



# Healthy Lives from Sustainable Food Systems

25–26 October 2022  
Uppsala Castle, Sweden

Uppsala Health Summit is an international forum for frank dialogue between decision-makers, experts and opinion makers on global health challenges. Each year, invited participants gather to explore how to implement research and innovation for better health globally. The summit is a collaborative effort led by Uppsala University, which includes the Swedish University of Agricultural Sciences, Uppsala Region, the Medical Products Agency, the National Veterinary Institute, the City of Uppsala, and Örebro University.

## CONTENTS

Healthy Lives from Sustainable Food Systems 4

### Workshops

<b>A</b> Food Planning for Sustainable Consumption and Healthier Living	8
<b>B</b> SHIFT Framework for Health Equity in Food Environment Transformations	12
<b>C</b> Sustainable Animal Food Production, in War and Peace	18
<b>D</b> The Diet-Health-Environment Nexus – how to go from knowledge to practice?	22
<b>E</b> Zero Hunger: Is Smallholder Farming the Solution?	26
<b>F</b> Food Safety versus Food Security	32
<b>G</b> Foodscapes for Future – creating local support for sustainable human health	36
<b>H</b> A Global Health Perspective on the Future of Meat	40
<b>I</b> Tackling Antimicrobial Resistance for Sustainable Food Systems – how to address the knowledge, practice and governance gaps	44

**Uppsala Health Summit**  
Governance 50

## Preface

Since 2014, Uppsala Health Summit has brought thought-leaders and practitioners together to strengthen exchange on solutions to global health challenges. The themes have ranged from antibiotic resistance, mental health, and childhood obesity to cancer. With our multi-disciplinary approach, we know that each summit has contributed to new ways of thinking, networks and ideas on how to make positive changes in policy and practice.

This year, this kind of exchange is perhaps more important and urgent than ever. The deepening food and climate crises that the world is seeing today profoundly impact health globally. Our food systems are at the heart of the crisis; how we produce, supply and consume food is the main contributor to climate change and poor global health outcomes.

This calls for urgent science-to-policy dialogue around evidence-based solutions for sustainable food systems supporting healthy lives. And given the complexity of the problem, collaboration across sectors is the only way forward.

Our summit, Healthy Lives from Sustainable Food Systems, is following on the heels of the UN Food Systems Summit last autumn. As countries are now working out how to make the necessary local transitions in the follow-up, our summit will be a chance to discuss the “how”. How, across the many different drivers, stakeholders and local conditions, can we promote and support health within our planetary boundaries while also ensuring that the transition benefits everyone?

Now we have a real opportunity to apply and share our hard-learned lessons from the Covid 19-pandemic and direct our newly found energy and insights to discuss the urgent next steps for a healthier world.

I welcome you to challenging and rewarding discussions at Uppsala Health Summit 2022.

Anders Hagfeldt  
Chairman of Uppsala Health Summit and  
Vice-Chancellor of Uppsala University

# Healthy Lives from Sustainable Food Systems

Professor Karin Artursson  
Scientific Director, National Veterinary Institute, Sweden,  
Chair of the Uppsala Health Summit Programme Committee

Providing healthy food for everyone is a considerable challenge. To produce food in a sustainable way is even more challenging. Uppsala Health Summit will provide an arena for discussions on how we can practically support efforts to shift food systems toward becoming more sustainable, with a special emphasis on health.

A sustainable food system delivers food security and nutrition for all without compromising the economic, social or environmental foundations for future generations as well.<sup>1</sup> A healthy diet helps to protect against malnutrition in all its forms, as well as against both communicable and non-communicable diseases. The composition of a healthy and sustainable diet varies depending on our individual needs, the cultural context we live in, dietary habits and locally available foods. However, eating at least 400 g of fruit and vegetables daily is part of a healthy adult diet for everyone.<sup>2</sup>

It is estimated that a total of about 3 billion people worldwide do not have access to food that can support healthy diets for reasons such as high cost and poverty.<sup>3</sup>

In 2020, approximately 800 million people faced hunger. More than half of the world's undernourished are found in Asia and more than one-third in Africa. Another form of malnutrition is associated with the consumption of highly processed food, which for many is the cheapest and most available option. This contributes to overweight and diseases such as cardiovascular diseases, diabetes and cancer. The prevalence of adult obesity shows an increasing trend, with 39% of adults being overweight worldwide and 13% obese in 2016.<sup>4</sup>

Unfortunately, the number of malnourished people in the world continues to grow. Conflicts, climate shocks, low productivity and inefficient food supply chains push up the cost of nutritious foods and increase the unaffordability of healthy diets. The COVID-19 pandemic has shown the vulnerability of our food systems and the need for a functional society to produce and distribute food. Economic slowdowns and downturns result in a non-functional market characterized by a lack of many products. The ongoing crisis in Ukraine further highlights the logistic challenges for transporting food from the place where it is produced to consumers. In the event of a serious food shortage, people may be forced to include whatever is available in their diet, including food of poor quality.

We are moving further away from our target, which is to ensure access to safe, nutritious and sufficient food for all people and to eradicate all forms of malnutrition, as stated in the Sustainable Development Goals. Hence, there is an urgent need for decision-makers to support a transformation towards more sustainable food production.

Yet, despite the many challenges, there is hope. Using a wide array of instruments, from legislation to policy, from technology to capacity building, we can transform our food systems to support both our health and the planet. Knowing that we can make a difference is an important start. In the report "The state of Food Security and nutrition in the world 2021" from the Food and Agricultural Organization of the United Nations (FAO), it is argued that health and climate change costs can be reduced by shifting to healthy diets, including sustainability considerations because

many hidden costs connected to unhealthy diets are lowered when consumers choose healthier food.<sup>5</sup>

At the 2022 Uppsala Health Summit, solutions for more sustainable food production that can produce healthy, affordable and accessible foods for everyone will be presented and discussed. The outputs will be guidance and roadmaps to support such initiatives. The focus areas of the workshops and plenary sessions are presented below, from farm to fork!

## Sustainable animal production

Food of animal origin is a major source of protein for the world's population. Many farm animals graze on land that cannot be cultivated. This contributes to high biodiversity and to keeping landscapes open. Only grazing animals can keep natural pastures alive. However, 15-20 per cent of the global greenhouse gas emissions are estimated to be attributable to the livestock sector.<sup>5</sup> Thus, the agricultural sector must work together with researchers to find the best ways of raising and keeping animals in different settings, which differ a great deal depending on, for example, the farmland, climate, culture and political conditions.

The benefits of smallholder farming systems versus large-scale production have been debated because finding solutions that also help to lower carbon footprints is crucial to a sustainable future. When transforming food systems, different aspects must be taken into consideration, including the socioeconomic factors of the farmer, the robustness of the production systems, the adaptability to climate change, biodiversity, etc. Improved resilience will contribute to maintaining the food production in situations like draught, armed conflicts and other unwanted events affecting the production and supply chains.

Overuse or misuse of antibiotics in animal husbandry contributes to the development of antimicrobial resistance, which poses a huge threat to human health. The consumption of antibiotics in animals is nearly triple that in humans.<sup>6</sup> In livestock production, antibiotics are largely used as growth promoters or to prevent disease. The use of antibiotics as a growth promoter was banned in Sweden as early as 1986.<sup>7</sup> This was followed by a ban in the EU in 2006.<sup>8</sup> However, antibiotic use as a growth promoter

is still allowed in large parts of the world. With antibiotics in animal production, animals can be raised even under poor hygienic conditions that compromise animal welfare. There is a need to raise animals and produce animal products with a minimum use of antibiotics and with relevant measures to control infections. There is a great deal to be learned from countries that have succeeded in decreasing their use of antibiotics in livestock while still maintaining high production levels.

## Effects on health

In situations where food is scarce, there might be a conflict between food security and food safety. People eat what is available, regardless of whether the food poses a health risk. Contaminants such as pesticide residues, mycotoxins or microbiological contamination may constitute a risk to human health. Many of these risks are dose-dependent and may not be a problem in the short run. What risks are we willing to accept to feed everyone? As an example, the EU has regulations regarding limits for allowed concentrations for different contaminants. This means that crops exceeding these limits cannot be exported to EU, but the crop might instead end up as food or feed consumed in other markets. There are conflicting interests between food security and food safety inherent in the Sustainable Development Goal number two "Zero hunger" and number three "Good health and wellbeing." Political and ethical dimensions of this dilemma will be an important issue to discuss and deal with in creating a sustainable food system.

Attention should also be paid to the ongoing debate about whether or not we should eat meat. There are many arguments for decreasing meat consumption, especially red meat. The EU Farm to Fork strategy states that "Moving to a more plant-based diet with less red and processed meat and with more fruits and vegetables will reduce not only risks of life-threatening diseases, but also the environmental impact of the food system."<sup>9</sup> On the other hand, meat is a very protein-rich source of food, provides many nutrients and is pivotal for a large part of the world's population. The livelihood of more than one billion people is dependent on livestock production.<sup>10</sup> However, the consumption of especially red meat will need to be reduced in the transition towards a more sustainable food system. Ongoing research provides an arsenal of alternatives



to meat. Among these are plant-based diets, cultured “meat” and insects. Even if the future might not be meatless, meat will certainly be substituted with new products. Still, we have very limited knowledge about the health effects of these different options.

### Consumer behavior

Dietary patterns have a great impact on both people’s health and the environment. There are wide discrepancies between what people choose to eat and recommendations concerning the composition of healthy diets. There are complex interactions between science, policy and behavior that need to be recognized and the factors that influence food choices and behavior must be better understood. To nudge consumers towards healthier choices, information and education are needed. This requires interdisciplinary and collaborative efforts.

With food planning, perspectives on what we eat and how we eat can be integrated into spatial planning and into local, regional, national and global food strategies. The outcomes of food planning include food access and availability as well as green spaces and physical movement. Sustainable Healthy Diets are defined by the World Health Organization (WHO) and FAO as “Dietary patterns that promote all dimensions of individuals’ health and wellbeing; have low environmental pressure and impact; are accessible, affordable, safe and equitable; and are culturally acceptable.”<sup>11</sup> This definition truly highlights the need for cross-disciplinary efforts to promote diets that are healthy and have low environmental impacts.

Everyone has the right to adequate and nutritious food. This does not only involve having access to affordable food, but also food that can contribute to good health and well-being. But large parts of the human population cannot choose what food they consume. Instead, their food environments determine what they eat. Lack of financial resources may make inexpensive, low-nutrient, energy-dense food more attractive, but such food entails the risk of overweight or obesity and other diet-related diseases. Identifying factors with the greatest relative impact on facilitating change in local contexts is therefore important. How this creates co-benefits for healthy lives and sustainable food systems will be one of the topics at our summit.

The challenges outlined here are great and complex. But we trust that the dialogue at our summit will provide inspiration and stimulate actions that contribute to change towards more sustainable and healthier food systems. We look forward to your contribution, in Uppsala and online!

Karin Artursson



PHOTO: MARIA FLEISCHMANN, WORLD BANK, FLICKR

### References and further reading

1. FAO. 2018. Sustainable Food Systems - Concept and Framework. <https://www.fao.org/3/ca2079en/CA2079EN.pdf> as per 2022 07 26
2. WHO. 2020. Healthy Diet. <https://www.who.int/en/news-room/fact-sheets/detail/healthy-diet> as per 2022 07 26
3. FAO, IFAD, UNICEF, WFP and WHO. 2021. The State of Food Security and Nutrition in the World 2021. Transforming food systems for food security, improved nutrition and affordable healthy diets for all. Rome, FAO. <https://doi.org/10.4060/cb4474en>
4. WHO. 2021. Obesity and overweight. <https://www.who.int/en/news-room/fact-sheets/detail/obesity-and-overweight> as per 2022 07 26
5. Herrero, M. 2016. To reduce greenhouse gases from cows and sheep, we need to look at the big picture <https://theconversation.com/to-reduce-greenhouse-gases-from-cows-and-sheep-we-need-to-look-at-the-big-picture-56509> as per 2022 07 26
6. Sriram, A., Kalanxhi, E., Kapoor, G. et al. 2021. State of the world’s antibiotics 2021: A global analysis of antimicrobial resistance and its drivers. Center for Disease Dynamics, Economics & Policy, Washington DC. <https://cddep.org/wp-content/uploads/2021/02/The-State-of-the-Worlds-Antibiotics-in-2021.pdf> as per 2022 07 27
7. The Public Health Agency of Sweden, the National Veterinary Institute and the Swedish Board of Agriculture. 2020. Swedish work against antibiotic resistance – a one health approach. <https://www.folkhalsomyndigheten.se/the-public-health-agency-of-sweden/communicable-disease-control/antibiotics-and-antimicrobial-resistance/swedish-one-health-work-against-amr/> as per 2022 07 27
8. European Commission. 2005. Ban on antibiotics as growth promoters in animal feed enters into effect. Press release December 22, 2005. [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_05\\_1687](https://ec.europa.eu/commission/presscorner/detail/en/IP_05_1687) as per 220727
9. European Commission, 2020. Farm to Fork Strategy - For a fair, healthy and environmentally-friendly food system. [https://food.ec.europa.eu/system/files/2020-05/f2f\\_action-plan\\_2020\\_strategy-info\\_en.pdf](https://food.ec.europa.eu/system/files/2020-05/f2f_action-plan_2020_strategy-info_en.pdf) as per 2022 07 26
10. Herrero, M., Henderson, B., Havlik, P. et al. Greenhouse gas mitigation potentials in the livestock sector. *Nature Clim Change* 6, 452–461 (2016). <https://doi.org/10.1038/nclimate2925>
11. FAO and WHO. 2019. Sustainable healthy diets – Guiding principles. Rome. <https://www.who.int/publications/i/item/9789241516648> as per 2022 07 26



# Food Planning for Sustainable Consumption and Healthier Living

**Fredrik Fernqvist\***, Senior Lecturer, Department of People and Society/SLU Future Food, Swedish University of Agricultural Sciences

**Håkan Jönsson**, Visiting professor, Swedish University of Agricultural Sciences; Associate professor, Lund University

**Ingrid Sarlöv Herlin**, Professor, Swedish University of Agricultural Sciences

**Annsophie Wahlström**, Manager SLU Future Food, Swedish University of Agricultural Sciences

**Andrew Gallagher**, Project assistant SLU Urban Futures, Swedish University of Agricultural Sciences

\*Corresponding author: fredrik.fernqvist@slu.se

## Introduction

Food systems consist of the entire range of actors involved in food value chain, from farm to fork, and their activities. A sustainable food system “delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generation are not compromised” (FAO, 2018, p. 1). However, current food systems are broken, in that the food supply chain, the food environment and citizen behaviour lead to undesirable food systems outputs and poor health outcomes, such as obesity, nutrient deficiencies, food waste, cardiovascular diseases and other negative outcomes (WHO, 2021). This includes issues such as citizens’ insufficient knowledge about food (food literacy) and sedentary behaviours.

Whereas food availability, access, and utilization, from a health perspective, are central outcomes of the food system (Ericksen, 2008), other externalities regard, for example, negative climate impact, biodiversity and habitat losses, environmental degradation, the loss of rural communities and decreasing farmer incomes. Recent crises also have shed light on issues such as food system resilience, food provision and sufficiency.

Information and education are commonly suggested as a way to push consumers in a healthier direction (e.g., European commission, 2020), but the toolbox for facilitating healthier eating is diverse. A holistic approach is needed to address the challenges associated with achieving healthier eating and healthier lifestyles. Planning for sustainable food systems requires interdisciplinary and collaborative approaches.



PHOTO: INGRID SARLÖV HERLIN, SWEDISH UNIVERSITY OF AGRICULTURAL SCIENCES

## Food planning for sustainable foodscapes

An emerging field of research and application relates to Food Planning – the integration of food perspectives into spatial planning and into local, regional, national and global food strategies. This can facilitate the transition into more sustainable food landscapes (foodscapes) (Egberg Mikkelsen, 2011). The term foodscapes is used in subjects such as geography, studies of urban agriculture (e.g., Salmon, 2012), planning and urban studies, social sciences and public health. The term reminds us that both food and landscape are socio-cultural artefacts, grounded in nature and the environment, but essentially human developments (Fairclough & Sarlöv Herlin, forthcoming). Foodscapes refers to the shape of the world in which people dwell and to relationships between food and the environment, the spatial relationships that underpin geographies of food, the relationships between people and landscape that create or affect identification, belonging and wellbeing, and the relationship between places of production and places to eat (Roe et al., 2016).

Tentatively, the central parts of food planning consist of: 1) Food strategies, 2) Spatial planning, and 3) Implementation in practice (Figure 1). Food strategies and spatial planning direct activities of implementation. The interrelation between food strategies and spatial planning is indicated, as they preferably should not be made independent of each other. The right box shows different food system outcomes as a consequence, and how these outcomes in turn influence food planning in an iterative process.

## Food strategies, from local to global

During the past decade, the development of several public strategic documents have shown that food and health are a priority in public agendas. Food strategies point out the direction of food-related policies at different governance levels, such as the municipal (local), regional, national, or even international level, and eventually may be the basis to develop action plans. Morgan (2009) points out a number of local food strategies with different objectives, such as mak-

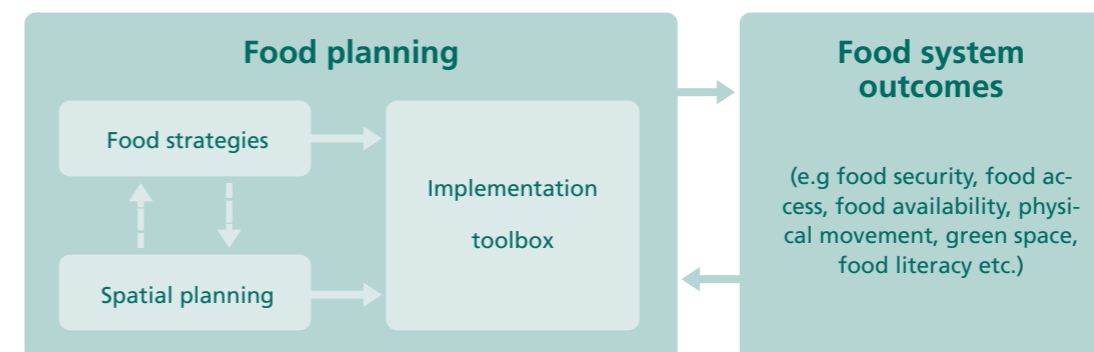


FIGURE 1. CONCEPTUALIZING FOOD PLANNING (OWN ELABORATION)



ing healthy food accessible for economic disadvantaged groups, promote social justice and improving food security. The Swedish national food strategy (*Regeringen, 2016/17:104*) is a national example, showing an ambition to improve people's health and food habits as well as recognizing the importance of rural landscapes. The EU farm-to-fork strategy is another document guiding policy implementation (*European Commission, 2020*). At the regional and municipal levels, food strategies are being developed, e.g., in the *Region of Skåne (2017)* in southern Sweden and in a pilot study on a local food strategy in the City of Malmö (*Food Malmö, 2020*).

### Spatial planning - Food planning in space

The architect *Carolyn Steel (2009; 2020)* argues that, by using food as a lens, we can interpret human civilizations as various forms of 'sitopia': food-places whose diverse characteristics share a common thread. During the development of industrialized society, pioneers of planning have embraced the problems of food systems. Initiatives for improved living conditions and health were implemented during the period of industrialization, including the 'own-your-own-home movement' in Sweden for food growing, school gardens and food education.

More recently, municipalities have made progress in building bridges between food and spatial planning. Spatial planning focuses on place-specific qualities and social, cultural, physical assets in an area or region. It aims to organize land uses and the linkages between them, to balance demands for development with the need to protect the environment, and to achieve social and economic objectives.

Land use planning and associated responsibilities are governed by local municipalities. Food policies set at a regional, national and international level are interpreted and applied locally (*Wingård, 2021*). The planning of a foodscapes challenges all sectorial compartmentalisation on different governing levels (*ibid.*). Spatial planning has a major impact on human health, including the distribution of food (*Hagstam, 2022*). 'Food deserts' are examples of this, as socio-economically vulnerable areas where the inhabitants have a relative lack of access to nutritious, affordable food. The concept of food deserts is debated, but has been illustrated using examples from the US (*Beaulac et al., 2009 in Hagstam,*

*2022*) and the UK (*Wrigley, 2002*). In Sweden, *Amcoff (2017)* identified several geographical concentrations of disadvantaged people with longer than average distances to the nearest food shop.

Food strategies and spatial planning show the desired direction of societal development. The need for basic nutrition and food safety is often at the core of food planning directed to the Global South, while obesity and environmental issues are more prevalent in the Global North. Food strategies and food planning are iterative processes that change over time and with the needs and diets of citizens, advancements in technology, and government policy. Engaged food citizens are shaping local food systems on the ground (*Richardson & Fernqvist, 2022*), which could serve as a source of inspiration and learning that contributes relevant knowledge to urban food planning.

### Implementation – a broad spectrum of alternatives

Implementation occurs at all governance levels, including in the private, common, and corporate spheres. The implementation could furthermore be plans, collaborative arrangements, citizen engagement, landscapes for physical activities or for making food visible in the landscape. For example, *Perrin (2013)* described different practices of farmland conservation and land-planning, and the relation to community food strategies. This involved protection of valuable farmland and activities to promote local products and build new forms of collaborative arrangements. New methods of collaboration between actors are a key feature of the food-planning toolbox, such as the creation of local food councils (*Stierand, 2016; Food Malmö, 2020*), facilitating local trade (*Machell & Caraher, 2016; Smith, 2016*) or through a revival of smaller co-operatives (*Caraher & Machell, 2016*). The increased interest in urban agriculture has been highlighted (e.g., *van der Schans & Wiswerke, 2016*). The evolving field of practices is further described in *Viljoen and Wiskerke (2016)*. There are also hands-on guidebooks on the planning of agriculture and food systems, for example *Freedgood and Fydenkevez (2013)*. It includes both an overview of an iterative planning process, and a toolbox with various practices ranging from natural conservation efforts to develop local communities, production practices, markets and infrastructure. Other practices may regard plans for procurement, in-

troducing activities for increased food literacy in schools and education, and involvement of food industry and retail to promote healthier products and develop local food environments.

### Aim of the workshop - Mapping the toolbox for the next generation of food planners

Food planning is an area in which different actors elaborate on and explore methods intended to facilitate healthier lifestyles and sustainable landscapes. The aim of this workshop is to fur-

ther explore how different tools in the planning toolbox can promote increased food awareness, healthier food consumption and physical activity. We will meet with researchers and practitioners from different foodscape levels, exemplifying the need for and potential of food planning and discussing how different applications can be implemented in practice and what is needed for these processes.

### References/ Suggested reading

- Amcoff, J. 2017 Food deserts in Sweden? Access to food retail in 1998 and 2008, *Geografiska Annaler: Series B, Human Geography*, 99:1, 94-105,
- Beaulac, J., Kristjansson, E., & Cummins, S. 2009. A systematic review of food deserts, 1966-2007. *Preventing chronic disease*, 6(3), A105.
- Caraher, M. & Machell, G. 2016. Defining food co-ops. In: Viljoen & Wiskerke (eds.). *Sustainable food planning: evolving theory and practice*. Wageningen Academic Publishers, p. 223-232.
- Egberg Mikkelsen, B. 2011. Images of foodscapes: Introduction to foodscape studies and their application. *Perspectives in Public Health*, 131(5), 209-216.
- Ericksen, P. J. 2008. Conceptualizing food systems for global environmental change research. *Global Environmental Change*, 18(1), 234-245.
- European Commission, 2020. Farm to Fork Strategy – For a fair, healthy and environmentally- friendly food system. COM(2020) 38, 20.5.2020. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0381> (Retrieved 28 April, 2022).
- FAO 2018. Sustainable food systems - Concept and framework. Rome: Food and Agriculture Organization of the United Nations. Available at: <https://www.fao.org/3/ca2079en/CA2079EN.pdf> (Retrieved 28 April, 2022).
- Fairclough G. & Sarlöv Herlin I. (In press). Strong or weak links in the food chain – Heritage and Landscape. *Routledge Handbook of Heritage & Ethics, Part 6. Heritage Ethics and Management*.
- Food Malmö 2020. Handboken om collective action – mot en inkluderande lokal matstrategi i malmö. Available at: <https://foodmalmö.files.wordpress.com/2020/02/handbokenomcollectiveaction.pdf> (retrieved 28 April, 2022)
- Freedgood, J. & Fydenkevez, J. 2013. Growing Local - A Community Guide to Planning for Agriculture and Food Systems. American Farmland Trust, and Growing Food Connections. Available at: [http://growingfoodconnections.org/wp-content/uploads/sites/3/2013/06/AFT\\_GFC\\_Community-Guide\\_lo\\_res\\_04-2017.pdf](http://growingfoodconnections.org/wp-content/uploads/sites/3/2013/06/AFT_GFC_Community-Guide_lo_res_04-2017.pdf) (Retrieved 28 April, 2022).
- Hagstam, M. (2022) Kommunal främjande av lokal livsmedelsproduktion ur ett norrbottniskt perspektiv – fallet Piteå kommun. Självständigt arbete • 30 hp. Sveriges lantbruksuniversitet, SLU.
- Machell, G. & Caraher, M. 2012. The role of municipal markets in urban food strategies: a case study. In: Viljoen & Wiskerke (eds.). *Sustainable food planning: evolving theory and practice*. Wageningen Academic Publishers, p. 127-136.
- Morgan, K. 2009. Feeding the City: The Challenge of Urban Food Planning.
- International Planning Studies, 14(4), 341-348 Perrin, C. 2013. Regulation of Farmland Conversion on the Urban Fringe: From Land-Use Planning to Food Strategies. *Insight into Two Case Studies in Provence and Tuscany. International Planning Studies*, 18(1), 21-36.
- Regeringen 2018. Regeringens proposition 2016/17:104. En livsmedelsstrategi för Sverige – fler jobb och hållbar tillväxt i hela landet. Available at: <https://www.regeringen.se/490897/contentassets/256cc25ab5a84db7a76730abb9cc3773/en-livsmedelsstrategi-for-sverige-fler-jobb-och-hallbar-tillvaxt-i-hela-landet-prop-2016-17-104.pdf> (Retrieved 28 April, 2022).
- Region Skåne 2017. Den skånska livsmedelsstrategin. Available at: <https://utveckling.skane.se/publikationer/strategier-och-planer/skanes-livsmedelsstrategi-2030/> (Retrieved 28 April, 2022).
- Richardson, L. & Fernqvist, F. In press. Transforming the Food System through Sustainable Gastronomy - How Chefs Engage with Food Democracy. *Journal of Hunger & Environmental Nutrition*.
- Roe, M., Sarlov-Herlin, I. & Speak, S. 2016. Identity, food and landscape character in the urban context. *Landscape Research*, 41(7), 757-772.
- Salmón, E. 2012. Eating the landscape: American Indian stories of food, identity and resilience. Tucson: University of Arizona Press.
- Steel, C. 2009. Hungry city: How food shapes our lives. London, UK: Vintage.
- Steel, C. 2020. Sitopia. How Food Can Save the World. Chatto & Windus, UK.
- Stierand, P. 2016. Food Policy Councils: recovering the local level in food policy. In: Viljoen & Wiskerke (eds.). *Sustainable food planning: evolving theory and practice*. Wageningen Academic Publishers, p. 67-78.
- Van der Schans, J.W. & Wiskerke, J.S.C. 2016. Urban agriculture in developed economies. In: Viljoen & Wiskerke (eds.). *Sustainable food planning: evolving theory and practice*. Wageningen Academic Publishers, p. 243-258.
- Viljoen, A. & Wiskerke, J.S.C. 2016. Sustainable food planning: evolving theory and practice (e-book). Wageningen Academic Publishers.
- Wingård, K. 2021. Matlandskap: om kommuners fysiska planering för hållbara livsmedelssystem. Avancerad nivå, A2E. Alnarp: SLU, Institutionen för landskapsarkitektur, planering och förvaltning.
- WHO 2021. Executive summary – Food systems delivering better health. World Health Organization, Geneva. Available at: <https://www.who.int/publications/i/item/9789240031814>
- Wrigley, N. 2002. 'Food Deserts' in British Cities: Policy Context and Research Priorities. *Urban Studies*, 11, 2029-2040.

# SHIFT Framework for Health Equity in Food Environment Transformations

**Meena Daivadanam\***, Associate Professor and Senior Researcher, Uppsala University  
**Mathilde Sengoelge**, Associate Professor, Karolinska Institutet

\*Corresponding author: meena.daivadanam@kbh.uu.se

## Healthy food, good health for all

The global population is struggling with malnutrition in unprecedented ways. Co-existing problems of underweight, overweight and micro-nutrient deficiencies are interacting with climate-change, conflicts and other human and planetary factors that challenge health. A transformative change of our food environment is urgently needed to improve human and planetary health and well-being and to meet the Sustainable Development Goals (SDGs)<sup>1-3</sup>. In particular, the SDGs directly related to nutrition include zero hunger (SDG2), good health and well-being (SDG3), gender equality (SDG5), planetary health and the revitalisation of the global partnership for sustainable development (SDG4, SDG17)<sup>4</sup>. Food environments are of vital importance to achieve these SDGs. This brief aims to assist technical staff, such as programme developers and managers, working on reaching the SDG goals. Food environment refers to “the interface that mediates people’s food acquisition and consumption within the wider food system. It encompasses external dimensions such as the availability, prices, vendor and product properties, and promotional information; and personal dimensions such as the accessibility, affordability, convenience and desirability of food sources and products.”<sup>5</sup>

Currently, 1 in 9 people – 820 million world-wide – are hungry or undernourished<sup>6</sup>, and simultaneously, one-third of the world’s adult population is overweight or obese<sup>7</sup>. In addition, there exists an unequal burden in terms of disease incidence, morbidity, mortality, survival, and quality of life between subgroups related to the food environment. Persons at risk are those with diets that are high in unhealthy fats, low in fruit, vegetables, and whole grains, and high in salt. Combining nutritional adequacy with planetary health has been on the global health agenda for some time now, as emphasized by the EAT-Lancet Commission on Food, Planet and Health. However, whether such a planet healthy diet, “the universal healthy reference diet” is affordable<sup>8</sup> for the poorest across the globe or whether it is even nutritionally adequate<sup>9</sup>, especially with respect to animal-source foods for the under-nourished populations are some of the controversial questions that have been considered in this framework. These issues call for equity-focused action with respect to diets and food environments to ensure that the needs of the most vulnerable are explicitly considered.

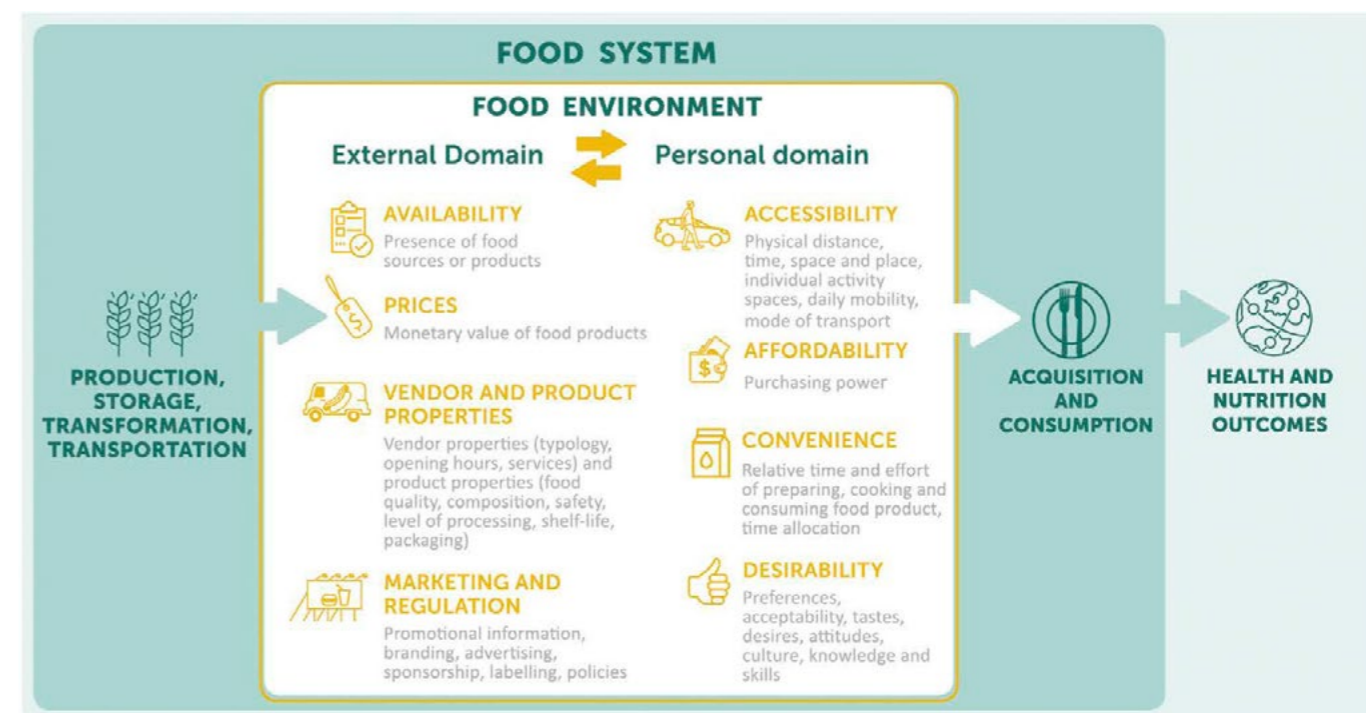


FIGURE 1. CONCEPTUAL FRAMEWORK OF THE FOOD ENVIRONMENT BY THE AGRICULTURE, NUTRITION AND HEALTH ACADEMY FOOD ENVIRONMENT WORKING GROUP.

Food environments are intricately related to the health and economic development of countries<sup>10</sup>. Investing in interventions to improve food environments for human health can therefore yield co-benefits for sustainable development<sup>11</sup>; for example, providing free, healthy lunches to school children may support their educational performance, which in turn leads to better future employment opportunities and a stronger workforce. Transforming local food environments with such actions contributes to the food system transformation needed for improved planetary (e.g. climate change and pollution) and human health globally. A key success factor in this transformation is identifying the agents and factors with the greatest relative impact on facilitating change, premised on sustainable and equitable practices in local contexts<sup>12</sup>.

## Questions to be addressed in this workshop

In this workshop, the SHIFT framework\* will be introduced and discussed with the help of a case example. The SHIFT framework assists technical staff through a four-step process and a compendium of good practices to develop context-relevant and equity-focused food environment transformation strategies. This tool developed by an international team of researchers comes in the form of an interactive pdf and an interactive website to guide users through the process.

## Why is food environment transformation an equity issue?

The food that people consume, particularly amongst the most vulnerable, is primarily determined by their food environments and not by ‘choice’<sup>13</sup>. Food environments have different impacts on the health of populations, both positive and negative. Some groups are more exposed to unhealthy food environments than others. A lack of financial resources for example, decreases access to fresh fruit and vegetables. Therefore, inexpensive, low-nutrient, energy-dense food may be perceived as more attractive, placing low-income groups at a higher risk of diet-related diseases.

The right to equitable health and nutrition is based on a human rights framework that recognizes that each person has the right to adequate and nutritious food. This involves access to the resources necessary to produce, earn and purchase food, not only to prevent hunger, but also to ensure good health and well-being. Food security policies and programmes require major paradigm shifts to elevate agency and sustainability as essential dimensions of food for all, together with availability, access, utilization and stability<sup>14</sup>.

Health equity is the notion that all people should have a fair opportunity to attain their full health potential, and that no one should be prevented from achieving this potential. Differences in

\*THIS IS AN EXCERPT FROM THE SHIFT FRAMEWORK. TO SEE THE COMPLETE FRAMEWORK VISIT [WWW.SHIFTFRAMEWORK.ORG](http://WWW.SHIFTFRAMEWORK.ORG).



health and nutrition status between groups are socially produced, systematic in their unequal distribution, avoidable and unfair. “Policies that promote a radical transformation of food systems need to be empowering, equitable, regenerative, productive, prosperous and must boldly reshape the underlying principles from production to consumption. These include stronger measures to promote equity among food system participants by promoting agency and the right to food, especially for vulnerable and marginalized people.”<sup>15</sup>

Promoting equity is therefore essential to delivering on the SDG promise of ‘leaving no one behind’. Equity in health refers to fair access to resources and opportunities to achieve the best possible physical, emotional, and social well-being<sup>16</sup>. This translates to addressing the needs of vulnerable groups through actions that consider and evaluate equity<sup>17,18</sup>. It also means involving representatives from vulnerable communities in the decision-making process to improve their food environments for better health and nutrition for all.

#### SHIFT Framework

The SHIFT Framework was developed by an international team of researchers committed to assisting technical staff such as programme

developers and managers to improve health and nutrition equity. The Framework seeks to mobilize high level commitment and promote coordinated multi-stakeholder processes throughout, including the review of progress and sharing of lessons learnt. This process complements existing initiatives and actions addressing malnutrition and diet-related noncommunicable diseases such as the WHO Global Noncommunicable Diseases Action Plan, Double Duty Actions, Global Nutrition Reports and the Healthy Food Index. The SHIFT Framework consists of four steps: Step 1 is to Map, Step 2 is to Engage, Step 3 is to Transform, and Step 4 is to Monitor. For each step there is a yes or no question for making the decision as to what action to take and/or the next step to follow to move forward in the process. The user can start and end at any of the four steps, depending on what step is most appropriate for the specific setting. The Framework is based on a Theory of Change (ToC) focusing on the intersection between the food environment and human behaviour using an equity focus. The SHIFT ToC consists of a series of interconnected and interrelated steps that are grouped into three phases. Equity is the main focus, and it can be approached through targeting settings such as schools, workplaces or community hubs, or through targeting specific vulnerable groups for transformative action.

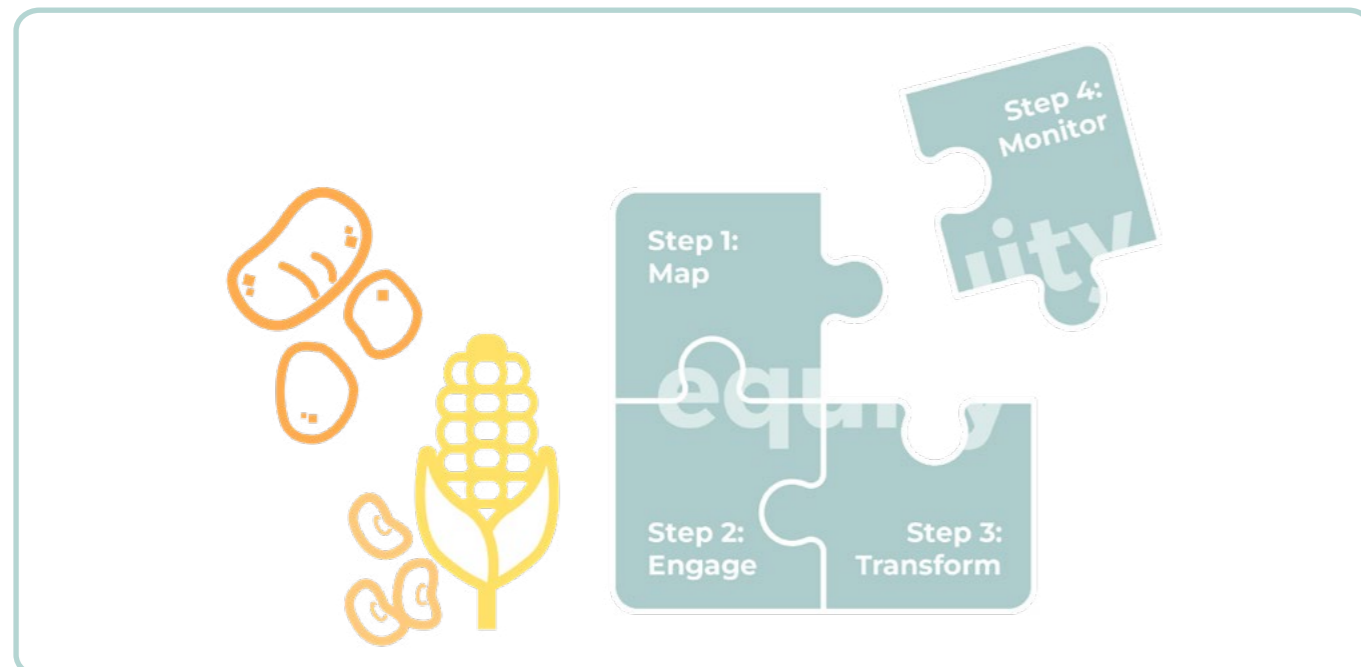
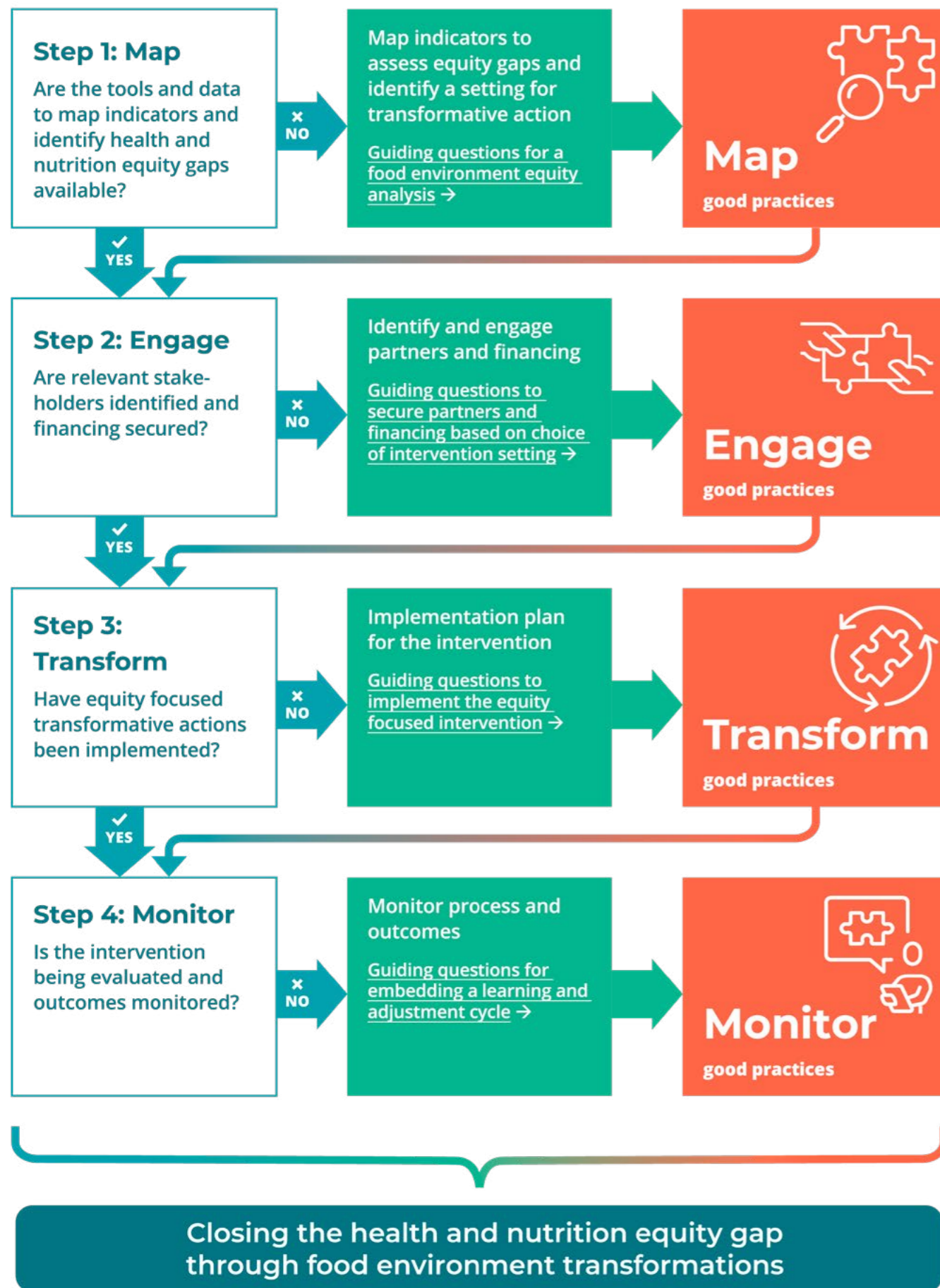


FIGURE 2. SHIFT FRAMEWORK STEPS AND GOOD PRACTICES TO IDENTIFY AND TRANSFORM LOCAL FOOD ENVIRONMENTS FOR EQUITABLE HEALTH AND NUTRITION



\* Food environment: physical, economic, political and socio-cultural context in which consumers engage with the food system to make their decisions about acquiring, preparing and consuming food;  
 \*\* Disadvantaged groups: populations at higher risk for unhealthy diets and poor health due to unfavorable social, political and environmental conditions (for example women, children, indigenous populations, disadvantaged migrants)





#### References

- EAT-Lancet Commission on Food, Planet, Health. Summary Report of the EAT-Lancet Commission. Healthy Diets from Sustainable Food Systems: Food, Planet, Health. Available at: <https://eatforum.org/eat-lancet-commission/>
- The Sustainable Development Goals: <https://sdgs.un.org/goals>
- Willet et al. Food in the Anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food systems. *The Lancet* 2019; 393;10170:447–492.
- Kraef et al. Primary Health Care and Nutrition. *Bull World Health Organ* 2020; 98:886–893.
- Turner et al. Concepts and critical perspectives for food environment research: A global framework with implications for action in low- and middle-income countries. *Global Food Security*. 2018; 18:93–101.
- Ng et al., 2014. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet* 2014; 384(9945):766–781.
- FAO, IFAD, UNICEF, WFP and WHO. The State of Food Security and Nutrition in the World 2021. Transforming food systems for food security, improved nutrition and affordable healthy diets for all. 2021. Available at: <https://doi.org/10.4060/cb4474en>
- Hirvonen et al. Affordability of the EAT-Lancet reference diet: a global analysis. *Lancet Glob Health*. 2020;1:e59–e66. doi:10.1016/S2214-109X(19)30447-4.
- Adesogan et al. Animal source foods: Sustainability problem or malnutrition and sustainability solution? Perspective matters. *Global Food Security* 2020; 25:100325.
- Perez-Escamilla et al. Nutrition disparities and the global burden of malnutrition, *BMJ* 2018; 36:k2252
- United Nations Development Programme (UNDP). Case studies of sustainable development in practice. Triple Wins for Sustainable Development. UNDP, 2021.
- Pereira et al. Food System Transformation: Integrating a Political-Economy and Social-Ecological Approach to Regime Shifts. *Int J Environ Res Public Health*. 2020;17(4):1313. doi: 10.3390/ijerph17041313.
- Popkin et al. *The Lancet* 395/10217 (2020), 65–74. [https://doi.org/10.1016/S0140-6736\(19\)32497-3](https://doi.org/10.1016/S0140-6736(19)32497-3)
- FAO. Food security and nutrition: building a global narrative towards 2030. 2020. Available at: <https://www.fao.org/3/ca9731en/ca9731en.pdf>
- HLPE. Summary and Recommendations of the 15th report by the High Level Panel of Experts on Food Security and Nutrition (HLPE), page 14. 2020. Available at: <https://www.unscn.org/en/news-events/recent-news?id-news=2091>
- Peterson, Charles, Yeung, Coyle. The Health Equity Framework: A Science- and Justice-Based Model for Public Health Researchers and Practitioners. *Health Promotion Practice*. August 2020. doi:10.1177/1524839920950730
- Food systems and nutrition equity. *Global Nutrition Report*, Chapter 4. Available at: <https://globalnutritionreport.org/reports/2020-global-nutrition-report/food-systems-and-nutrition-equity/>
- Bamberg et al. How to design and manage equity-focused evaluations. UNICEF. Available at: [https://evalpartners.org/sites/default/files/EWP5\\_Equity\\_focused\\_evaluations.pdf](https://evalpartners.org/sites/default/files/EWP5_Equity_focused_evaluations.pdf)
- Pomeroy-Stevens. Participatory Systems Mapping: Implications for Improving Urban Maternal and Childhood Outcomes. Webinar presentation, December 2020. Available at: [https://www.childhealthtaskforce.org/sites/default/files/2020-12/BHC%20Webinar\\_12.1.2020\\_shared.pdf](https://www.childhealthtaskforce.org/sites/default/files/2020-12/BHC%20Webinar_12.1.2020_shared.pdf)

FIGURE 3. SHIFT FRAMEWORK – THEORY OF CHANGE (TOC)



# Sustainable Animal Food Production, in War and Peace

**Sigrid Agenäs**, Professor, Swedish University of Agricultural Sciences

**Ylva Persson\***, Associate Professor, National Veterinary Institute, Swedish University of Agricultural Sciences

\*Corresponding author: ylva.persson@sva.se

## Introduction

The future holds challenges for the livestock industry, including climate change and risks of more extreme weather events. Political, societal, and environmental changes may influence the patterns of both the consumption and production of food and animal feed. The Covid-19 pandemic highlighted vulnerabilities in the global food system, and several actors have emphasized the importance of sustainable and resilient food production. The importance of a robust food chain and flexible animal production is further emphasized in the light of armed conflicts, such as the one taking place in Ukraine in 2022. Food production must be maintained even during times of change. Preparedness for the unknown requires flexible solutions to ensure continued production of safe and nutritious food using effective and environmentally friendly methods. We may need to adapt our food production to new systems, new animal species and new products. The role of animals in today's food production is to upgrade plant nutrients that have a low value in human nutrition by eating and digesting such nutrients, which enables animals to serve as the source of the eggs, meat, and milk that humans then consume. In this process, an economical value is also added. In addition, animal production delivers eco system services like biodiversity

from grazing, and perennial ley crops can be a significant carbon sink and at the same time be a barrier for plant pathogens that otherwise require chemical plant protection. Moreover, animal manure is an important resource for cropping. However, livestock can also have negative impacts on the environment, climate, and human health, and sustainability issues need to be considered in all aspects of animal production. The food system needs to be designed so that sudden changes do not compromise biosecurity, animal welfare or cause antimicrobial resistance. We also need to ensure that "system changes to ensure that food systems transform and result in better health outcomes by mainstreaming the concept of healthy, sustainable diets, with democratic, transparent, accountable governance frameworks and conducting accessible, credible, interdisciplinary research in this area; and recognizing the human right to safe, nutritious foods" (WHO 2021).

## Aim of the Workshop

This workshop will bring together scientists, experts in animal health, representatives from the private sector, communication experts, and policymakers to explore how livestock production can be sustainable and resilient in times of peace, but at the same time taking a preparedness perspective.



PHOTO: KARIN ALVÄSEN, SWEDISH UNIVERSITY OF AGRICULTURAL SCIENCES

## Background

Society is at a critical point. Scientific evidence shows global changes in climate and environment, strongly suggesting that societies need to transform and function in ways that are more sustainable and resilient (Steffen et al., 2015; Willett et al., 2019; IPBES, 2019). To adhere to both the Sustainable Development Goals (SDGs) and the Paris Agreement, transformation needs to accelerate (Wood et al., 2019). Extreme events, such as the severe drought of 2018, the COVID-19 pandemic in 2020 and the Ukraine war, further underline the need for transformation. With improved resilience, the food system would be better equipped to maintain food production in unexpected situations. Food and agriculture play a unique role in our efforts to meet the SDGs, as the 17 SDGs are all tightly linked to food and agriculture (DeClerck et al., 2016; FAO, 2016; Wood et al., 2019). Agricultural land is a prerequisite for land-based food production. Permanent grasslands cannot be used for crop production, but are suitable as pasture for grazing animals and animal feed production. Production of animal feed can also be part of the crops in crop rotation on arable land. There are different conditions and challenges in different regions due to, e.g., climate gradients,

variation in physical and human landscapes, infrastructure, and production intensity, and it is thus important to further study and learn from these differences, aiming for sustainable and competitive livestock production globally. There are some aspects of sustainability that need to be considered in animal production: (1) animal welfare and health standards, (2) low use of antibiotics and (3) high production intensity, which contributes to lower carbon footprints per unit of food product. Policy measures and industry initiatives also need to be taken to reduce the use of mineral fertilizers and to minimize nitrogen losses, as well as work towards further reducing the negative impact, aiming at net-zero greenhouse gas (GHG) emissions, and enhancing biodiversity. Biodiversity and ecosystem services have been undervalued in SDG discussions (Reyers et al., 2020), and the interaction between grazing animals and biodiversity is one example of this. Another key challenge is the profitability of the sector. Competitiveness is also a key condition to enable the development and innovation needed to achieve a transition towards sustainability. Economic sustainability, often understood as economic viability, can be defined as the potential of farms to survive in the long run in a changing economic and envi-



ronmental context (Latruffe et al., 2016). This is often measured using traditional indicators that revolve around productivity, profitability, and labour demand (D'Annolfo et al., 2017).

The poor profitability in the primary sector also poses a challenge to the profitability and competitiveness of other food system actors, outside the farm. Consumer awareness of sustainability in food production is increasing, and in many countries, the willingness to pay for sustainability attributes like animal welfare and avoiding overuse of antibiotics is high. At the same time, consumers are facing many incentives to move from animal-based towards plant-derived protein. The main argument used by NGOs and manufacturers alike is that plant-derived protein has a lower environmental impact than animal protein does. This message is reinforced by large organizations such as WHO and consortia like EAT Lancet (Willett et al., 2019). There is thus a pressing need to focus in depth on how to improve the sustainability and competitiveness of systems that produce animal-derived food. In many countries, arable land is highly suitable for ley and cereal crops, and the role of livestock is to increase the nutritional value of ley. Ley is important in crop rotation, as it improves soil properties and can reduce the prevalence of pests, diseases, and weeds through its role as a break crop (Robson et al., 2002). Also, regardless of crop, including cereals, some fractions are not used as food, but can enter the food system as animal feed (Röös et al., 2016).

In addition, manure plays a key role in fertilization, perennial crops can deposit carbon in soil and thereby act as a carbon sink, and grazing semi-natural pastures is critical for biodiversity. Today, livestock is a well-integrated part of the global food system, and its role in increased sustainable and competitive food production is highly relevant. SustAinimal, a Formas-financed collaborative research centre, focuses specifically on animal production, exploring the role of livestock in future food systems. This must be done in trans- and cross-disciplinary programmes, where non-academic food system actors and researchers across different disciplines gather to learn, identify knowledge gaps, conduct research aimed at system transformation, and where scientific questions are evaluated from a systems perspective.

### Questions to discuss

In the proposed workshop, we want to focus on food security in a sustainable yet flexible food production system. Food production needs to continue even during times of change. Fluctuating weather, climate change, crises and changed political landscapes all require flexible solutions to ensure continued production of safe and high-quality food using effective and environmentally friendly methods. We may need to adapt our food production to new systems, new animal species and new products. To do this, our animals need to be healthy and raised sustainably, with little negative impact on the environment and climate and a positive impact on biodiversity. We cannot run the risk that changes in food production will lead to decreased biosecurity, impaired animal welfare and antimicrobial resistance. We will also highlight how sustainable food systems can positively affect health and well-being among people, particularly by defining the role of animal products in a healthy sustainable diet. Some specific questions will be addressed:

- The governance of a transition towards sustainable, resilient, and competitive food production: What is the role of communication and public policy from the perspective of primary producers in animal production?
- Adaptation of production systems, species, and breeds; the need for agile solutions: How can farmers transform their production in times of change? Moreover, how can biosecurity, animal health and welfare and food safety be maintained during a crisis?

Other aspects that also need to be considered are:

- The role of livestock in different regions and countries: What are the effects of different interventions on the contribution of livestock to sustainable, resilient, and competitive food production in different regions, from north to south?
- The future role of grasslands and grazing: How can permanent and temporary grasslands contribute to increased food production, sustainability, biodiversity, and competitiveness?



PHOTO: YLVA PERSSON, THE NATIONAL VETERINARY INSTITUTE AND THE SWEDISH UNIVERSITY OF AGRICULTURAL SCIENCES

- Indicators of sustainability assessment of animal-derived food products: What are the main sustainability indicators of biodiversity, food safety and security, competitiveness and productivity, nutrient cycles, climate impact, and social aspects, including governance, ethics, animal welfare and the contribution to the landscape?
- For human nutrition, the high nutrient density of animal-derived foods is particularly important and valuable in a crisis: How can this be communicated to policymakers and consumers?

### References and suggestions for further reading

1. D'Annolfo R et al. 2017. *Int J Agr Sustain*, 15(6):632-659
2. DeClerck F et al. 2016. *Curr Opin Env Sust* 23:92-99
3. FAO, 2016 ISBN 978-92-5-109374-0
4. IPBES 2019. ISBN: 978-3-947851-13-3
5. Latruffe L et al. 2016. *ISSN 2063-0476*. 118(3):123-142
6. Reyers B et al. 2020. *Nat Ecol Evol* 4:1011-1019
7. Robson MC et al. 2002. *ISSN 0065-2113*. 77:369-427
8. Röös E et al. 2016. *Food Policy* 58:1-13
9. Steffen et al. 2019. *Science* 347(6223):1259855
10. WHO, 2021. Executive summary. Food systems delivering better health.
11. Willett W et al. 2019. *The Lancet* 393(10170):447-492
12. Wood A et al. 2019. Nordic food systems for improved health and sustainability - Baseline assessment to inform transformation. Stockholm Resilience Centre



# The Diet-Health-Environment Nexus

– *how to go from knowledge to practice?*

**Alicja Wolk\***, Professor, Karolinska Institutet  
**Eva Warensjö Lemming**, Associate Professor, Senior Lecturer, Uppsala University  
**Nicklas Neuman**, Associate Professor, Associate Senior Lecturer, Uppsala University  
**Carolin Zorell**, Senior Lecturer, Örebro University  
**Emma Patterson**, Associate Professor, Karolinska Institutet, Nutritionist, Swedish Food Agency  
**Stephanie Pitt**, Research Assistant, Karolinska Institutet

\*Corresponding author: [alicja.wolk@ki.se](mailto:alicja.wolk@ki.se)

## Aim of the workshop

While there is fairly good evidence available concerning what a healthier diet with reduced environmental impact could look like, it is clear there is a large gap between this and current dietary patterns. Unfortunately, there is very scant evidence on how to effectively influence large-scale behavioral patterns. This discrepancy lies at the core of this workshop. What is the role of the private sector, NGOs, communicators, policymakers, and civil society in evaluating, debating, promoting, or even discouraging any given intervention proposed based on the evidence?

## Current Swedish dietary habits and impact on health and the environment

In most high-income countries, including Sweden, current dietary habits are far from sustainable. They have negative effects on both health and the environment, for example on greenhouse gas emissions, land use and biodiversity. A sustainable dietary pattern not only promotes health and has a minimal effect on the environment, but also considers social and economic factors, such as culture, livelihoods, cost, and accessibility. According to estimates

of the global burden of disease, improved dietary patterns could potentially prevent one in five deaths globally, and suboptimal intake of three dietary factors (low intake of whole grains and fruits and high intake of sodium) accounted for more than 50 percent of these deaths and 66 percent of disability-adjusted life years attributable to diet. Moreover, food constitutes a large proportion of the total environmental impacts (20-30 percent) caused by household consumption; hence one way to reduce these impacts is to change current dietary consumption patterns.

There is fairly solid evidence for current dietary recommendations. A healthy diet is characterized by an abundance of vegetables and fruits, whole grains, and it includes low-fat dairy, fish, legumes, nuts, and vegetable fat, but only a little red meats, refined grains, sugars, and saturated fat. However, results from national surveys in Sweden illustrate the large gap between recommendations and practice. Furthermore, there are notable inequalities across genders, age groups, and education levels.



PHOTO: BET\_NOIRE, ISTOCK

“Riksmaten adults 2010–2011,” a national survey conducted by the Swedish Food Agency, indicated that only 21 percent of participants consumed more than the recommended 500 grams a day of vegetables and fruit, and only 30 percent ate fish according to recommendations (2–3 times a week). An excessively high intake of red and processed meat was reported by 42 percent of women and 72 percent of men. Dietary patterns were generally healthier among women than among men. Participants with higher educational attainment as well as those who were more physically active consumed more vegetables and fruit. Further, the intake of whole grains was too low, and the intake of sugary and fatty foods with a high content of saturated fat and salt was too high. The survey indicated that young adults, especially young women, had the most problematic dietary habits. The youngest age group (aged 18-30 years) consumed less fruit, vegetables, and fish, and they had a high intake of sweetened beverages.

The survey “Health on Equal Terms,” conducted by the Public Health Agency in Sweden, generally supports these results. Interestingly, the average consumption of vegetables has increased in Sweden over the past ten years. However, this increase has not occurred among those with unhealthier dietary habits, as this proportion has not decreased since 2004. Increased consumption of vegetables is seen among those who already had a healthier diet.

One modelling study using data from the “Riksmaten adults” showed that it is possible to cut greenhouse gas emissions resulting from diet by more than 50 percent and still ensure nutritional adequacy by making more sustainable and healthy food choices. Another study showed that large health gains could be achieved by making relatively small food substitutions.

There are clearly major challenges associated with transitioning to a healthy and environmentally beneficial diet on a population level. Swedish national food-based dietary guidelines (“Hitta ditt sätt”) translate the evidence regarding foods and health into specific and culturally appropriate dietary guidelines; the guidelines also consider some aspects of environmental sustainability. The guidelines are primarily intended to influence consumer behavior. However, a large proportion of the population does not adhere to these guidelines, and thus their effectiveness is poor. There is an urgent need for novel strategies that may help close the inequality gaps in health and reduce the environmental impact of diets.

## *Evidence-based behavioral-change policy*

The Nuffield Council on Bioethics published an “intervention ladder” that lists categories of public health interventions based on how strongly they intervene in the market and individuals’ lives (2007). At the top are interventions that



simply eliminate a choice, for example by making it illegal (e.g., cannabis), followed by different forms of disincentives such as added or increased taxes on certain 'unwanted behavior' (e.g., sugar-sweetened soft drinks). Price increases would most likely lead to decreased intakes, but may affect individuals and enterprises negatively, and harms must be weighed against possible health or environmental benefits. Such interventions are unrealistic in the current Swedish political and economic framework.

The challenge thus is to identify and handle trade-offs between what we can realistically anticipate in terms of positive effects on a given set of outcomes, on the one hand, and what the social, economic, and political side effects may be, on the another – and then to formulate evidence-based intervention strategies. The foundation for being able to do this is to understand what factors influence food choices and behaviors. One way of illustrating the complexities of nutritional behavior is through illustrative models. Many exist, but here we use the ecological framework from Story et al. (2008) as an example (Figure). The strength of such a model is its holistic view of how different layers of society are connected and interact with the individual and his/her personal preconditions. The model helps

us think about the many factors influencing food behaviors that exist in society. The drawback, however, is that the model does not provide any guidance concerning in what areas there is more or less evidence for substantial influence, what arenas are likely to be the most acceptable among the population or what actors have the main responsibility. Is the best intervention to target individuals with information, or perhaps to discourage or encourage via “nudging” or even limiting their choices? There is evidence, for example, for short-term effects on the amounts consumed when portion sizes are manipulated. Other effects on dietary intakes have been observed in response to exposure to social norms or other forms of social influence, mostly in laboratory environments. There is also a great deal of research demonstrating how health behaviors “spread” within social networks, thus showing the structural effects of social influence. Open questions remain, however, such as what a possible intervention within a social network – or other arenas within the social environment – would look like. Could actions such as portion modifications or social influences, at the individual level, have large-scale and long-lasting effects?

In a natural experiment, Swedish economists recently showed that the Swedish school lunch reform of the 1940s, which marked the beginning of tax-subsidized lunches for every child, had long-term effects on children's height as well as their educational and financial outcomes (Lundborg, Rooth, & Alex-Petersen, 2021). Thanks to their painstaking research design, other possible explanations such as indirect effects of mothers' labor market participation (due to time being freed from domestic food responsibilities) or increased attendance (with the lunch as a mere incentive for children to come to school) could be ruled out. Thus, we have evidence for an effect of a large-scale food reform, via a change in the physical environment enabled by macro-level action, that has likely had a causal effect on food behavior. But are similar reforms possible today? And can efforts like the Swedish school lunch

reform be repeated when today's challenges are not so much about improving the nutritional status of the population, but rather about changing, or even reducing, consumption?

These are just a selection of the potential questions we can ask and discuss in the workshop. What they all share is that they point to the complex interaction between science, policy, and real-life/everyday behavior. Our aim is to discuss these and related questions, guided by the illustrative model depicted in the Figure to identify levels, actors, arenas, and actions at the different layers, where we can anticipate the 'best' effects of interventions on nutritional behaviors, as well as to eventually and rapidly advance the widespread uptake of healthier diets with reduced environmental impact.

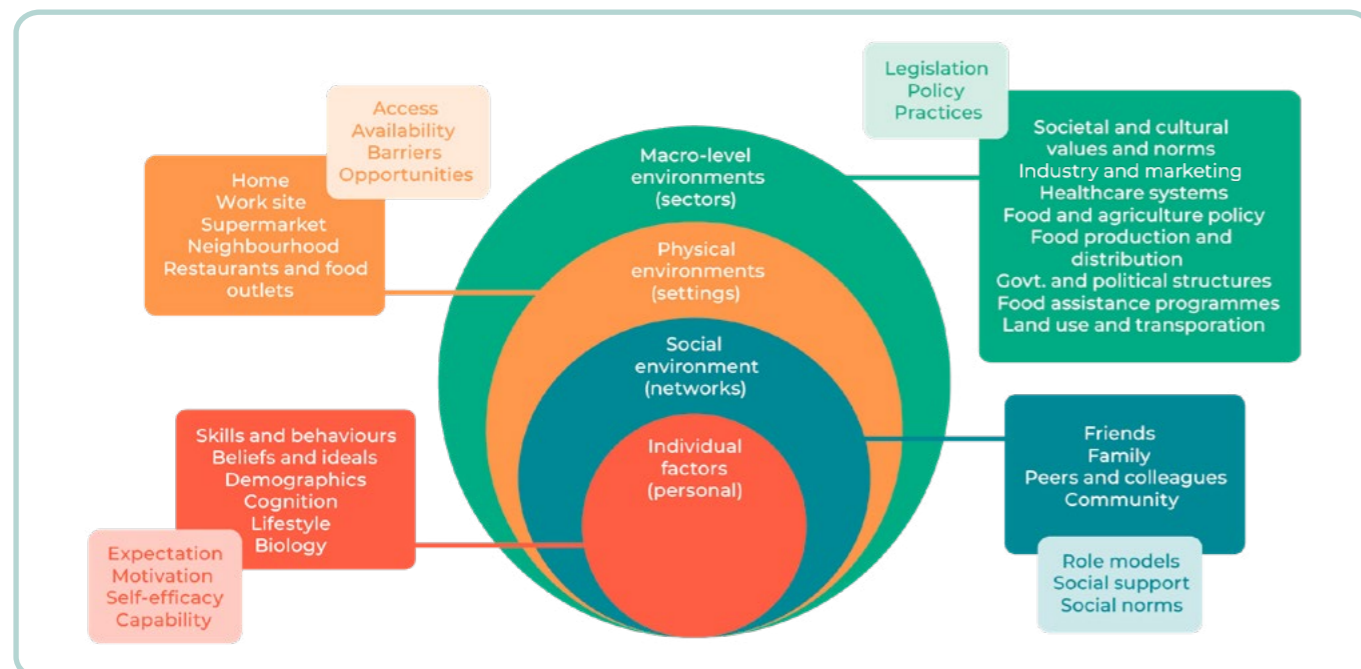


FIGURE 1. THE DIET-HEALTH-ENVIRONMENT NEXUS

#### References/Suggestions for further reading

1. Steenson, S. & Buttriss, J.L. (2021) Healthier and more sustainable diets: What changes are needed in high-income countries? *Nutrition Bulletin*, 46, 279–309. <https://doi.org/10.1111/nbu.12518>
2. Nordic Nutrition Recommendations 2012 : Integrating nutrition and physical activity (5th ed.). (2014). <https://doi.org/10.6027/Nord2014-002>
3. Vieux, F., Perignon, M., Gazan, R., & Darmon, N. (2018). Dietary changes needed to improve diet sustainability: are they similar across Europe? *European journal of clinical nutrition*, 72(7), 951–960. <https://doi.org/10.1038/s41430-017-0080-z>
4. Nuffield Council on Bioethics, N. C. o. (2007). *Public Health: Ethical Issues*. Cambridge, UK: Nuffield Council on Bioethics.
5. Story M, Kaphingst KM, Robinson-O'Brien R, Glanz K. Creating Healthy Food and Eating Environments: Policy and Environmental Approaches. *Annual Review of Public Health* 2008; 29:253-72
6. Lundborg, P., Rooth, D.-O., & Alex-Petersen, J. (2021). Long-Term Effects of Childhood Nutrition: Evidence from a School Lunch Reform. *The Review of Economic Studies*, 89(2), 876-908. [doi:10.1093/restud/rdab028](https://doi.org/10.1093/restud/rdab028)



# Zero Hunger: Is Smallholder Farming the Solution?

**Erika Chenais\***, Associate professor, National Veterinary Institute, Sweden  
**Klara Fischer**, Associate professor, Swedish University of Agricultural Sciences  
**Jonas Johansson Wensman**, Associate Professor, National Veterinary Institute, Sweden, Swedish University of Agricultural Sciences  
**Johanna Lindahl**, Associate professor, National Veterinary Institute, Sweden, Swedish University of Agricultural Sciences, and Uppsala University  
**Ylva Persson**, Associate Professor, National Veterinary Institute, Sweden, Swedish University of Agricultural Sciences  
**Assem Abu Hatab**, Associate Professor, Swedish University of Agricultural Sciences, Senior Researcher, Nordic Africa Institute, Sweden

\*Corresponding author: erika.chenais@sva.se

## Aim of the workshop

A large proportion of the food consumed around the world every day is produced by smallholder farmers. At the same time, people engaging in smallholder farming are often poorer and thus more food insecure than the respective national averages. Transforming smallholder farming into more industrialized or intensive forms of agriculture is often emphasized as a solution for providing more returns, increasing global food security, boosting rural economic development, and contributing to poverty reduction. This workshop will discuss the future of smallholder farming, whether sustainable small-scale agriculture can be achieved and whether sustainable industrialization is possible, or even desirable.



PHOTO: ERIKA CHENAIS, NATIONAL VETERINARY INSTITUTE, SWEDEN

## Background

Around the world, approximately 500 million smallholder farmers generate over 30 per cent of the global food production (Ricciardi et al., 2018). In low-income countries, this figure is even higher, with up to 70 percent of food being produced by smallholders. Smallholder farmers in low-income countries are generally poorer than farmers with more land or animals (Rapsomanikis, 2015; Bernard et al., 2019). In such contexts, mixed smallholder farming comprising different crops and several livestock species is the dominating farming system (Fig. 1). Poor smallholders face numerous risks to production, including climate change, which is projected to disproportionately affect them, making their livelihoods more precarious and further exacerbating their food insecurity. Climate change and global mobility both contribute to increasing the geographical distribution and local occurrence of certain animal diseases and insect pests (FAO, 2020; OIE, 2021). Sustained plant and animal health are vital for smallholders' household economies (Rich and Perry, 2011; Grace et al., 2017). In contrast to wealthier farmers, small-

holders commonly farm less fertile land and have suboptimal access to good-quality grazing and water for their livestock. Smallholders further have limited means to buffer environmental dynamics with purchased inputs such as feed, fertilizers, and pesticides. Together, these factors make smallholders' farming and livelihoods more vulnerable. Engaging in several different agriculture activities, such as in the mixed smallholder system, can help to cope with the precariousness and complexity of their farming systems, e.g., by spreading risks (Chambers et al., 1989; Almekinders and Louwaars, 2002; Behera and France, 2016; Paramesh et al., 2022). In smallholder systems, livestock contributes monetary income, access to vital, high-quality protein, manure for crops, transport and traction, as well as playing roles such as "walking banks", status symbols or social and cultural markers (Perry and Grace, 2009; Hunter et al., 2021). The people who own animals are usually not the poorest of the poor, but smaller animals (chickens, pigs, small ruminants) are more often owned by poorer people than are larger animals (cows, buffaloes, camels), and in some contexts



it is only some marginalized groups that own, for example, pigs, or only women and children who take care of sheep and goats (Perry et al., 2002). Acute diseases among animals affect humans in ways similar to other disasters, such as human disease or natural disasters, and lead to deepened poverty or missed chances of escaping poverty (Krishna, 2007). Chronic or subclinical animal diseases lead to a constant decrease in production. Both acute and chronic diseases lead to animal suffering, increased antibiotic consumption and increased climate impact (healthy animals produce more with the same inputs or climate footprint) and can pose a risk of spreading zoonotic infections both via direct contact and via food.

The widespread poverty among smallholder farmers creates a negative spiral: It makes them particularly vulnerable to any shocks to their farming systems because it constrains their capacity to respond to pest and disease outbreaks and extreme weather events, thus causing significant crop and income losses and exacerbating food insecurity (Ebata et al., 2020b). Poverty is further strongly associated with (ill)health and with fewer opportunities for physical and mental development in children (Brooks-Gunn and Duncan, 1997). Lack of important vitamins and micronutrients during childhood has been correlated with impaired development of cognitive functions (Jáuregui-Lobera, 2014). These challenges place poor smallholder farmers under additional stress, both owing to direct reductions in agricultural productivity and through impacts on human health by exposing them to communicable and non-communicable diseases, mental health problems, and other health issues, which can have further implications for poverty as well as food and nutritional security.

#### **Sustainable transformation**

Many low- and middle-income countries have long focused on intensification of mainly crop production in their development policies, but have neglected the importance of small-scale mixed farming systems for household and national economies and for increasing food production. Likewise, for those countries that mention animal husbandry as a possible poverty-reducing activity, transforming small-scale animal keeping into more industrialized and intensive forms of production, thus providing

more returns, is often emphasized as the solution (Havnevik et al., 2007; Wiggins, 2016). However, such changes will most likely not be possible for the poorest smallholders, for whom small-scale subsistence farming will continue to be the only option to support themselves and their families (Fischer, 2016). Sustainable transformation and sustainable industrialization have been mentioned as processes for developing sustainable smallholder farming that can effectively contribute to achieving the sustainable development goals (SDGs) and national development plans as well as to decreasing rural households' vulnerability, while concurrently respecting human and environmental rights. One important part of such transformation is to improve smallholder farmers' market access. To improve sustainability, and the feasibility of initiatives aiming to transform smallholder farming, it is also important both to ensure that support is appropriate for smallholder farmers in their local context and to better include smallholders' voices and priorities in policy and research. These aspects will be discussed specifically during the workshop.

#### **Improve smallholder farmers' market access**

Over the past few decades, agricultural and food markets have significantly changed due to the globalization of agri-food value chains, and the growing demand for high-value products (Abu Hatab et al., 2019). This has created more opportunities for smallholders in low- and middle-income countries, but also entails the risk that they might be excluded and pushed out of markets. In this respect, market access remains a major challenge for productivity growth and agricultural transformation in these countries (Nandi et al., 2021). Improving smallholders' access to markets is widely recognized as a key mechanism to boost productivity and increase incomes by allowing them to reliably sell more produce, of better quality and at higher prices (Burke et al., 2020; Bonuedi et al., 2021). This can in turn encourage farmers to invest in their own businesses and can increase the quantity, quality and diversity of their produce. Better access to markets thus also contributes to improving food security and reducing poverty and hunger for producing households and their communities (Kafle et al., 2022). However, smallholders often face major challenges in accessing markets to sell their produce in the marketplace: They are constrained by their remote location,

high transportation costs, limited knowledge and access to market information, as well as the lack of business skills and an organization that could give them the bargaining power they require to interact on equal terms with other market intermediaries (Ouma et al., 2010; Bolwig et al., 2013; Luiz et al., 2019). Faced with these challenges, smallholder farmers struggle to shift from subsistence to more productive forms of farming. Overcoming these issues and linking them to markets is a critical part of any long-term development strategy to reduce poverty and hunger. This requires an upgrading process that includes investment in local infrastructure, strengthening of business services, and building the capacity of smallholder farmers. Effort also needs to go into promoting mechanisms to assist the transition from a production-based system to a market-based one. These include market analysis, contract farming, certification and strategies to strengthen local business development and support chain investment.

#### **Include smallholders' voices and priorities in policy and research**

Different kinds of stakeholders involved in development work concerning smallholder farming (e.g., multilateral organizations, national governments and agencies, non-governmental organizations, development researchers as well as farmers' organizations and individual farmers) will have different priorities, even if the overarching objective for all is to meet the SDGs. Taking the example of animal health and disease control, multilateral organizations and national governments will often prioritize control of diseases that achieve global attention, are included in global eradication programmes and for which international regulations connected to, e.g., trade exist, such as foot and mouth disease or peste des petits ruminants (Thomson et al., 2013; Barnett et al., 2020). Still other multilateral organizations and other national agencies will prioritize control of animal diseases with zoonotic potential such as rabies, and researchers might prioritize diseases in which they have a special, professional research interest (Chenais and Fischer, 2018; Barnett et al., 2020; Ebata et al., 2020a; Tasker, 2020; Chenais et al., 2021). The complexity of smallholders' farming contexts and livelihood circumstances, on the other hand, generates multiple and variable animal health challenges, with priority often given to

endemic viral and parasitic diseases or management challenges such as feed, pasture and water (Chenais and Fischer, 2018; Fischer et al., 2020a; Chenais et al., 2021). Smallholders' own priorities might thus not correspond to those of other stakeholders involved in development work. For actions intended to promote the development of smallholder farming to be sustainable and survive "beyond projects", however, smallholders' own priorities and perspectives on their challenges need to be put in focus, making sure that the problems addressed are those the end-users prioritize (Fischer et al., 2015; Chenais and Fischer, 2018; Marshak et al., 2021; Arvidsson et al., 2022). In other words, for any development intervention to be sustainable, it must meet smallholders in their local context, starting from local contexts, problems, possibilities and priorities (Chambers et al., 1989; Barnett et al., 2020; Ebata et al., 2020a). This requires in-depth engagement with local communities, embracing local contexts, perspectives and priorities (Fischer et al., 2020b). Conducting thorough baseline studies that apply bottom-up, participatory methodologies and letting participants define their own problems and find the solutions at the outset of a development project are ways to safeguard the inclusion of smallholders' voices and priorities (Chenais and Fischer, 2021). This further includes paying more attention to the fact that smallholder communities are heterogeneous and that methodologies that do not actively seek to reach the most marginalized smallholders will commonly only capture the perspectives of local elites (Fischer et al., 2020b).



## References

1. Abu Hatab, A., Hess, S., Surry, Y., 2019. EU's trade standards and the export performance of small and medium-sized agri-food export firms in Egypt. *International Food and Agribusiness Management Review* 22, 689-705.
2. Almekinders, C.J.M., Louwaars, N.P., 2002. The Importance of the Farmers' Seed Systems in a Functional National Seed Sector. *Journal of New Seeds* 4, 15-33.
3. Arvidsson, A., Fischer, K., Hansen, K., Sternberg-Lewerin, S., Chenais, E., 2022. Diverging discourses: Animal health challenges and veterinary care in northern Uganda. *Frontiers in Veterinary Science*, 211.
4. Barnett, T., Pfeiffer, D.U., Hoque, M.A., Giasuddin, M., Flora, M.S., Biswas, P.K., Debnath, N., Fournié, G., 2020. Practising co-production and interdisciplinarity: Challenges and implications for one health research. *Prev Vet Med* 177, 104949.
5. Behera, U., France, J., 2016. Integrated farming systems and the livelihood security of small and marginal farmers in India and other developing countries. *Advances in agronomy* 138, 235-282.
6. Bernard, J., Conzen, S., Decker, A., Shucksmith, M., 2019. Poverty and social exclusion in diversified rural contexts. *Sociologia Ruralis*.
7. Bolwig, S., Riisgaard, L., Gibbon, P., Ponte, S., 2013. Challenges of agro-food standards conformity: lessons from East Africa and policy implications. *The European Journal of Development Research* 25, 408-427.
8. Bonuedi, I., Kornher, L., Gerber, N., 2021. Agricultural seasonality, market access, and food security in Sierra Leone. *Food Security*, 1-24.
9. Brooks-Gunn, J., Duncan, G.J., 1997. The effects of poverty on children. *The future of children*, 55-71.
10. Burke, W.J., Jayne, T.S., Sitko, N.J., 2020. Do medium-scale farms improve market access conditions for Zambian smallholders? *Journal of Agricultural Economics* 71, 517-533.
11. Chambers, R., Pacey, A., Thrupp, L.A., 1989. *Farmer first: farmer innovation and agricultural research*. Intermediate Technology Publications Ltd. London.
12. Chenais, E., Fischer, K., 2018. Increasing the local relevance of epidemiological research: situated knowledge of cattle disease among basongora pastoralists in Uganda. *Frontiers in veterinary science* 5, 119.
13. Chenais, E., Fischer, K., 2021. Power, participation and interdisciplinary tensions: Introducing a special issue on methodological developments in participatory epidemiology. *Prev Vet Med* 196, 105490-105490.
14. Chenais, E., Wennström, P., Kartschia, N., Fischer, K., Risatti, G., Chaligava, T., Erukidze, T., Ståhl, K., Vepkhvadze, N.G., 2021. Perceptions of pastoralist problems: A participatory study on animal management, disease spectrum and animal health priorities of small ruminant pastoralists in Georgia. *Prev Vet Med*, 105412.
15. Ebata, A., Hodge, C., Braam, D., Waldman, L., Sharp, J., MacGregor, H., Moore, H., 2020a. Power, Participation and their Problems: A consideration of power dynamics in the use of Participatory Epidemiology for One Health and zoonoses research. *Prev Vet Med*, 104940.
16. Ebata, A., MacGregor, H., Loevinsohn, M., Win, K.S., Tucker, A.W., 2020b. Value Chain Governance, Power and Negative Externalities: What Influences Efforts to Control Pig Diseases in Myanmar? *The European Journal of Development Research* 32, 759-780.
17. FAO, 2020. *International Year of Plant Health 2020*. Food and Agriculture Organization, Rome.
18. Fischer, K., 2016. Why new crop technology is not scale-neutral—A critique of the expectations for a crop-based African Green Revolution. *Research Policy* 45, 1185-1194.
19. Fischer, K., Lysholm, S., Johansson Wensman, J., 2020a. Factors Enabling Sustainable Goat Production in Zambia. In: SIANI (Ed.), SIANI policy brief.
20. Fischer, K., Schulz, K., Chenais, E., 2020b. "Can we agree on that"? Plurality, power and language in participatory research. *Prev Vet Med*, 104991.
21. Fischer, K., van den Berg, J., Mutengwa, C., 2015. Is Bt maize effective in improving South African smallholder agriculture? *South African Journal of Science* 111, 15-16.
22. Grace, D., Lindahl, J., Wanyoike, F., Bett, B., Randolph, T., Rich, K.M., 2017. Poor livestock keepers: ecosystem-poverty-health interactions. *Philosophical Transactions of the Royal Society B: Biological Sciences* 372, 20160166.
23. Havnevik, K., Bryceson, D., Birgegård, L.-E., Matondi, P., Beyene, A., 2007. African agriculture and the World Bank: development or impoverishment? Nordiska Afrikainstitutet.
24. Hunter, C.L., Millar, J., LML Toribio, J.-A., 2021. More than meat: the role of pigs in Timorese culture and the household economy. *International Journal of Agricultural Sustainability*, 1-15.
25. Jáuregui-Lobera, I., 2014. Iron deficiency and cognitive functions. *Neuropsychiatric disease and treatment* 10, 2087.
26. Kafle, K., Songsermsawas, T., Winters, P., 2022. Agricultural value chain development in Nepal: Understanding mechanisms for poverty reduction. *Agricultural Economics*.
27. Krishna, A., 2007. Escaping poverty and becoming poor in three states of India, with additional evidence from Kenya, Uganda, and Peru. *Out of*, 165.
28. Luiz, J.M., Kachika, K., Kudzurunga, T., 2019. Negotiating new institutional logics: Market access amongst smallholder farmers in Zambia and Malawi. *Society and Business Review*.
29. Marshak, M., Wickson, F., Herrero, A., Wynberg, R., 2021. Losing practices, relationships and agency: ecological deskilling as a consequence of the uptake of modern seed varieties among South African Smallholders. *Agroecology and Sustainable Food Systems*, 1-24.
30. Nandi, R., Nedumaran, S., Ravula, P., 2021. The interplay between food market access and farm household dietary diversity in low and middle income countries: a systematic review of literature. *Global Food Security* 28, 100484.
31. OIE, 2021. *Keep on fighting animal diseases*. OIE World Organization for Animal Health Paris
32. Ouma, E., Jagwe, J., Obare, G.A., Abele, S., 2010. Determinants of smallholder farmers' participation in banana markets in Central Africa: the role of transaction costs. *Agricultural economics* 41, 111-122.
33. Paramesh, V., Ravisankar, N., Behera, U., Arunachalam, V., Kumar, P., Solomon Rajkumar, R., Dhar Misra, S., Mohan Kumar, R., Prusty, A., Jacob, D., 2022. Integrated farming system approaches to achieve food and nutritional security for enhancing profitability, employment, and climate resilience in India. *Food and Energy Security*, e321.
34. Perry, B., Grace, D., 2009. The impacts of livestock diseases and their control on growth and development processes that are pro-poor. *Philos Trans R Soc Lond B Biol Sci* 364, 2643-2655.
35. Perry, B.D., Randolph, T.F., McDermott, J.J., K.R., S., P.K., T., 2002. Investing in Animal Health Research to Alleviate Poverty. International Livestock Research Institute Nairobi, Kenya.
36. Rapsomanikis, G., 2015. The economic lives of smallholder farmers: An analysis based on household data from nine countries. Food and Agriculture Organization of the United Nations, Rome.
37. Ricciardi, V., Ramankutty, N., Mehrabi, Z., Jarvis, L., Chookolingo, B., 2018. How much of the world's food do smallholders produce? *Global food security* 17, 64-72.
38. Rich, K.M., Perry, B.D., 2011. The economic and poverty impacts of animal diseases in developing countries: new roles, new demands for economics and epidemiology. *Prev Vet Med* 101, 133-147.
39. Tasker, A., 2020. Exploring power and participation through informal livestock knowledge networks. *Prev Vet Med*, 105058.
40. Thomson, G.R., Penrith, M.L., Atkinson, M.W., Thalwitzer, S., Mancuso, A., Atkinson, S.J., Osofsky, S.A., 2013. *International Trade Standards for Commodities and Products Derived from Animals: The Need for a System that Integrates Food Safety and Animal Disease Risk Management*. Transbound Emerg Dis.
41. Wiggins, S., 2016. *IFAD RESEARCH SERIES 1-Agricultural and rural development reconsidered: a guide to issues and debates*. IFAD Research Series.



PHOTO: QUY-TOAN DO, WORLD BANK, FLICKR



# Food Safety versus Food Security

**Johanna Dernfalk**, Head of Section, National Veterinary Institute, Sweden

**Gunnar Andersson**, Associate Professor, National Veterinary Institute, Sweden

**Johanna Lindahl\***, Associate Professor, Swedish University of Agricultural Sciences

& Uppsala University

**Åsa Svanström**, Risk Assessor, Swedish Food Agency

**Nurun Nahar**, Principal Regulatory Officer, Swedish Food Agency

\*Corresponding author: johanna.lindahl@slu.se

## Aim of the workshop

The aim of this workshop is to discuss the conflicts between interests and sustainable development goals (SDGs) in relation to food safety, food security, economic development, and environmental sustainability. We wish to discuss potential research needed to find solutions and to change policies, as well as to create linkages and networks to minimize these conflicts and find potential synergisms.

The workshop will use group and plenary discussions to consider the following questions:

- How safe is safe enough, and how do food safety priorities change at different levels of food insecurity?
- What is the impact of food standards on global food waste and the unequal burden of foodborne disease?
- How can these questions be dealt with on a global level to promote reduced food waste and improved health for all?

## Desired outcome

This workshop will give insights into the different aspects of food security and food safety trade-offs, particularly in relation to crises. We hope this workshop will have the following outcomes: these conflicts of interest are raised to the surface; contacts between different actors and stakeholders are generated; preparedness for future decision-making processes is initiated and facilitated.

## Background

“Only the dose makes the poison” is a famous quote by the “father of toxicology”, Paracelsus, during the 16th century. When it comes to food safety, this is still considered true. Because food and water inherently contain both micro-biological and chemical hazards, there are constant decisions to be taken regarding what is or is not safe to consume.

Naturally, we do not want any hazards in our food, but imagine if all you had to eat was maize that was contaminated with a carcinogenic toxin. Will you feed it to your children? This is a reality for many parents worldwide and a real conflict between food security and food safety. Many of the UN’s SDGs are similarly in conflict with each other. The most basic human need is keeping hunger away (SDG 2). However, more is needed for human health and wellbeing (SDG 3): food and water must be safe from contaminants and provide all the nutrients required. In addition, there is a need to reduce food production’s environmental impacts and safeguard economic, cultural, and social values. Food security is a key concern in all low- and middle-income countries (LMIC), but concerns over food safety, the environment and the obesogenic effects of food are also growing worldwide. The question is: How safe is safe?



PHOTO: CAMPTOLOMA, ISTOCK

These SDG conflicts mean that decision-makers end up in a “catch-22 situation”. If we were only to allow food that is completely safe to eat, we would not have enough food to feed our constantly growing population.

This workshop aims to initiate discussions about decision-making processes when balancing conflicting priorities and values and to bring together persons with different professional backgrounds and perspectives to form new networks. We hope these networks will then initiate activities aimed at addressing the challenges. Such activities include, but are not restricted to, cross-disciplinary research projects and future discussion or opinion papers. These questions could also be addressed through education, exercises, contingency planning, societal planning, and even the formation of political programs.

One major threat to food security and food and feed safety are mycotoxins. One of the most toxicologically potent mycotoxins are aflatoxins, as they may cause cancer and have been associated with stunting and immunosuppression. Mycotoxins are produced by fungi and are an increasing problem in response to climate change. Today, cereals, including maize, wheat, and other grains, are important staples worldwide and thus vital to food security. In addition, they are used for animal feeds, thereby indirectly contributing to food and nutrition security, affecting SDG 2 and 3. However, increasing contamination of grains with various mycotoxins negatively affects human health and animal production, and the stricter regulations on allowed mycotoxin levels in, for example, the EU create a conflict between these two SDGs. There are estimates that more than half of the cereals produced globally contain detectable mycotoxins, and 25% exceed regula-

tory limits. This is a major cause of post-harvest losses, food waste, and reduced economic and environmental sustainability.

However, many other foodborne hazards also constitute a health hazard to humans and require regulations. One example is Salmonella, which some countries do not accept at all in food products, which means that products with potential contamination are destroyed, and animals from infected farms may be culled instead of slaughtered for consumption. If food security is good, this will not affect human nutrition, but may impact the sustainability of food production. However, in other parts of the world, almost half of the meat sold may be contaminated, and destroying it would not be an option. Laws regarding safe levels vary considerably across countries. With growing uncertainties in the world, there may be more crises (wars, droughts, floodings, pandemics, etc.) in the future. During a crisis, we may also need to consider lowering our food safety standards to ensure food security, but there are many difficulties with this. Who can take the decision, how can this be communicated to the public, and when is the time to start prioritizing food security at the expense of food safety?

### Decision-making and communication

Food safety is complex and reaches well beyond the traditional microbiological and toxicological studies. Risk assessment is a systematic process aimed at informing the decision-maker about the risk associated with food and feed hazards. Sometimes a risk-benefit assessment is conducted to compare the risks with the possible beneficial effects of the same commodity to the consumer. However, in addition to the health effects on the person consuming the product, the decision-maker will have to consider the impact at a societal level, for example, food security, economics, environment, and culture.

Would we, for example, accept a higher risk from mycotoxin if that could reduce the carbon footprint? If this is done, politicians and other decision-makers will also face ethical dilemmas: Regulations aimed at protecting European consumers from risks related to food contamination may result in shortages of safe food in poorer countries. Solving an animal welfare problem in the EU may cause a health problem in Africa

and may violate other values, such as equality. There are also gender dimensions in food consumption, production and purchasing that needs to be considered. When the decision-making problem involves individuals and groups with different interests, supporting rational decision-making is not simply a matter of finding the average best collective utility if that solution has unacceptable consequences for some groups.

Communication is a crucial factor in the management of health hazards in food. Communicating messages to the public as well as to stakeholders along the value chains is only one part of this. Equally important is the communication between decision-makers and the experts who assess risk and other consequences, so that the final management decision not only balances different SDGs, but also has a chance of gaining public acceptance.

Failed communication may have unintended consequences. For example, when a report on the presence of the toxin aflatoxin M1 in milk in Ethiopia was picked up by social media, this caused many consumers to fear drinking milk, which resulted in severe economic impacts and loss of nutritious food in a food-insecure country. Considering the relatively limited contribution of intake of aflatoxin M1 in milk to developing cancer, and the importance of milk as a protein source, the dairy crises spiked by a scientific publication may have had worse consequences for human health than the toxin itself. High-income countries have been spared from many such dilemmas. If consumers avoid a product due to a perceived health risk, such as dioxins, GMO, aflatoxin, heavy metals, PFAS or pesticide residues, they will have other products to choose from, regardless of whether the perceived risk was real. Thus, we do not know how consumers would react if a global food crisis or an economic depression were to leave us with the food we can produce locally, and if consumers were told to increase consumption of products today that they were recommended to avoid yesterday.

### Improving preparedness

The task of managing the multiple facets of emerging threats is too complex to be grasped by a single person. For this reason, a cross-disciplinary working group, involving decision-makers,

politicians, scientists, growers, producers, stakeholders and consumers, may be necessary to discuss these questions if we are to have sufficient operative capacity when a crisis occurs. To make the best decision, it is not enough to understand the nature and expected magnitude of the consequences of a decision regarding different SDGs. Is it, for example, at all possible to say that 1 unit of one SDG is equal to n units of SDG 2, and is this relation stable over all possible values and in different contexts? Moreover, if it were possible to find a solution with the *best collective utility*, would this solution be acceptable when we consider the societal codes of fairness and ethics?

Besides the challenges of even quantifying and comparing the consequences, the decision problem takes us to the cutting edge of decision theory and requires a solid understanding of the human mind and the society in which the decision applies. Once a cross-disciplinary working group is formed, they must overcome the barriers of different professional languages, sometimes referred to as *semantic interoperability*. This is not as simple as writing a glossary, because the professional terms and expressions may refer to implicit knowledge essential to understanding.

Thus, as a first step towards safer food as well as the sustainable development goals of no hunger, improved health, less environmental impacts, and reduced poverty, we will need a scientific collective mind that is not only that of a natural scientist, an economist, an anthropologist or a social scientist, but that can also create a synthesis that is greater than the sum of its individual parts.

Once a competent working group is formed, the activities may range from fully the theoretical to the practical. Building a theoretical framework

### References

1. Gelan. Aflatoxin Alarm Holds No Water. Addis Fortune (2015).
2. Ahlberg et al. A Risk Assessment of Aflatoxin M1 Exposure in Low and Mid-Income Dairy Consumers in Kenya. Toxins 2018, Vol. 10, Page 348 (2018).
3. Sirma et al. Aflatoxin Exposure from Milk in Rural Kenya and the Contribution to the Risk of Liver Cancer. Toxins 2019, Vol. 11, Page 469 (2019).
4. Alonso et al. The role of livestock products for nutrition in the first 1,000 days of life. Anim. Front. (2019).

would help us identify the key uncertainties to address in research and fact-finding missions, such as risk assessments, and to develop methods to support the work.

Building an operative capacity may require more practical activities, including training, education and joint exercises, where participants with different roles and professions improve their skills by solving complex problems together. The importance of exercises may be most important in the context of an acute crisis, where difficult decisions must be made quickly. It should be noted that the war in Ukraine, a major exporter of food, has the potential to trigger a global food crisis. By the time this workshop takes place, the balance between SDGs such as food safety and food security might have shifted dramatically. Preparedness is thus the key to adaptation.

Efficient communication about risks requires understanding different ontologies as well as the perceptions of the public. Thus, an interdisciplinary research constellation is necessary if we are to generate decision support tools.

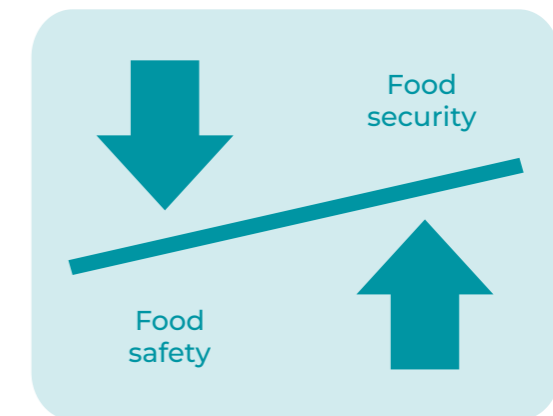


FIGURE 1. ILLUSTRATION ON HOW INCREASED FOOD SECURITY MAY MEAN DECREASING THE STANDARDS FOR FOOD SAFETY IN SETTINGS WITH HIGH CONTAMINATION AND LIMITED FOOD.



# Foodscapes for Future

– creating local support for sustainable human health

**Anna-Karin Quetel**, Sustainability strategist, Swedish Food Agency  
**Maja Engsner**, Graduate student, Uppsala University  
**Peter Bergsten\***, Professor, Uppsala University

\*Corresponding author: peter.bergsten@mcb.uu.se

## Purpose of Workshop

The purpose of this workshop is to try to understand how we can move actors in the foodscape towards promoting a healthier and more sustainable life for youth in a local context in Sweden.

## Introduction

The pandemic of obesity synergizes with the pandemic of climate change, contributing significantly to the ongoing human and environmental health crisis <sup>1</sup>.

To move society towards promoting sustainable health for its citizens as well as for the environment, a transformation of society and all its components is needed. In this context,

the food landscape – the foodscape – is an important part of the system and plays a significant role in reducing the consequences of the syndemic between obesity and CO<sub>2</sub> emissions for human and environmental health <sup>1</sup>. Therefore, a great deal would be achieved towards sustainable health if we could mobilize actors in the foodscape. However, there are challenges associated with getting the food system to act in line with the goal of supporting sustainable human and environmental health.

## Main focus of the Workshop

This workshop will focus on the following question: What is needed to achieve foodscape change and move it towards sustainable consumption?



PHOTO: NAFISE MOTLAQ, WORLD BANK, FLICKR

## Background to Workshop

*What is a foodscape?*

Foodscape is a merging of the words “food” and “landscape” and is used to describe the physical, social and perceived food environment. At times the word is used synonymously with food environment, but it isn’t necessarily the same <sup>2</sup>. In Sweden, food consumption is one of the primary contributors to ill-health and healthy life years lost, and because the foodscape influences what we consume and how much, it is one of the culprits <sup>3</sup>. Moreover, it also contributes to inequality through differential exposure in residential areas, where more energy dense and less healthy foods are frequently found in socio-economically weak areas. Still, the foodscape is poorly monitored. Most often, changes in Swedish foodscapes are anecdotally described, and there is no consistent follow-up of how they change.

## How can foodscapes change?

Foodscape change towards more sustainable food consumption will be illustrated by representatives of a Swedish municipality, retailers, and authorities. Conditions needed for co-creation between foodscape actors and multiple local societal stakeholders to move the foodscape in a society

towards supporting sustainable food consumption will be in focus. In this connection, food recommendations, guidelines and corporate responsibility plans are important components.

## Who is involved?

*Local environment*

Säffle Municipality wants to reduce ill health in children, and one part of this effort was an investigation of the local foodscape. When teenagers at one high school were asked about their diet, their answers were disheartening. In a foodscape with a wide variety of food on offer, everywhere, it was not easy for youth to make healthy choices about what to eat. Building on this, the workshop will discuss how actors in food retail, distribution and sale contribute to the local foodscape for youth in Säffle. Drivers of and barriers to foodscape change will be discussed. To start this discussion, two local speakers have been invited.

*Regulations*

Food regulations, recommendations and guidelines determine the fundamentals of food distribution, and as such, they are important to young people’s foodscape. By listening to the reasoning of the Swedish Food Agency and actors in the



local food system, participants can discuss the use of hard and soft policy measures.

*Private sector / Corporate industry / Companies*  
Many actors in the foodscape are driven by profit, but it is not their only interest. Other values such as health are also important, and part of this is described in corporate responsibility plans.

**How can we follow up foodscape change?**  
Another part of the workshop will deal with how we can monitor the shift in the local context to see movement towards a more sustainable foodscape. The participants will discuss available data, desirable data not yet available and responsibility for follow-up.

#### **Outcome**

Changing the foodscape is possible! The workshop will build a better understanding of how food retail, distribution and sales can promote more sustainable food consumption. It will also provide new insights into how to locally engage actors long-term for systemically transforming the foodscape; tools to map the local foodscape and identify its actors, gaps and leverage points; the role of guidelines and corporate plans in transforming the foodscape; tools to follow actor transition by monitoring data-driven system change.

#### **References**

1. Swinburn BA, Kraak VI, Allender S, Atkins VJ, Baker PI, Bogard JR, et al. The Global Syndemic of Obesity, Undernutrition, and Climate Change: The Lancet Commission report. *The Lancet*. 2019 Feb 23;393(10173):791–846.
2. Vonthron S, Perrin C, Soulard CT. Foodscape: A scoping review and a research agenda for food security-related studies. *PLOS ONE*. 2020 May 20;15(5):e0233218.
3. Public Health Agency of Sweden. Matmiljöns betydelse för vår hälsa. 2021.



PHOTO: BART VERWEIJ, WORLD BANK, FLICKR



# A Global Health Perspective on the Future of Meat

**Matthew Kessler\***, Project coordinator, TABLE / SLU Future Food, Swedish University of Agricultural Sciences

**Annsophie Wahlström**, Director/Manager, SLU Future Food, Swedish University of Agricultural Sciences

**Ylva Carlqvist Warnborg**, Science journalist, SLU Future Food, Swedish University of Agricultural Sciences

\*Corresponding author: [matthew.kessler@slu.se](mailto:matthew.kessler@slu.se)

## Introduction

Meat production and consumption are intertwined with public health, sustainability, cultural values, equality and planetary boundaries. The question of what role meat should play in meeting the global demand for healthy and nutritious food becomes more and more complex when we think about how deeply personal, contested, and polarizing discussions around meat often are.

Current rates of meat consumption place severe pressures on the environment. Over 75% of global agricultural land is devoted to animal production (Poore and Nemecek, 2018) and approximately 15% of global anthropogenic greenhouse gas emissions are attributed to the livestock sector (Gerber et al., 2013). At the same time, sustainable livestock production is pivotal to livelihoods across the world, as well as reducing malnutrition and hunger and contributing to ecological functioning (Leroy et al. 2022).

While people broadly agree on the global challenges confronting producers and consumers of meat, there isn't a clear alignment on how farmers, civil society, governments, industry, retailers, and citizens advocate for solutions. Some say we must increase the efficiency of both livestock production and meat consumption (e.g., eating all parts of the animal), while others advocate for more

sustainable and humane production and at the same time decrease overall meat consumption. There are some who call for a near elimination of meat from diets in high-income countries and urge people to adopt a more plant-based diet. Others call for a radical redesign of food production and suggest that we should produce cultured "meat" indoors in labs to reduce our dependence on land, water and soil. And some find insects an important part of the solution for healthier people and a healthier planet.

Our workshop aims to understand what combination of these futures can meet the complex and interrelated food, climate and health challenges facing different countries and regions. To do so, we will discuss the following questions:

- From a global public health perspective, what futures for meat and livestock make the most sense across different regional contexts?
- How much is the health status of the planet and animals intertwined with human health? What are the tradeoffs when we advocate for better outcomes for food security, nutrition, animal welfare or reduced environmental impacts?
- What are the challenges when communicating specific recommendations to different regions across the world?



PHOTO: GLORCZA, GETTY IMAGES

## Background

Questions about what the future of meat should look like encompass all of the typical food systems problems and some unique ones. People have different levels of access to healthy, nutritious and culturally appropriate foods (both within any given country and across countries around the world). Some parts of the global population are eating too much, and others are severely undernourished. Overproduction and food waste lead to many harmful impacts on the environment, including increased greenhouse gas emissions, deforestation, and reduced soil and water quality. To meet these challenges and create a sustainable, resilient and just food future, we have to tackle big questions, including: What is a sustainable, healthy diet, and how much land should be devoted to animal agriculture?

Outlining these problems and identifying that meat and livestock are at the center of these challenges, however, does not readily bring us to simple solutions. Livestock are incredibly important and beneficial to people and ecosystems in a variety of ways. Meat consumption provides many essential nutrients including iron, zinc and B vitamins. It's estimated that more than 1 billion people across the world have livelihoods dependent on or related to livestock production (Magnusson, 2016). Livestock are also important

contributors to sustainability, as they can graze on non-arable lands and convert non-edible byproducts of agriculture into food. They act as landscape managers and play a role in the nutrient cycling of ecosystems and agroecosystems (Karlsson, 2022). There are also debates surrounding whether livestock can be used to manage soils to increase and store additional carbon as a way to mitigate the impacts of climate change (Garnett et al., 2018). Ultimately, meat production and consumption are seen as either part of the problem or as part of the solution.

### *A project to increase dialogue and decrease polarization*

Not only is the evidence contested concerning what role livestock and meat should play in the future, but discussions around the topic are often personal, disputed and increasingly polarized. Opposing stakeholders often talk past one another and fail to see – or are unwilling to see – each other's point of view. The consequences of this failure are the further entrenchment of positions and policy inertia at a time when the need to address the unsustainability of the food system has never been more urgent.

This workshop is part of an ongoing two-year Formas communications project led by TABLE and SLU Future Food: Meat: the four futures. The project examines four different futures for





PHOTO: THOMAS ZSEBOK



PHOTO: SANJERI, GETTY IMAGES

meat and livestock (adapted from Garnett (2015) Gut feelings essay) - a plant-based meatless future without animals, an alternative “meat” future without “traditional meat” but with insects and meat produced in labs instead, a less meat future that favors animals on pasture and decreased consumption of meat, and an efficient meat 2.0 future that reduces the environmental impact of livestock production and maintains or increases current levels of consumption.

The workshop will build on the work of this project and focus particularly on a public and human health perspective. We will set up small groups to discuss the promises and pitfalls of each future when applied to different regional and country-specific contexts and emphasize the animal, people and planetary health dimensions.

**Suggested reading:**

Meat the four futures project webpage: <https://tabledebates.org/meat>

Garnett, T. 2015. Gut feelings and possible tomorrows: (where) does animal farming fit. Food Climate Research Network, Environmental Change Institute, University of Oxford: Oxford.

**Suggested listening:**

Meat: the four futures podcast

**References:**

- Garnett, T., Godde, C., Muller, A., Röss, E., Smith, P., De Boer, I.J.M., zu Ermgassen, E., Herrero, M., Van Middelaar, C.E., Schader, C. and Van Zanten, H.H.E., 2017. Grazed and confused?: Ruminating on cattle, grazing systems, methane, nitrous oxide, the soil carbon sequestration question-and what it all means for greenhouse gas emissions. Food Climate Research Network.

**Workshop aims**

In line with the project, the workshop aims to increase the clarity of context-specific communication on this complex topic. Specifically, we wish to sort out evidence-based facts from “facts” based on values, find common ground among a diverse set of stakeholders, and identify what the tradeoffs are when advocating for one future over another. Given the highly polarized environment, where it can be difficult to communicate nuanced messages, we will also identify important considerations when making recommendations at the country, region, or global level. The insights from this workshop alongside the project will be formatted into a policy brief.

- Gerber, P.J.; Steinfeld, H.; Henderson, B.; Mottet, A.; Opio, C.; Dijkman, J.; Faluccci, A.; Tempio, G. 2013. Tackling Climate Change Through Livestock—A Global Assessment of Emissions and Mitigation Opportunities; FAO: Rome, Italy.
- Karlsson, J., 2022. ‘Livestock as resource users and landscape managers-A food systems perspective.’ PhD dissertation. Swedish University of Agricultural Sciences. Uppsala.
- Leroy, F., Abrai, F., Beal, T., Dominguez-Salas, P., Gregorini, P., Manzano, P., Rowntree, J. and Van Vliet, S., 2022. Animal board invited review: Animal source foods in healthy, sustainable, and ethical diets—An argument against drastic limitation of livestock in the food system. *Animal*, 16(3), p.100457.
- Magnusson, U., 2016. Sustainable global livestock development for food security and nutrition including roles for Sweden. Ministry of Enterprise and Innovation, Swedish FAO Committee, Stockholm.
- Lal, R., 2004. Soil carbon sequestration to mitigate climate change. *Geoderma*, 123(1-2), pp.1-22.
- Poore, J. and Nemecek, T., 2018. Reducing food’s environmental impacts through producers and consumers. *Science*, 360(6392), pp.987-992.



# Tackling Antimicrobial Resistance for Sustainable Food Systems

*– how to address the knowledge, practice and governance gaps*

**Marmar Nekoro\***, Assessor, Swedish Medical Products Agency  
**Krister Halldin**, Assessor, Swedish Medical Products Agency  
**Kristina Osbjer**, Scientific Advisor, International Centre for Antimicrobial Resistance Solutions  
**Ulf Magnusson**, Professor, Swedish University of Agricultural Sciences

\*Corresponding author: marmar.nekoro@lakemedelsverket.se

## Aim of the workshop

Increased occurrence of antimicrobial resistance (AMR), sometimes termed the silent pandemic, is increasingly recognized as one of the biggest threats to global health, food security and development. It has serious consequences for societies and economies (WHO, 2020). Our ability to sustainably feed a growing global population depends on our success in protecting the food systems from threats, including AMR. According to FAO, the world is expected to produce the same amount of food in the next 30 years as it has produced in the last 10,000 years combined. This will put unprecedented pressure on our agricultural systems to deliver nutritious food safely and sustainably, while facing climate change, global health treats and diminishing natural resources (FAO, 2021). It is estimated that more than half of the antibiotics used globally are used in food animals and that the use of antimicrobials for livestock alone will nearly double by 2030 compared to 2010 (van Boeckel et al., 2015).

We acknowledge that there are large geographical, socioeconomic and cultural variations in food systems. These differences may

influence knowledge sharing and application of policies, regulations and planning frameworks, all of which are important for infection prevention, infection control, use of antimicrobials in animal production, and approaches to minimize the risk of the development and spread of AMR.

To reduce AMR in global food production, we are convinced that there is a need to understand and recognize local differences, barriers, and opportunities. How do we ensure food security and economically resilient food production while reducing the use of antimicrobials? How can national and global funding best support the development and implementation of National Action Plans (NAPs) and other local or global frameworks? What can we learn from countries that have managed to maintain production and market sales while reducing the use of antimicrobials? How can farmers who depend on animal husbandry as their main livelihood be supported in reducing and refining antimicrobial use?



PHOTO: CHARLOTTE KESL, WORLD BANK, FLICKR

This workshop invites stakeholders and actors from the private, public and non-profit sectors from different geographical, economic and cultural settings to jointly and openly discuss hurdles for implementation. Participants will share knowledge and best practices, with the aim to contribute to new solutions to the complex and urgent problem of AMR.

We especially encourage the animal husbandry and welfare sector, including veterinary medicine, and policymakers to share knowledge and experiences as well as examples of evidence-based best practices, including soft and hard policies such as guidelines, laws and regulations. What is needed for producers, practitioners, retailers and other stakeholders, including policymakers, across sectors and ministries, to facilitate the implementation of NAPs?

## Aim of the workshop

- Share ideas and experiences on how different settings in global animal food production influence the implementation of best practices, guidelines, policies and regulations.
- Propose actions that consider differences in economy, culture, trade and production systems when developing policies related to antimicrobial use and resistance in livestock.

## Introduction

Widespread overuse and misuse of antimicrobials in the health and livestock sectors, in combination with inadequate preventive measures to control infections, have contributed to the global emergence and spread of AMR. Consequently, antimicrobials, including antibiotics, have lost efficacy. This has major implications, because antimicrobials are prerequisites for modern healthcare and treatment of a wide range of diseases, as well as an important tool to ensure the health, welfare and productivity of food-producing animals. AMR makes treatments for disease less effective or even useless. This is reducing possibilities to treat infection, which leads to more severe and prolonged illness and ultimately increased mortality.

The consequences of AMR for global health and economy are large and increasing. A recent report published in Lancet shows that, in 2019, approximately 1.2 million people died as a direct result of antibiotic resistance and up to five million deaths are associated with AMR (Murray et al., 2022). For the EU alone, the burden of resistant infections of 870,000 person-years is estimated to result in healthcare costs and productivity losses of approximately 1.5 million Euro annually (ECDC, 2009). According to estimates by the World Bank Group, annual





PHOTO: FAO / ISAK AMIN / ARETE

reductions in global GDP caused by AMR will be 1.1 – 3.8 percent by 2050, with an annual shortfall of 3.4 trillion USD by 2030 (Jonas et al., 2016). Output and trade in livestock and livestock products are especially vulnerable, with scenarios showing that livestock production in low-income countries could decline by up to 11 percent by 2050. Thus, low-income countries are projected to experience larger reductions in economic growth compared to high-income countries, leading to increased economic inequalities (Jonas et al., 2016).

Without AMR containment, the 17 United Nations Sustainable Development Goals for 2030 (UNGA, 2015) are less likely to be achieved. This concerns in particular the goals on ending poverty and hunger, ensuring good health and wellbeing, food security and economic growth. According to the report by the World Bank Group (Jonas et al., 2016), the impact of AMR on poverty is particularly worrying. In the high AMR-impact scenario, an additional 24 million people would be forced into extreme poverty by 2030, with most of the increase occurring in low-income countries. Given the increasing recognition that AMR has effects on global health and global economy, policymakers and stakeholders from various sectors worldwide must treat AMR as a priority global health and sustainability issue (Sida, 2022).

#### Why are antimicrobials used in livestock production?

We recognize the ethical dimensions and the need to secure efficient antimicrobials to treat infections in sick animals. However, most of the antimicrobials used in the livestock sector are to compensate for sub-optimal animal management (disease prevention) and for promoting growth in food animals (van Boeckel et al., 2015).

In 2010, the total global consumption of antimicrobials was estimated at approximately 63,000 tons. Following increasing urbanization and economic development, there is a growing demand for a more varied diet that includes animal source foods. This increased consumer demand fuels a transformation towards more large-scale farming. As this often corresponds to more routine use of antimicrobials, the consumption of

antimicrobials is predicted to rise. Tieso et al. (2020) estimated that antimicrobial use (AMU) in chicken, cattle and pigs (accounting for 94 percent of all food animals) was 93,309 tons in 2017 and projected to increase 11.5 percent by 2030 to 104,079 tons). This increase in antimicrobial use is a key driver for the increasing levels of antimicrobial resistance threatening human and animal health.

#### Preventing and controlling AMR in food production systems

Food systems encompass the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products. Management of AMR in the food chain starts from primary production and continues through to consumption (FAO, 2020). In today's food production systems, there is extensive reliance on antimicrobials in animal husbandry. This extensive use is associated with several risks coupled to the potential passing of drug-resistant strains of microorganisms and antimicrobial resistance genes (FAO and IEAE, 2019). Pathways include:

- Transmission through contact between humans and animals on farms
- Processing, transport, or handling of food animals and food products
- Environmental contamination (e.g., via water or soil, manure or wastewater discharge)

It should be noted that the overall, as well as relative, importance of these three pathways is largely unknown. The so-called One Health approach recognizes that the health of people is connected to the health of animals and the environment. Resistant bacteria and genes, and thus AMR, can pass between and among humans, wild and domesticated animals, plants and the environment. This has an impact on food production, biodiversity and ecosystem services, livelihoods and sustainable development.

Minimizing the development and spread of AMR in animal husbandry is one important factor if we wish to achieve national and international goals of controlling AMR and to build resilience in the food and agricultural sectors. According to the FAO Action Plan on Anti-



microbial resistance 2021-2025 (FAO, 2021), a combination of measures and actions are needed including:

- Improving access to expert advice, prescriptions and appropriate antimicrobials will help tackle the challenge of antimicrobial misuse
- Training stakeholders through better guidance for antibiotic stewardship will help to reduce the inappropriate use of antimicrobials
- Phasing out of the use of antimicrobials in animals for growth promotion or to prevent diseases in healthy animals
- Improving the biosecurity of farms and preventing infections through good animal husbandry
- Vaccinating animals to reduce the need for antibiotics, and when available, using alternatives to antibiotics
- Only giving antibiotics to animals under veterinary supervision and not those critically important for humans.

One example of effective work towards decreasing use of antibiotics, although from a very specific setting, is Sweden's long history of incorporating measures coupled to prevention of infectious diseases in animals into legislation. A general ban on antibiotics for growth-promotion purposes in livestock came into force in 1986 (FAO, 2020). Moreover, by showing other EU member states that efficient animal production is possible without antibiotic growth promoters (AGPs), Sweden was one of the driving forces behind the EU-wide ban on AGPs being enforced in 2006. This ban has led to a decrease in antibiotic use in many EU member states. In January 2022, the EU enforced a new Veterinary Medicinal Products Regulation (Regulation (EU) 2019/6) with updated rules on the authorization and use of veterinary medicines, which strengthens EU action to fight AMR. Through specific measures to ensure prudent and responsible use of antimicrobials in animals, including reserving certain antimicrobials for the treatment of infections in people, this complements previous Infection Prevention and Control (IPC) measures. It is also an important tool to ensure that antibiotics for human use are safeguarded.

Addressing the AMR issue depends, among other things, on access to relevant knowledge, education, and information (WHO, 2016). As organizers of this workshop, we acknowledge that a key element in achieving sustainable change in Sweden has been the bottom-up approach. Mandatory measures and new legislation related to AMR have often originated from voluntary commitments made by farmers as well as thorough discussions and evaluations carried out by stakeholders. This has ensured feasibility and increased compliance.

In this workshop, we wish to discuss and contribute to greater understanding among policy-makers and practitioners concerning how dissemination of knowledge, economic incentives, choice of measures and possibilities for enforcing regulations can successfully change practices in different socioeconomic and cultural settings. Acknowledging that behavioral change is key, we hope to jointly identify solutions adapted to different settings that can guide policy recommendations for antimicrobial stewardship in food production.

#### References and suggested readings

1. ECDC, The bacterial challenge: time to react. A call to narrow the gap between multidrug-resistant bacteria in the EU and the development of new antibacterial agents, 2009, ISBN 978-92-9193-193-4. (0909\_TER\_The\_Bacterial\_Challenge\_Time\_to\_React.pdf (europa.eu))
2. European Commission, Regulation (EU) 2019/6 of the European Parliament and the Council of 11 December 2018 on veterinary medicinal products and repealing Directive 2001/82/EC
3. EUR-Lex - 32019R0006 - EN - EUR-Lex (europa.eu)
4. European Medicines Agency, Antimicrobial resistance in veterinary medicine. Assessed 20 May 2022. Antimicrobial resistance in veterinary medicine | European Medicines Agency (europa.eu)
5. FAO, Tackling antimicrobial use and resistance in dairy cattle: Lessons learned in Sweden. Rome. 2020, (<https://doi.org/10.4060/cb2201en>)
6. FAO, Antimicrobial resistance in food. Information sheet 2020,
7. (<https://www.fao.org/3/ca8275en/CA8275EN.pdf>)
8. FAO and IAEA. Antimicrobial movement from agricultural areas to the environment: The missing link. A role for nuclear techniques. Rome, FAO 2019. (CA5386EN.pdf (fao.org))
9. FAO. The FAO Action Plan on Antimicrobial Resistance 2021–2025. Rome 2021. <https://doi.org/10.4060/cb5545en>
10. Jonas, Olga B. et al., Drug-resistant infections: a threat to our economic future (Vol. 2): final report (English). HNP/Agriculture Global Antimicrobial Resistance Initiative Washington, D.C.: World Bank Group. 2016.
11. Magnusson U. and Stewart K. (editors), Uppsala Health Summit: Managing Antimicrobial Resistance Through Behavior Change, Uppsala, March 2021
12. Murrey C., et al., Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis, *The Lancet*, Vol. 399, Issue 10325, p. 629-655, Feb 12, 2022.
13. OECD, Antimicrobial resistance and agriculture policy brief. 2019. (Antimicrobial resistance and agriculture - OECD)
14. Sida, Addressing Antimicrobial Resistance to Support Sustainable Development, Technical Note, March 2022.
15. Tieso, K., et al., Global Trends in Antimicrobial Use in Food Animals from 2017 to 2030. *Antibiotics* (Basel, Switzerland), 9(12), 918, 2020.
16. UNGA (United Nations General Assembly, Transforming our world: the 2030 Agenda for Sustainable Development, 2015. (United Nations Official Document)
17. van Boeckel T, et al., Global trends in antimicrobial use in food animals, *PNAS*, Vol. 112, Issue 18. Pp 5649-5654, 2015. (Global trends in antimicrobial use in food animals | PNAS)
18. World Health Organization, "Antibiotic resistance factsheet", 2020. Accessed 10 March 2022, (Antibiotic resistance (who.int))
19. World Health Organization, Global action plan on antimicrobial resistance, 2015. (ISBN: 9789241509763. Global action plan on antimicrobial resistance (who.int))



# Governance

## Steering Committee

Chair: Professor Anders Hagfeldt  
Vice-Chancellor, Uppsala University

Dr Björn Eriksson  
Director General, Medical Products Agency

Professor Maria Knutson Wedel  
Vice Chancellor, Swedish University of Agricultural Sciences, SLU

Professor Ann Lindberg  
Director General, National Veterinary Institute, SVA

Emilie Orring  
Chair: Uppsala County Council Executive Committee,  
Uppsala County Council

Professor Johan Schnürer  
Vice-Chancellor, Örebro University

Charlotte Skott  
Director, Business and Economic Development,  
City of Uppsala

## Advisory Board

Chair: Professor Stefan Swartling Peterson  
Professor of Global Transformations for Health,  
Karolinska Institutet; Professor, Uppsala University;  
Professor, Makerere University; Health Specialist,  
UNICEF Sweden

Professor Florence Haseltine  
Medical Director of the North Texas Genome Center,  
founder Society for Women's Health Research; Former  
Director NIH Center for Population Research

Dr Anders Milton  
Senior consultant, former President and CEO of the  
Swedish Medical Association and Swedish Red Cross

Maria Stella de Sabata  
International Diabetes Federation European Region,  
and Advisor, Fondo Elena Moroni per l'Oncologia

Dr Ingrid Wünning Tschol  
Senior Vice President, Strategy, Robert Bosch  
Foundation

## Project management

Dr Anna Ledin  
Project Manager and Senior Advisor, Uppsala University

Kerstin Stewart  
MPH, M.Sc., Project Coordinator, Uppsala University

Monika Gutestam Hustus  
M.A., Communicator, Uppsala University

Ellen Genstrand  
M.Sc., Administrator, Uppsala University

Hang Nguyen  
M.Sc., Administrator, Uppsala University  
(on maternity leave)

## Program Committee

### Programme Committee Chair:

Karin Artursson, PhD, Scientific Director and Adjunct  
Professor, National Veterinary Institute (SVA)

### Committee Members:

Assem Abu Hatab  
PhD, Associate Professor, Department of Economics,  
Swedish University of Agricultural Sciences (SLU),  
Senior Researcher, Nordic Africa Institute, Sweden

Peter Bergsten  
PhD, Professor, Department of Medical Cell Biology  
(MCB), Uppsala University

Meena Daivadanam  
PhD, Associate Professor and Senior Lecturer,  
Department of Women's and Children's Health –  
International Child Health and Nutrition, Uppsala  
University

Fredrik Fernqvist  
PhD, Senior Lecturer, Department of People and  
Society/SLU Future Food, Swedish University of  
Agricultural Sciences (SLU)

Matthew Kessler  
M.Sc., Project Coordinator TABLE, SLU Future  
Food/Department of Energy and Technology,  
Swedish University of Agricultural Sciences (SLU)

Johanna Lindahl  
PhD, Research Scientist, Swedish University of  
Agricultural Sciences (SLU) and International  
Livestock Research Institute

Marmar Nekoro  
M.Sc., Assessor, Swedish Knowledge Centre  
on Pharmaceuticals in the Environment,  
Swedish Medical Products Agency

Ylva Persson  
PhD, Associate State Veterinarian and  
Associate Professor, Department of Animal  
Health and Antimicrobial Strategies, National  
Veterinary Institute (SVA)

Anna-Karin Quetel  
M.Sc., Nutritionist and Sustainability Strategist,  
Swedish Food Agency

Alicja Wolk  
PhD, Professor of Nutritional Epidemiology,  
Karolinska Institutet; Deputy Chairman of  
the Institute of Environmental Medicine,  
Karolinska Institutet





## SPONSOR



## PARTNERS



[www.uppsalahealthsummit.se](http://www.uppsalahealthsummit.se)

Uppsala Health Summit  
c/o Uppsala University  
P.O. Box 256  
SE-751 05 Uppsala, Sweden  
info@uppsalahealthsummit.se  
#UppsalaHealthSummit