although virtually no country has adequately profiled its full extent and severity of MNDs nationally in life stages of childhood, or the reproductive and geriatric years. Notwithstanding, where examined, inadequate intakes and status continue to be documented in undernourished (and low income) regions, meriting sustained and assertive attention to prevention policies. Also, while data remain inadequate, low micronutrient intakes and deficiencies are likely to persist in countries facing a "double burden" of undernourishment and obesity, as populations transition to diets higher in fat, sugar and processed foods but lacking diversity and nutrient density. While some countries are making progress with food fortification, crop biofortification and limited supplement use, risks of multiple MNDs are likely to remain a major public health concern for most low-middle income countries. There remains an urgent need for more comprehensive, validated, less expensive methods with which to fully assess hidden hunger and guide safe, effective evidence-based MND prevention, possible through an increasing number of intervention options, in low-middle income countries. Supported by the Bill & Melinda Gates Foundation, USAID and the Sight and Life Global Nutrition Research Institute.

Unravelling the Food-Health Nexus to build healthier food systems *

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While food systems have many positive impacts, they have increasingly affected health through multiple channels and interconnected pathways.
IPES-Food in collaboration with the Global Alliance for the Future of Food undertook a review of the scientific evidence covering a whole range of global health impacts associated with food systems. The review examined how food and farming systems affect human health, explored why the negative impacts are systematically reproduced and why we fail to prioritize them politically, and how we build healthier food systems for all.
The health impacts of food systems were grouped into five categories to include occupational hazards; environmental contamination; contaminated, unsafe, and altered foods; unhealthy dietary patterns and food insecurity. The costs associated with these impacts were also estimated. The prevailing power systems and imperatives in the food system and how they help to shape our understanding of the impacts they generate were examined.
The findings clearly show that food systems affect health through multiple, interconnected pathways, generating severe human and economic costs. However, the full picture is often lost from view, allowing the connections to be obscured and the root causes of poor health to be left unaddressed. Too often the negative health impacts are disconnected 1) from one another, 2) from the food systems practices that systematically generate health risks, and 3) from the underlying environmental and socio-economic conditions for health — conditions that are, in turn, undermined by food systems activities.
A call is made for the urgent need for reforming food and farming systems on grounds of protecting human health. Five co-dependent leverage points for building healthier food systems are recommended: (i) promotion of food systems thinking, (ii)reasserting scientific integrity and research as a public good, (iii)bringing the alternatives to light, (iv) adopting the precautionary principle and (v) building integrated food policies under participatory governance.

*IPES-Food. 2017. Unravelling the Food–Health Nexus: Addressing practices, political economy, and power relations to build healthier food systems. The Global Alliance for the Future of Food and IPES-Food.