UPPSALA HEALTH SUMMIT

Healthy Lives from Sustainable Food Systems
October 2022

Uppsala HEALTH SUMMIT

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Healthy Lives from Sustainable Food Systems
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A sustainable food system should deliver food security and nutrition for all. But unfortunately, the number of malnourished people continues to grow worldwide. Conflicts, climate shocks, low productivity and inefficient food supply chains are pushing the cost of nutritious foods and increasing the unaffordability of healthy diets. Currently, one in nine people, 820 million worldwide, are hungry or undernourished, and simultaneously, one-third of the world's adult population is overweight or obese. In addition, there is an unequal burden in terms of disease incidence, morbidity, mortality, survival, and quality of life between subgroups related to the food environment.

At the 2022 Uppsala Health Summit held on October 25-26, solutions for creating a more sustainable food system were discussed. Around 200 food and health experts from civil society organizations, private companies, the public sector and academia from approximately 30 countries met to take part in these science-to-policy dialogues.

The conference consisted of four plenary sessions and nine workshops focusing on different aspects of the complex food systems puzzle. The summit was organized by researchers from Uppsala University, the Swedish University of Agricultural Sciences, Örebro University and the National Veterinary Institute (SVA), along with the city of Uppsala, Uppsala Region and the Swedish Medical Products Agency.

In workshops and in plenary sessions, human medicine and nutrition perspectives were met with views from agriculture, veterinary sciences and the social sciences. Practical experience of policy implementation at different levels and contexts was central to the discussions.

The summit's objective was to contribute to the dialogue on how to practically follow-up on recommendations from the 2021 UN Food Systems Summit, but with a particular emphasis on food systems' impact on health. In nine different workshops and plenary presentations, as well as dialogues, the following was discussed:

- What does the term 'food systems' mean to different groups representing various interests in the food systems, and how can different actors work together to promote policy and practice change?
- A toolbox of policy interventions intended to create the right incentives for adopting more appropriate practices aimed at systems change, as well as the ethical aspects of our options and choices.

Examples of tools in the toolbox:

- Actions that improve the production and increase the supply of foods needed to support healthy diets in crisis as well as in stable times – including agile solutions for adaptation of production systems, animal species, and breeds, greater recognition of the role of smallholder farmers and policies that can protect us from unsafe foods and antimicrobial resistance.
- Actions that make healthy diets more accessible by integrating food perspectives into spatial planning and local, national, and global food strategies. Actions that enable, motivate and empower people everywhere to prepare and eat healthy diets produced using environmentally sustainable practices. This also included perspectives on individual behavioural change.

A transformative change in our food environment is urgently needed if we are to improve human and planetary health and well-being and achieve the Sustainable Development Goals (SDGs) 1–3. Despite relatively good evidence of what a healthy and sustainable diet could look like, there is a large gap between knowledge and current dietary habits. Overweight and obesity are increasing globally, not least among adolescents. Because less healthy foods, such as energy-dense and nutrient-poor foods, tend to be more common in socioeconomically disadvantaged areas, food exposure also contributes to health inequality. The workshop Foodscapes for the Future - Creating Local Support for Sustainable Human Health emphasized that bridging the gaps involves changes to both the food environment and our behavioural patterns using both soft and hard policy measures. The participants stressed the importance of locally co-created solutions between different foodscape actors, e.g., politicians, retail and multiple local stakeholders, to support adolescent health. Using a real example from a Swedish municipality, the participants suggested necessary actions to encourage healthy and sustainable eating, such as displaying healthy foods in places associated with positive feelings, improving pricing incentives for both industry and consumers, and introducing nutrition education across all levels of society and government. Similarly, the workshop, the Diet-Environment-Health Nexus, highlighted the interconnectedness between solutions at the individual level (micro-level) and policies (macro-level) as well as the opportunities associated with improving the choice architecture around individuals and ensuring that the "right choice" is the default choice. One key success factor is identifying the agents and factors with the greatest relative impact on facilitating change, and building on sustainable and equitable practices in local contexts.

Imbalances in food systems are major drivers of dietary and nutrition inequities. Participants in the Summit had the opportunity to actively contribute to the continued development of the SHIFT Framework, which was established by an international team of researchers committed to assisting technical staff in improving health and nutrition equity. The framework tool helps identify and implement equity-focused interventions related to the food environment. To further improve the equity aspects of the tool, a set of recommendations was suggested. These include mapping equity gaps within the food environment, ensuring the engagement of relevant stakeholders, facilitating transformation by setting goals and securing financial and human resources as well as monitoring and evaluating both the process and the outcome.

Food planning refers to the integration of food into societal planning and policies, primarily implemented through the mechanisms of spatial planning and the development of food strategies. Food strategies and spatial planning consist of many different implementation activities, which result in different food system outcomes, such as improved access to food, better food availability and affordability, improved public health and nutrition, and greater consideration of environmental impacts. In the workshop Food Planning for Sustainable Consumption and Healthier Living, participants reviewed and discussed a toolbox containing different approaches at different foodscape levels. Instruments included taxes, legislation and regulations, empowerment and youth engagement, and sharing and collaboration through holistic planning approaches, including spatial planning, social science and public health.

When transforming food systems, the robustness of the production systems, the adaptability to climate change, biodiversity, and farmers' socioeconomic factors are key. Diversity in farming systems and solutions adapted to local factors are other important aspects. Improved resilience will contribute to maintaining food production in situations like drought, armed conflicts and other unwanted events affecting the production and supply chains. In the workshop Sustainable Animal Food Production in War and Peace, participants devised solutions to promote a sustainable ruminant food system with a preparedness perspective, including top-down and bottom-up perspectives. To minimize global greenhouse gas emissions, diverse ruminant production with regard to herd size, breeds, species, region, technology, etc. is needed. The contribution of grazing animals to biodiversity, as well as to sustainable and robust production, must be recognized. More self-sufficiency is essential to being prepared for a crisis. There is also a need for on-farm preparedness and contingency plans and the ability to allocate people to work on farms instead of going into the armed services. The cost of producing sustainable food with a preparedness perspective will be higher, with the consequence that consumers will have to pay more for food and thus must be made aware of these interrelationships.

One problem in animal husbandry is the widespread over- and misuse of antimicrobials (AMR), in combination with inadequate measures to prevent and control infections, which have contributed to the global emergence of resistance. This poses a considerable threat to human health and modern medicine. Tackling AMR is needed if we are to protect human and animal health while increasing sustainability in the food and agricultural sectors. Tackling Antimicrobial Resistance for Sustainable Food Systems - how to address the knowledge, practice and governance gaps identified solutions in different settings that can guide policy recommendations on antimicrobial stewardship. Consensus was reached on several prioritized actions and solutions to address the challenges of tackling antimicrobial resistance for sustainable food systems. These were divided into knowledge, practice, and governance gaps, respectively. For each of these gaps, a set of recommendations was identified.

Smallholder farmers produce a large proportion of the food consumed around the world. People engaging in smallholder farming are often poorer and thus more food insecure than the respective national averages. Transforming smallholder farming into more industrialized intensive forms of agriculture is often emphasized as a solution to providing more returns, increasing global food security, boosting rural economic development, and contributing to poverty reduction. Smallholder farming, however, improves food and nutrition security directly by improving access to diverse sources of food, and indirectly by increasing incomes and thus expend on more and better food. The workshop Zero hunger; Is Smallholder farming the solution? invited researchers, policymakers, and international organizations working with agriculture and food systems to discuss the future of smallholder farming, whether sustainable small-scale agriculture can be achieved and whether sustainable industrialization is desirable. One question discussed in the workshop during the Summit was how to better include smallholder voices and priorities in policy and research. Part of the solution could be to encourage smallholders to work together, for example, in cooperatives, to provide a common voice to influence policymakers. Creating political will for supporting smallholder farming requires awareness-raising activities with national and local decision-makers concerning their understanding of the contribution, role and impact of smallholders.

Often there is a conflict between food security and food safety. Foodborne hazards, such as mycotoxins and salmonella, constitute a health hazard to humans. Some countries do not accept this kind of hazard in food products, which means that products with potential contamination are banned or destroyed. If food security is good, this will not affect human nutrition, but in large parts of the world, destroying food is not an option. The workshop Food Safety vs. Food Security highlighted when the different UN Sustainable Development Goals (SDGs) can come into conflict with each other, and how frequently priorities and goals compete with each other. During a crisis, lowering food safety standards may need to be considered to ensure food

security. Because priorities vary across countries and in different situations, conflicts between SDG 2 and 3 may arise. To reduce the impact, a suggested priority action area is to decide on legislation for sustainability and develop scales to measure it. Research is needed on how to reuse food waste and reduce post-harvest losses, and a framework for risk-benefit assessments with more dimensions is called for. These actions include many stakeholders.

Meat production and consumption are intertwined with public health, sustainability, cultural values, equality, and planetary boundaries. Moving to a more plant-based diet with less red and processed meat and with more fruits and vegetables will reduce not only the risks of life-threatening diseases but also the environmental impact of the food system. However, meat is also a very important protein source in many countries and for some population groups, such as the elderly. Questions about what the future of meat should look like were the focus of the workshop A Global Health Perspective on the Future of Meat. The aim of this workshop was to explore different pathways for the future of meat and livestock, and one of the recommendations was that food and agriculture decision-makers be more self-reflective and nuanced when approaching this highly complex topic.

In conclusion, the Uppsala Health Summit 2022 resulted in several innovative ideas and recommendations for how to transform the food system into sustainable food production that supports healthy lives for everyone – a step towards especially SDG 2 and 3. These ideas will now be brought back to policymakers and hopefully integrated into future strategies for a sustainable food system. The importance of cross-sector collaboration cannot be overestimated and should always be considered when creating strategies. The outcome of the Summit is our contribution to a more sustainable world. You are always welcome to contact the researchers to study the results further and discuss possible applications. The conclusions and suggestions from the nine workshops are presented on the following pages and can be found at www.uppsalahealthsummit.se.

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Healthy Lives from Sustainable Food Systems
October 2022

Food Planning for Sustainable Consumption and Healthier Living

Fredrik Fernqvist, Andrew Gallagher, Håkan Jönsson, Charles van de Kerkhof, Ingrid Sarlöv-Herlin, Naila Sharifova, Annsofie Wahlström, Jannie Vestergaard

Background

In the past decade, the development of several public strategic documents has shown that food and health are priorities on public agendas. Food strategies point out the direction of food-related policies at different governance levels, such as the municipal (local), regional, national and international level.

Food planning refers to the integration of food into societal planning and policies, which is primarily implemented through two mechanisms: spatial planning and the development of food strategies. Spatial planning is the coordination of policies and practices organizing lived environments, whereas food strategies are the policy visions setting out long-term measures affecting the food system. Bringing together these domains means that a diversity of stakeholders must be involved in shaping food planning at different governance levels, which is broadly aimed at creating a more sustainable food system that is better aligned with the societal goals of public health, ecological integrity and social justice.

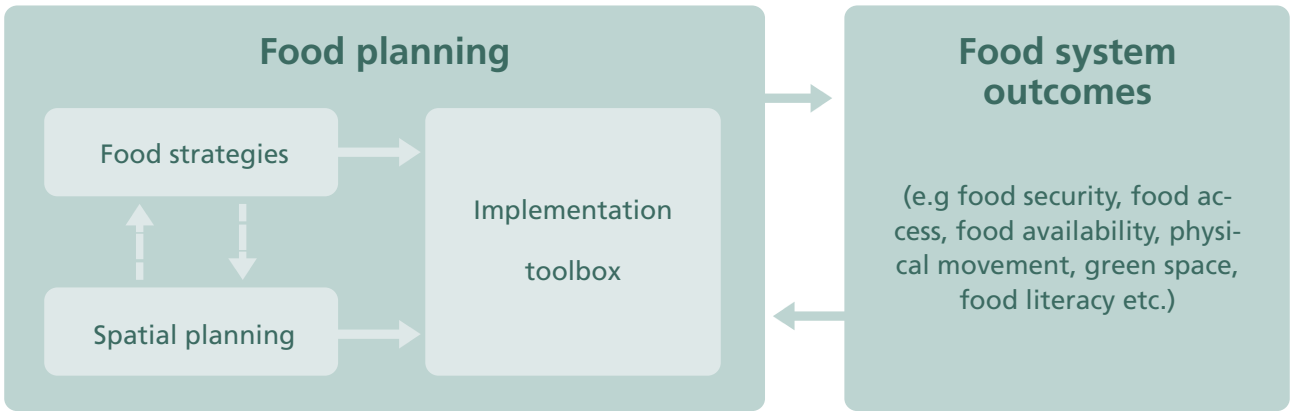
Food strategies and spatial planning consist of many different activities of implementation, which result in different food system outcomes, such as improved access to food, better food availability and affordability, improved public health and nutrition, and greater consideration of environmental impacts (Figure 1). Implementation can take the form of collaborative arrangements, citizen engagement, changes in landscapes for physical activities, and making food more visible in the landscape.

Approach

The objectives of this workshop were to explore how different tools in the planning toolbox can promote increased food awareness, healthier food consumption and physical activity as well as to exemplify the need for and potential of food planning and discuss how different applications can be implemented in practice. Twenty-five participants from eight countries – who come from the public sector, private businesses, NGO's and academia – contributed to the workshop.

The workshop was introduced by two inspirational speakers. Professor Kevin Morgan from Cardiff University stressed that society needs more effective food planning if we are to create a more sustainable food system that is better aligned with the societal goals of public health, ecological integrity and social justice. He emphasized that this can best be done by

FIGURE 1. CONCEPTUALIZING FOOD PLANNING



empowering communities and utilizing existing policy levers to move the food system onto a more desirable trajectory. He used the example of municipalities that are able to consult and interact with citizens on the creation of sustainable foodscapes and that direct ways to influence the food system through policy levers like food procurement. Associate professor Chiara Tornaghi from Coventry University raised the grassroots perspective on food system change and the need to include food actors across society, as well as to engage activists in food-related questions in spatial planning and the development of food strategies. She argued that food system change is a transdisciplinary endeavour that should rest upon the principle that everyone can help in generating new knowledge and practices in their food environments. In this respect, food planning and policy-making need to be more radical, more equitable and include multiple forms of collaboration for change-making.

The following discussion pinpointed that grassroots activists may not need planners, but planners, by virtue of their profession, need to be part of the movement if we are to reshape and reframe the food system. This stresses the need for an inclusive and participatory approach to food planning.

In the following creative workshop, more specific questions related to food planning were discussed. Through a 'brainstorming session', Post-it Notes were successively added to a larger whiteboard reflecting the main take-aways from the group discussions. The results may be used to further explore the realm of food planning so as to develop the food planning toolbox. Four questions were in focus:

- WHAT are the challenges (hardest-to-solve issues) in the current food systems?
- WHY? What are the desired OUTCOMES of food planning?
- HOW to do it? What tools, models, recommendations could be used?
- WHO should be part of food planning and who – from the grassroots to authorities and the private sector – is missing?

Recommendations

Recommendation 1: Identify the food system challenges for which food planning can make a difference.

The workshop identified numerous challenges that need to be resolved, where food planning could prove important. These were assigned to the following ten categories:

1. Accessibility and Affordability of food: related to access, pricing, value, purchasing, sovereignty, security and exposure.
2. Nutrition and Health: nutrition, the role of the industry, marketing and distributors, food safety & security and food labelling.
3. Resources: efficiency, land scarcity, production, shocks, and land planning.
4. Technologies: recycling.
5. Culture: the rising middle class, cultural habits, lifestyles and what is accepted.
6. Food Waste: production and resource inefficiency.
7. Measuring: difficult-to-measure outcomes, data deficiency and traceability.
8. Economy: challenges related to current forms of capitalist economic systems.
9. Communication and Education: influencers and children not knowing where food comes from and how to cook.
10. Governance: building bridges, food and social policies, rules and regulations regarding the selling of food.

Recommendation 2. Specify the goals of food planning. What are the desired outcomes?

Food planning should be used to respond to these various food system challenges and drive changes towards more sustainable food system outcomes. Such desirable outcomes could be:

1. Improved health: e.g., individual health, societal health, environmental health, food safety and a resilient food system (sustaining the accessibility of healthy food also in times of crisis).
2. Knowledge and Education: e.g., improved knowledge and interest in healthy and sustainable food.
3. Improved (food) infrastructure: city planning, healthy environments/landscapes on both local, regional and national scales, regenerative agriculture.
4. Involvement of multiple stakeholders: e.g., food suppliers, consumers, politicians, corporations and the food system itself.

Recommendation 3. Map all possible actors who need to be involved to have an impact; develop methods to involve these actors.

The workshop results indicated several central actors:

1. Government: politicians in general, empowered/engaged people, policies and both bottom-up and top-down initiatives.
2. Farmers, producers and service providers.
3. Consumers: future generations (children and youth), senior citizens, companies, families, vulnerable people and chefs.
4. Industry: multi-national food industry companies and government.

The participants believed that the hardest problems to solve related to global collaboration were the challenge of persuading the public about the holistic risks involved in our current food behaviours (e.g., our individual food desires,

PHOTO: INGRID SARLÖV HERLIN

people's reluctance to change food behaviours, politicians' unwillingness to deal with sensitive topics) as well as the scale of the system, lack of transparency and the many players involved.

Recommendation 4. Continue the work to develop a "food planning toolbox" with different approaches at different foodscape levels.

Numerous tentative tools, many of them already in use in different countries and contexts, were brought together. Here, the results have been divided into six categories, briefly summarized in Table 1. Further work to systematically develop the food planning toolbox will be needed, as these are only examples derived from the workshop. A participatory approach is recommended, and methodologies should be developed.

Recommendation 5. Continue to develop processes for food planning, align actors at different foodscape levels with common goals, develop a common food planning agenda.

Through a final survey, the workshop pointed out those instruments in the elaborative food planning toolbox they thought could be of most importance. The result indicated the following:

1. Taxes, legislation and regulations
2. Various collaborations with the stakeholders
3. Empowerment
4. Transparency
5. Knowledge sharing
6. Youth engagement
7. Holistic planning approach including spatial planning, social science and public health

FOOD PLANNING AREA	EXAMPLE OF FOOD PLANNING TOOLS
Agriculture	Facilitation and promotion of, e.g., regenerative agriculture, Land Capability for Agriculture (LCA), spatial crop modelling, urban agriculture, Community Supported Agriculture (CSA)
Nutrition and Health	Screening malnutrition in elderly and reformulation of products to produce healthier products
Education and Knowledge	Citizen empowerment, visualization and education concerning the effects of food/diet, meeting places, information campaigns, labelling, data sharing and transparency around product and consumer behaviour
Strategies and Policies	Subsidies, taxation, investments in sustainability practices, urban planning, procurement, land use and legislations
Measurement	Digitalization and novel technologies, evidence-based recommendations. Two examples: phone apps to link surplus food with food banks and a food system dashboard in Nigeria
Support	Food banks, farmers markets, agricultural subsidies, taxation, both empowerment and nudging

TABLE 1. THE FOOD PLANNING TOOLS CAN ADDRESS DIFFERENT FOOD PLANNING AREAS, AND THEY ARE VARIOUS AND DIVERSE

The food planning toolbox has yet to be more systematically developed. The conclusion is that food planning can play an important role in the transition towards a more sustainable food system. Methods for collaboration and participation need to be further developed, and if we are to make change happen, initiatives must be taken at all foodscape levels.

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Invited workshop facilitator: Jannie Vestergaard, Sense of Nordic Food, Denmark

Invited speakers: Kevin Morgan, Cardiff University and Chiara Tornaghi, Coventry University

This brief is one in a series of nine policy briefs produced as an outcome of the 2022 Uppsala Health Summit "Healthy Lives from Sustainable Food Systems." Uppsala Health Summit is an international arena for dialogue, exploring possibilities and implementation challenges associated with advancement in medicine and public health. You can find the entire series of briefs and more information about Uppsala Health Summit at www.uppsalahealthsummit.se.

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Healthy Lives from Sustainable Food Systems
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The SHIFT Framework for Health Equity in Food Environment Transformations

Meena Daivadanam, Mathilde Sengoelge

Brief background

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 in our food environment is urgently needed to improve human and planetary health and well-being and to meet the Sustainable Development Goals (SDGs) [1–3], particularly the SDGs directly related to nutrition, which include zero hunger (SDG2), good health and well-being (SDG3), gender equality (SDG5), planetary health and the revitalization of the global partnership for sustainable development (SDG4, SDG17) [4]. Food environments are of vital importance if we are to achieve these SDGs. This brief aims to assist technical staff, such as programme developers and managers working on achieving the SDG goals.

Currently, one in nine people – 820 million worldwide – are hungry or undernourished [5], and simultaneously, one-third of the world's adult population is overweight or obese [6]. In addition, there is an unequal burden of disease incidence, morbidity, mortality, survival, and quality of life between subgroups that is related to the food environment. Food environments are intricately connected to the health and economic development of countries. Investing in interventions to improve food environments for human health can therefore yield co-benefits for sustainable development. 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.

The SHIFT Framework was developed by an international team of researchers committed to assisting technical staff, such as programme developers and managers, in improving 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 deciding what action to take and/or the next step to follow to move forward in the process. 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 by targeting certain settings, such as schools, workplaces, or community hubs, or by targeting specific vulnerable groups for transformative action.

Approach

In this workshop, the SHIFT Framework was introduced and discussed using case examples. The Framework assists technical staff through a 4-step process and a compendium of good practices to develop context-relevant and equity-focused food environment transformation strategies. It comes in the form of an interactive pdf and an interactive website to guide users through the process.

The workshop had 28 registered participants, including individuals from academia, the World Health Organization and other non-governmental organizations. It commenced with a welcome from the workshop lead, Meena Daivadanam, and workshop moderator, Mathilde Sengoelge.

Dr Francesco Branca, Director, Nutrition and Food Safety, WHO, opened the workshop while Meena Daivadanam

provided an overview of the SHIFT Framework to help participants better understand the tool, prior to discussion. Two case studies were presented, one from Tanzania and one from Australia. Oscar Mukasa, researcher from the Tanzania Food and Nutrition Centre (TFNC), shared their results from pilot testing the SHIFT Framework in the Tanzania context. Dheepa Jeyapalan, Manager, Healthy and Sustainable Food Systems at Victorian Health Promotion Foundation (VicHealth), spoke from a retrospective perspective on what the tool may or may not have contributed to their process of implementing food hubs among adolescents in Victoria, Australia.

The workshop was organized in a world café format. There were four stations, and each represented one step in the SHIFT Framework. The idea of the world café format was for the participants to rotate every 15 minutes to the next station, allowing them to discuss each step in detail and provide constructive comments for further improvement of the Framework. Each station had a facilitator and a rapporteur to provide an introduction to the step and a brief summary of the discussions of the previous group. This allowed for building on previous rounds with each rotation.

Recommendations

During the workshop, the discussions focused on how to improve the equity aspects of the tool. These are summarized below, both overall as well as for each step of the SHIFT framework.

Overall recommendations

- Clarify the focus on food environment and how this relates to diets or nutrition and consistently align the language of the whole Framework with the main focus. We also need to define and operationalize equity aspects that the tool would address with respect to the food environment. What do we mean by equity and which aspects of equity are addressed?
- Need to clarify how a bottom-up perspective, especially focusing on qualitative lived experiences, will be integrated throughout the Framework.
- The Framework needs to be context specific or clarify how it will enable context-specific strategies, because regardless of where you are, it will be different from place to place, and a cultural aspect needs to be considered.
- How can we mainstream the Framework? How do we ensure that THIS is the tool that will be at the frontline and used as a toolbox for transformation of food environments?
- Make the tool more flexible, especially its visible format – perhaps it should be circular, making it easy to see how we can go back and forth between the steps. This would also show that the Framework and the envisaged process are not linear. The SHIFT Framework should also be available in different languages to avoid communication barriers.
- The Framework is currently created for a high-level approach, but we need a tool for all levels, including both top-down and bottom-up perspectives. Consider how this can be addressed.

Step 1: Map

- Have a bottom-up approach at the mapping stage, to map the equity gaps within the food environment with technical staff gathering information directly from the communities.
- Establish criteria for or a clear definition of disadvantaged communities to allow better identification of disadvantaged groups and to map out gaps accurately based on the inequities present.
- Identify indicators specific to food environments and food environment interactions to measure the inequities – these should depend on the impact each community wants to achieve.
- Focus on identifying equity gaps within the food environment, including acquisition and consumption stages, to touch on intersections with the food system as a whole.
- Take a more bottom-up and participatory approach when mapping, as disadvantaged communities may not agree with technical staff's views on issues and equity gaps.
- Include additional tools, such as guidelines or appendix material, that are supplementary to the SHIFT Framework to explain methods or aspects that require more detailed clarification.
- Identify the driving factors of the stakeholders in the mapping stage – to assess the level of commitment of the key actors. Stakeholder analysis and grassroots assessment therefore need to be accomplished prior to the mapping step.

Step 2: Engage

- Clarify that stakeholders are not a single group; they will differ depending on the target group and the identified gaps that need to be addressed. Clarify who we want to work with. Do we work with the people creating the problem or the people helping with solutions? Who are we engaging? Who is involved in tackling or contributing to the existing problems? Create guiding questions or examples focused on how to identify which partners are needed and how to engage them. A stakeholder analysis would be a key step in guiding this process.
- Nutrition cuts across everything, which also means that many stakeholders should be involved. How do we ensure that they are coordinated and can use their mandates in "the best" ways possible? To be able to work with stakeholders across the system, we need a system that allows that. Commitment from stakeholders, including financial commitment, needs to be an explicit step. Financing needs to be secured earlier using a long-term plan.

- Important to clarify what kind of engagement we want from different stakeholders and how we can engage them. Will it be a consultation, participation, or co-design and what is needed for different types of engagement; what are the implications of each?

Step 3: Transform

- Provide more guidance on the project-specific process of goal setting. This will also enable a common understanding of expected outcomes and commitment needed for the same. A ´commitment´ step should be added to the Framework to signify both moral and financial commitment to the planned activities. This is especially critical before the 'transform' stage.
- Add finance and resources in all stages of the SHIFT Framework, instead of only in the engage phase, as is the case now. This is of great relevance to the 'transform' stage which, will require financial and human resources. The idea of a block budget was brought up, meaning freedom to use money based on need. This needs to be considered and some guidance provided.
- Focus on participatory approaches, using lived experiences, so that interventions are co-created. However, the relationship between participatory approaches and equity needs to be evaluated and considered.

Step 4: Monitor

- Evaluate and monitor both the process and the outcome. Throughout the process, we must be transparent with the donors about the challenges along the way – challenges that may impact expected outcomes. Possible additional financial requirement needs must be predicted, communicated and pre-planned.
- Important to appreciate the context and integrate the needs of community members. There is a need for increased integration within community settings and community-level organizations. Acceptability may be improved by reaching people within settings they already engage with and feel more comfortable in, thereby improving access.
- Increased involvement of political figures and, if possible, their support for the project(s) would be critical, as such projects require government-level commitment, including resources.
- Adopt technology for efficient reporting and evaluation wherever possible. Use case studies and stories of other projects as examples to guide such endeavours.

These recommendations will be discussed by the authors and further steps to modify and improve the tool will be formulated, including testing of the tool in different settings.

References

1. 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-lan - cet-commission/
2. The Sustainable Development Goals: https://sdgs. un.org/goals
3. 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.
4. Kraef et al. Primary Health Care and Nutrition. Bull World Health Organ 2020; 98:886–893.
5. 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.
6. 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 8.

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SustAinimal – Sustainable Animal Food Production in War and Peace

Sigrid Agenäs, Markos Managos, Ulrika Nordling, Ylva Persson

Brief background

The future holds challenges for the livestock industry, including climate change and the risk of more extreme weather events. Production of animal feed and consumption of animal-derived foods change due to political, societal, and environmental factors. The Covid-19 pandemic highlighted vulnerabilities in the global food system, and several actors have emphasized the importance of more sustainable and resilient food production for the future. The importance of having a robust food chain and flexible animal production has been further emphasized in the light of armed conflicts, such as the one taking place in Ukraine in 2022. Food production needs to continue even during times of change or crisis. Preparedness for the unknown requires flexible solutions to ensure continued production of safe and high-quality food using efficient and environmentally friendly methods. The food system needs to be designed so that sudden changes do not compromise biosecurity, animal welfare or antimicrobial resistance and at the same time ensure sufficient output of food. Animals in the food system need to be healthy and raised sustainably, with little negative impact on the environment and climate and a positive impact on biodiversity. New ways of organizing the food system may be needed, including new solutions for production of animal-derived foods, for example with other animal species and different animal-derived food products than we know today.

The Workshop – approach and highlights from the discussions

This workshop had around 40 participants from private companies, the health and livestock sectors, universities, international organizations, ministries, and governmental agencies. Three inspirational speakers were invited to the workshop:

John Young from INASP talked about how to be prepared for disasters in a presentation called "Avoiding catastrophe and building for peace: How research can help." Serina Ahlgren from RISE talked about dependencies, weaknesses, and diets during crisis in her presentation "Sustainable animal food production in war and peace." Finally, Anne Katrine Bolvig from Arla talked about sustainable diets; "Sustainable animal food production in war and peace – a dairy perspective."

The aim of the workshop was to increase awareness of how safe and nutritious food can be produced from sustainable livestock systems with a preparedness perspective. The following questions were discussed during the group discussions:

- Governance of the 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?

Recommendations

FIRST THEME: Path for the transition towards sustainable, resilient and competitive food production

The workshop discussed how to transform the food system. The participants agreed that change can happen without force or legislation, but knowledge and understanding among stakeholders is required. Legislation is necessary as a support, but we need to be aware that it can create inflexible systems and might work better in some countries. Legislation should be there to support the flow instead of enforcing it. Authoritarian approaches are worse than an informed voluntary decision. Knowledge will make it easier to follow the rules. An additional tool for transition is positive incentives. Incentives can be money, but also knowledge and motivation, though having too many "carrots" can cause chaos. The rules of the game: As long as we have a completely market-based arena, it is in the nature of the game that actors will make decisions that will

result in their own benefit. Making decisions for the common good might benefit society as a whole, but it will not necessarily benefit the one who made them. Therefore, we need a "mixed perspective". The farmers fulfil the requirements of the market. If the farmers initiate the change, the authorities can continue the work. Collaboration is absolutely necessary if we are to achieve a transition! Communication is a key factor, and sharing good examples may be an important way to promote change, as they can serve as "free commercials", helping spread ideas and knowledge. When good practice is communicated and rewarded, consumers' decisions can act as "carrots". Still, it is a dilemma. If the transition leads to lower profit, "carrots" will not work well. Such changes will depend more on legislation. Furthermore, it is always important to ensure that legislation supports the intended transition.

SECOND THEME: Adaption of production systems, species, and breeds – the need for agile solutions: How can farmers transform their production in times of change?

- Diversity in farming systems is a key factor. Few large and highly specialized units for primary production with one species/breed, located in a few regions/areas and highly mechanized/digitalized are more vulnerable to changed conditions than are diverse and less specialized types of farms.
- Beef cattle and small ruminants are less vulnerable, from a preparedness and crisis perspective, and require less input goods than dairy cattle.
- Who will produce the food and where? Many young people quit farming, and houses and supermarkets are built on agricultural land. Society needs to make farming competitive and desirable, to ensure that there is a new generation of farmers waiting to contribute to the transition to a sustainable and resilient food system.
- "War legislation" is needed: In a situation of war, requirements for food safety, ethics, and food security need to be balanced and they may differ from those in peace.
- There are many critical inputs, including water, fertilizers, fuel, energy, feed (priority between human and animal food/feed), personnel, seeds, veterinary drugs, breeding stock and internet as well as other technology.
- Healthy animals and farms with good biosecurity are more resilient also in times of war. Healthy animals will decrease the risk of zoonoses and foodborne diseases and, thus, reduce the need for antibiotics.
- Animal owners and staff need to have skills in hand milking/dairying, preservation, slaughter, and culling.
- People need to learn to eat everything from the animal, but also alternative species.
- We need to know where to evacuate animals and where to distribute milk and meat if normal routines are disrupted.
- Self-governance and local markets will probably be more important in times of war or another crisis. We need to approach different crises on a systemic level. A "good times" mentality has created nonchalance and a knowledge gap around preparedness. One conflict of aims is productivity in times of peace and resilience in times of war. Can dual-purpose breeds be a solution? How can we learn from countries that have war experience? What is the role of WHO/FAO/World Bank in a crisis? Global, national, regional, and local plans are needed. Map the food chains with reference to dependencies along the chain.

Based on the inspirational talks and discussions in the workshop, we wish to address the following solutions for a sustainable ruminant food system with a preparedness perspective:

- Diverse ruminant production, in terms of herd size, breeds, species, regions, technology
- Increased self-sufficiency, both for animal production, feed, and other inputs
- On-farm preparedness/contingency plans
- Long-term plan for agricultural land (national level)
- Ability to mobilize people to work on farms (instead of armed services)
- Practice scenarios
- War legislation and flexible regulatory systems
- Increased awareness among consumers that sustainable food production with a preparedness perspective costs more
- And finally, we must cherish democracy

It is difficult to pinpoint any particular organization that should be responsible for each task, as this involves teamwork between authorities, universities, NGOs, policymakers, media and the industry. To be sure, SustAinimal will take the lead in many of these questions and initiate projects, cooperation/networking, and communication campaigns.

The main objective of the workshop was to increase awareness of how safe and nutritious food can be produced from sustainable livestock systems with a preparedness perspective. We want to share some of the comments and insights from the participants:

"I need to include aspects of preparedness from now on. In teaching, research, and private life. My own preparedness is not enough, today's workshop has been an eye-opener."

"This is something I need to know more about!"

"We have been so privileged in Sweden/Europe!"

"What should we teach now to future generations?"

"Preparedness is really needed!

"We need more farmers. It's very complex."

"Difference in the weakness of different animals (e.g., chicken

PHOTO: KARIN ALVÅSEN SLU

vs. cattle) as well as between different breeds."

"All the different perspectives and their respective implications."

"Challenging to prepare for the unexpected. This limits our minds!"

"Large wars may affect global food security."

"All countries can be affected by a war - collaboration is the key."

"Holistic approach is critical for lasting solutions in war and peace."

"There is not one global solution – it depends on the context (geographical, cultural etc.)."

Acknowledgments

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Healthy Lives from Sustainable Food Systems
October 2022

The Diet-Environment-Health Nexus

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Background

In many countries of the Global North, the dietary habits of large proportions of the population are detrimental to human health, the environment, or both. As such, a population-level transition to healthy and sustainable diets is undoubtedly required. A healthy and sustainable diet is characterized by an abundance and variety of vegetables and fruits, legumes, nuts, and whole grains, while also including moderate amounts of low-fat dairy, fish, and vegetable fats. In an ideal scenario, such a diet would not only promote health with a minimal effect on the environment, but also consider social and economic factors, such as culture, livelihood, cost, and accessibility.

Despite fairly good evidence showing what a healthy and sustainable diet could look like in a Western context, there is a large gap between this and current dietary habits. For instance, results from national surveys in Sweden illustrate the disparity between dietary recommendations (primarily focussed on health, but also considering some aspects of sustainability) and population-level consumption in reality. Furthermore, such studies confirm that an additional gap exists, in the form of inequalities in diet composition across gender, age groups, and education levels. Bridging both gaps involves large-scale change in the food environment as well as in our behavioural patterns. However, at present, we lack sufficient evidence on how to effectively generate such changes, and crucially for this workshop, how to influence large-scale and long-lasting behavioural change.

Transforming current dietary patterns can be seen as a 'wicked' problem, which is inherently complex by nature, comprising multiple actors, and for which there is no single, simple solution. Furthermore, in finding evidence-based solutions, we must also consider the dynamic interaction between science, policy, industry, and reality. Therefore, we gathered as a group of about 40 stakeholders from academia, organizations, governments, and industry to discuss and address questions concerning how to best generate, communicate, and implement evidenced-based behaviour change interventions, from the micro-level (individual) to macro-level environments.

Approach

The workshop began by individually envisioning our ideal future of sustainable and healthy diets. Together, we recognized accessibility, affordability (financial feasibility for both industry and consumers), and (cultural) acceptability as important parts of the future we wish to see, in addition to collaboration between communities as well as between policymakers, researchers, and industry. Sustainable and healthy food becoming a social norm was additionally put forward as an ideal scenario. Once we had established where we would like to be, the next step was to discuss how we can get there.

To this end, in eight groups of approx. five people, we discussed what drives/influences current dietary patterns. As expected, drivers could be either positive or negative influences, and they spanned from political and economic drivers (e.g., [lack of] fiscal measures or bold action), to social norms (e.g., portion sizes) and global shocks. In essence, a wide variety of factors were identified that both directly and indirectly contribute to dietary choices that individuals can/do make every day.

Continuing in these groups, we considered possible solutions that could contribute to creating our envisioned ideal future (discussed further below). To complete the group work, iscussions then turned to which solutions or interventions we considered most effective and realistic. As a final task in the whole workshop group, examples, ideas, and proposed actions were shared, and everyone was given an opportunity to show support for their three preferred solutions.

Findings from the workshop

After collecting and reviewing the proposed solutions, two core elements could be identified: first, proposals on what needs to change and, second, how such changes should/could occur.

When considering what needs to change if we are to achieve population-level healthy and sustainable dietary habits, a clear link emerged between micro- and macro-level changes. Such changes are interconnected and can occur bi-directionally, such that a change at one level impacts another level. Therefore, multiple solutions at all levels of the socio-ecological model were generated – from individual actions (micro-level) to policies (macro-level). Reflecting this, the key policy recommendations from our workshop also have important implications at the individual level. Overall, our policy recommendations for generating healthy and sustainable diets predominantly point towards improving the choice architecture and ensuring that the "right choice" is the default choice.

Recommendations

The findings from our workshop on what needs to change can be summarized in five specific policy recommendations:

1. Regulation of the food industry: Introduction of more stringent food content regulations; labelling and portion sizes that encourage healthy and sustainable eating; reform of marketing regulations; and reduced industry influence through lobbying.
2. Fiscal measures: Improved pricing incentives for both industry and consumers to focus on healthy and sustainable foods, including financial support for individuals and financial feasibility for industry; and introduction of taxes and subsidies.
3. Invest in education: Arm individuals with knowledge by introducing nutrition education across all levels of society and types of institutions (e.g., schools, workplaces, healthcare settings, social work organizations, sports associations, etc.).
4. Empower communities: Support local-level initiatives to promote healthy and sustainable eating (e.g., in schools, hospitals, workplaces), to empower communities and to contribute to changing social norms.
5. Utilize research and Big Data: Consider the wealth of data collected through both industry and research institutes and the potential application of these data to improving consumer choice. Create avenues through which research findings can be maximized.

But how can policymakers best translate our recommendations into policies? What systems need to be in place for such recommendations to take effect? How can we turn evidence into policy action?

When trying to understand the problem of how to transform current dietary patterns, we must acknowledge the nature of wicked problems, for which no 'silver bullet' solutions exist. Furthermore, there is no clear endpoint to establish when our goal has been achieved. Instead, we must work collectively to find corrective and evidence-based actions that shift away from 'worse' and move towards 'better'. Therefore, in our Call to Action, we propose four steps as part of a cycle, where each step can positively influence the other. When carried out in unison, the overall goal is to support the building and sharing of evidence, and to highlight a mechanism by which knowledge can be turned into practice.

Call to Action: how to go from knowledge to practice?

1. Engage. Increase policymaker engagement with all stakeholders in the field: researchers, industry, communities, and individuals. Additionally, enable and support scientific lobbying, providing a permanent pipeline for research findings to be heard in the policy sphere. Building strong bridges and connections across institutions enables improved communication.
2. Communicate and educate. Use these bridges to enable a platform for evidence to be communicated across all levels of society and ensure that a bi-directional channel of communication between stakeholders can be set up and maintained. Create a space to share what is currently known and what still needs to be understood, thus enabling opportunities to collaborate.
3. Collaborate. Bridge gaps by working together within and across institutions to increase the synthesis of evidence, and support common goals by sharing findings, data, and results on food-related behaviour change. Furthermore, ensure policies that support continued government funding of scientific research.
4. Build evidence and monitor. With increased funding, researchers can continue to build evidence concerning best practices for generating behaviour change in specific contexts as well as monitor changes and impacts. Use this evidence to generate concrete solutions for moving forwards, supported by improved engagement and communication among stakeholders.

Acknowledgement

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We would like to thank everyone who participated in the workshop for stimulating discussion and valuable insights. Thank you also to Lauren Lissner for useful notes, and to Ulf Bley for his excellent workshop facilitation.

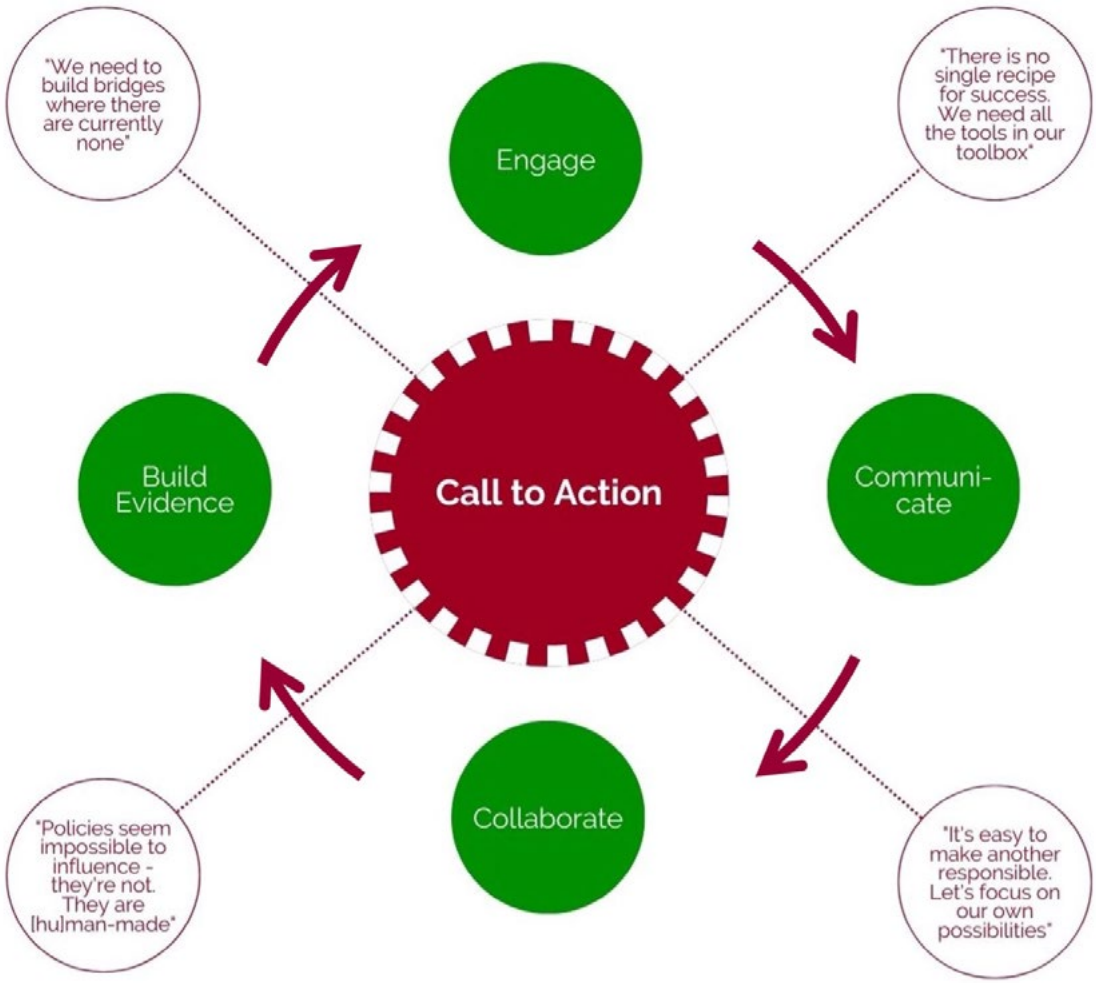

FIGURE: OUR CALL TO ACTION, ALONG WITH QUOTES FROM THE WORKSHOP

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Healthy Lives from Sustainable Food Systems
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Zero Hunger: Is Smallholder Farming the Solution?

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Background

A large proportion of the food consumed around the world is produced by smallholder farmers. At the same time, people engaging in smallholder farming are often poorer and 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 economic returns, boosting rural economic development, as well as increasing food security and reducing poverty.

The online workshop "Zero hunger: Is smallholder farming the solution?" discussed this food security paradox and the future of smallholder farming. Three speakers inspired 28 participants to consider different perspectives on the future of smallholder farming. Participants represented the global south and north and the academic, governmental, civil society and cooperative sectors. A plenary session was followed by break-out group discussions on topics ranging from whether sustainable small-scale agriculture can be achieved to whether sustainable industrialization is possible, or even desirable. Based on the workshop, we reach out to policymakers in agriculture and development demanding action within three areas:

- increased support for smallholder farmers in their local context
- better inclusion of smallholder voices and priorities in policy and research
- improved access to the market for smallholder farmers

How can we create the political will and attention to support smallholder farmers in their local context, based on their circumstances?

Smallholder farming improves food and nutrition security directly by improving access to diverse sources of food, and indirectly by increasing incomes and, thus, spending on more and better food. However, agricultural policy remains mainly focused on large-scale commercially oriented farms specializing in a handful of key commodities. The focus on large-scale farming undermines diversity and stimulates increased inequality in an already highly unequal global food system. Creating political will for supporting smallholder farming requires awareness-raising activities with national and local decision-makers concerning their understanding of the contribution, role and impact of smallholders as well as increasing respect for and willingness to engage with smallholders. Common perceptions of smallholder farming that need to be questioned and nuanced include the connection of poverty with being technology averse and lacking relevant knowledge. Such perceptions have little to do with reality and present an obstacle to effectively supporting smallholders. Accumulated evidence has established that smallholders are innovative and interested in improving their own situations; but they are often constrained by a range of challenges related to their resource disadvantages, low financial capacity, and lack of access to farm inputs, extension services, and preventive and curative veterinary care. Therefore, it is essential to better understand the different realities of smallholder farming across the world if we are to design relevant interventions to enhance their contribution to sustainable development and food security.

How can we better include smallholder voices and priorities in policy and research?

To better understand smallholders´ realities, priorities and challenges across the world, it is important to recognize that smallholders are not a homogenous group, and thus more context-specific solutions are needed to identify, monitor, and assess the complex and multidimensional challenges that smallholder farming systems face in different contexts. We need more and better studies exploring smallholders' farms and their production to understand their different dynamics within the food systems as well as their needs. To understand the realities of smallholders, we need inter-disciplinary research that takes a holistic view of smallholder livelihoods. In this regard, social science research has shed light on the social and economic factors that prevent smallholder farmers from

FIGURE CAPTION: RURAL MILK COLLECTION CENTRES SUPPORT SMALLHOLDER FARMERS BY INTRODUCING STANDARDS TO IMPROVE THE QUALITY OF THE PRODUCT BY GIVING ACCESS TO NEW TECHNIQUES, INFRASTRUCTURE, AND MARKETS AS WELL AS BY GIVING INDIVIDUAL FARMERS A STRONGER VOICE BY WORKING TOGETHER.

thriving and increasing productivity, while additionally taking climatic, ecological and socio-economic issues into account. One example highlighting the fact that access to technologies is only part of the solution is the control of East Coast Fever, a very important cattle disease that infects calves and results in high mortality. New technologies to prevent the disease exist, but they are not adopted on a broader scale. A study involving female livestock keepers revealed that increased survival rates in calves would result in more work for women, who were the primary caretakers of the young cattle in the studied community. Once the calves grow into young animals and bulls, they will belong to the men and contribute to their income, but not necessarily benefit the women. This example shows that we need to consider the fact that women and men have different needs, access to and control of resources. Hence, gender issues need to be embedded in development work, and not an add-on or a side-line. Another important consideration is local language; to enable smallholders to be engaged and have their voices heard, communication in local languages is important. In this regard, extension officers who both speak the local language and understand the local context can be valuable and serve as an important link between politicians and smallholders. Social media and participatory action research have been successfully used for the same purpose in some parts of the world. In the same way, connecting smallholders through cooperatives and other farmer organizations enables a stronger voice and access to the political agenda. Smallholder farmers are a key solution to food security, but they need to be supported in working together and strengthening their organizations.

How can smallholder farmers' access to markets be improved in a sustainable, equitable and fair way?

Smallholders often lack access to profitable, value-added markets. In the absence of critical supporting functions such as infrastructure and service provision, smallholders struggle to shift from subsistence to more productive forms of exchange. In particular, smallholders face serious difficulties in accessing markets on which to sell their produce. They are constrained by their physical remoteness to markets, high transportation costs, and the lack of business skills and an organization that could improve their bargaining power to interact on equal terms with other market intermediaries. It is not easy to connect smallholders to markets, nor to ensure that their produce meets market standards. Unequal distributions of power also mean that small producers may earn significantly less than other actors, such as larger retailers and exporters. Increasing smallholders' access to markets must be a top priority for policymakers and development actors. Reliable market access boosts productivity, increases incomes and strengthens food security. It can contribute to reducing poverty and hunger among producing smallholders and their communities, if appropriate measures are taken to reduce market risks and unequal market power. This in turn encourages farmers to invest in their own businesses and increase the quantity, quality and diversity of the goods they produce.

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Food Safety vs. Food Security

Johanna Dernfalk, Gunnar Andersson, Johanna Lindahl, Åsa Svanström, Nurun Nahar

Background

How safe is safe enough? The most basic human need is keeping hunger away. However, food and water inherently contain both microbiological and chemical hazards, and therefore there are constant decisions to be taken regarding what is or is not safe to consume. 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 is an example of when the different UN Sustainable Development Goals (SDGs) can be in conflict with each other, and frequently priorities and goals do compete with each other. Risk assessment is a systematic process aimed at informing the decision-maker about the risk associated with food and feed hazards and sometimes also the possible beneficial effects of the same commodity to the consumer. The decision-maker will also have to consider the impact at a societal level, for example, food security, economics, environment, and culture, and will often face conflicting goals and ethical dilemmas.

Communication is a crucial factor in risk management, which includes messages to the public and stakeholders, as well as the communication between decision-makers and the experts. 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, it caused many consumers to fear drinking milk, which resulted in severe economic impacts and loss of nutritious food in a food-insecure country that may have had worse consequences for human health than the toxin itself.

Thus far, high-income countries have been spared food insecurity consequences due to potential health hazards. 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. However, politicians and other decision-makers will face ethical dilemmas: Regulations aimed at protecting European consumers (and livestock) from risks related to food contamination may result in shortages of safe food in poorer countries. And would we, for example, accept a higher risk from foodborne hazards if that could reduce our carbon footprint?

With growing populations and uncertainties in the world, there may be more crises (wars, droughts, floodings, pandemics, etc.) in the future, where European citizens as well may need to consider lowering our food safety standards to ensure food security. This may lead to difficulties with communicating messages. How would consumers react if they were left with only food that can be produced locally, and if they were told to increase consumption of products that they were recommended to avoid yesterday?

Approach

The task of managing the multiple facets of emerging threats is too complex to be grasped by a single person. To make the best decision, it is not enough to understand the nature and expected magnitude of the consequences of a decision. 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 will be applied.

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

PHOTO: CAMPTOLOMA, ISTOCK

A key idea behind this workshop was thus to bring together people with different national and professional backgrounds, in order to increase awareness of the challenges ahead and hopefully seed new networks to work on the identified problems, as well as to inspire future research ideas.

The workshop aimed to discuss the conflicts between interests and sustainable development goals (SDGs) in relation to food safety, food security, economic development, and environmental sustainability. The participants also discussed 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 goal was that the workshop would provide insights into the different aspects of food security and food safety trade-offs, particularly in relation to crises; that these conflicts of interest would be raised to the surface; that contacts between different actors and stakeholders would be generated; and that preparedness for future decision-making processes would be initiated and facilitated.

The workshop used 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?

Recommendations

The workshop attracted participants from many different disciplines and included many different actors, which helped the discussions. One conclusion was that there are many conflicts between the various SDGs, not only between food security and safety, but also conflicts with environmental goals, equity, poverty reduction, biodiversity and many others. Identifying solutions that would avoid conflicts was not easy. There are many topics that require research, especially how we can increase resilience in food production, ensure safe recycling of food waste, and understand what the risks in different populations are from the various hazards.

One key knowledge gap that was highlighted during the workshop was that often we lack knowledge on how safe food needs to be for it to be safe enough. The present risk assessment and risk-benefit models also need to be developed so that they can include other considerations, including economy, food security, equity, alternative uses and food waste.

Another topic raised was the lack of standards and regulations for sustainable production, and that there is no good way to measure it. Sustainability has many aspects, and presently, it is not possible to measure these simultaneously in a good way. This would require research on how we best produce "planetary friendly" food.

The research suggestions from the workshop call for projects that would optimally include multinational teams of researchers from different disciplines, meaning that funding agencies would need to accommodate this by giving larger grant opportunities. However, not only research is lacking, but also the engagement of policy-makers and politicians in how the conflicts between goals can be resolved. In this connection, however, it is important that a global perspective be taken, so as to not simply move the problem from one country to another. In addition to the engagement in development of policies and regulations, it is also important to consider how the messages are communicated to the public, especially as social media have an important influence, and there are great concerns about food safety, especially regarding fears about chemical contamination.

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Foodscapes for the Future – Creating Local Support for Sustainable Human Health

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Background

The term foodscape is a combination of the words "food" and "landscape." It describes the milieus in which food is produced, exposed and consumed[1]. Food exposure and advertisement have a major impact on what and how much we consume[2], and they constitute a primary risk factor for non-communicable disease. In particular, exposure and advertisement contribute to the malnutrition pandemic, which involves stunted children and children with obesity, as well as healthy life years lost. Overweight and obesity are increasing globally, not least among adolescents[6]. Because less healthy foods, such as energy-dense and nutrient-poor foods, tend to be more frequently found in socioeconomically disadvantaged areas[2,3], and food exposure also contributes to health inequality.

The pandemic resulting from malnutrition synergizes with the pandemic of climate change, contributing significantly to the ongoing human and environmental health crisis [4]. To move society toward solutions that promote sustainable health and a sustainable environment, a transformation of the foodscape and all its components is required[5]. However, mobilizing actors in the foodscape, particularly food retailers, to act in line with supporting sustainable human and environmental health is challenging.

Approach

The workshop had 30 participants from eight countries, representing Europe, Africa, North America, and Oceania. The participants represented local government (municipalities and regions), food retail companies, innovative food companies, public health authorities (VicHealth, Swedish Public Health Agency and Swedish Food Agency), policymaker advisors (the International Livestock Research Institute and the UN agency Food and Agriculture Organization, FAO), academia (working with nutritional biomarkers and epidemiology, sustainable food consumption, childhood obesity prevention and global transformations for health), as well as healthcare representatives (nurses, medical doctors and dieticians).

The workshop focused on the question: What is needed to achieve foodscape change and move it towards contributing to sustainable adolescent health?

In the morning session of the workshop, the unhealthy foodscape took centerstage in the form of a real-life example from the Swedish Municipality of Säffle, as presented by Elin Bergström and Fredrik Eriksson. The municipality had conducted interviews with teenagers about their food habits surrounding the school day and their activities. The visualized results, a short video, were disturbing[7]. It showed a foodscape with a wide variety of low-quality snacks, sugar-sweetened beverages, and unhealthy food on offer everywhere. The conclusion was that it is not easy for teenagers to make healthy choices. The example was commented on by Paula Frösell, representing the Swedish food retailer ICA, and Anna-Karin Quetel, from the Swedish Food Agency, who discussed how their organizations can contribute to a healthier foodscape.

In smaller groups, participants were first asked to discuss underlying causes of the unsustainable foodscape for adolescents, building on the case study from Säffle.

Examples mentioned included social norms around food choice and peer pressure, aggressive marketing and social media targeting youth in the real world and digitally through, e.g., influencers, low prices or unhealthy food products, lack of time and money, convenience, long-lasting foods that are easy to take away and store, stress and disrupted circadian rhythm, and foods targeting the biological fast-reward system, to mention a few.

Five problems were chosen to be addressed:

1. Lack of policies to regulate the local foodscape
2. High demand for unsustainable foods driven by social norms
3. Poor knowledge about the cost of malnutrition among stakeholders
4. Low profit on healthy and sustainable foods
5. Young people are not actively involved in shaping their foodscape

The afternoon session started with a talk given by Dheepa Jeyapalan, from VicHealth, Australia. VicHealth is a non-governmental public-health-promoting organization funded by the state government of Victoria, Australia. They shared their experiences and gave examples of how they work on the foodscapes in communities[8].

Subsequently, workshop participants were asked to address the five problems: first, to discuss which actor can act to tackle the problem and, second, to suggest a concrete first step toward solving the problem. In the final part of the workshop, a plenary discussion of the proposed solutions was held to further develop the recommendations.

Recommendations

Suggested actions to address the chosen problems were:

1. Lack of policies to regulate the local foodscape.
   Action: Raising awareness among local stakeholders about the cost of an unhealthy foodscape may encourage municipalities to adopt policies that promote a healthier foodscape. Showing municipalities their consumption patterns based on supply by using real-time data could support awareness. Thus, collaboration should be pursued with credible actors who can provide this information, e.g., innovative health-oriented companies.

   Municipalities are central to the local setting, including the schools. In the Säffle case study, offering healthy food at school has been insufficient to promote overall healthy eating. Adolescents spend considerable time outside the school. There is an evident need for a whole-of-community approach to building a healthier food landscape. Data-driven action is proposed as an effective and feasible method, because it can ultimately involve both public and private actors in the municipality.

2. High demand for unsustainable foods is driven by social norms.

   Action: Social norms are influenced by advertisement and the media. National governments should strengthen policies to regulate the marketing of food to children. It is important that such policies target all actors including small retailers and social media, actors who may be less responsive to public policies.

   "Influencers" in social media should be involved and encouraged to change what is considered 'cool' and desirable to eat toward healthier alternatives. Healthy snacks rather than candy and sweetened beverages should be found in places associated with positive feelings such as

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sports centers or the cinema. Such measures may promote healthier social norms concerning food, thus increasing demand for a healthier food supply.

3. Poor knowledge about the cost of malnutrition among stakeholders.

   Action: Build an advocacy tool to show politicians the costs of the present foodscape in relation to ill health and the costs to the healthcare economy. The advocacy tool may be used by policymakers on the municipal level, but also in a regional or national context, and promote a long-term perspective regarding interventions for a healthier foodscape.

   By showing the current costs related to an unsustainable foodscape, the need for further action should be evident. One suggestion is to allocate national funds for future costs of human illness, as done by. VicHealth, to put the issue of direct and indirect health costs on the political agenda permanently.

4. Low profit on healthy and sustainable foods.
   Action: Increase taxes on producers of unhealthy foods and simultaneously subsidize healthy foods through national government policies. Prioritize taxes on producers rather than on consumers to efficiently affect the supply of unhealthy foods. It is important to increase taxes on unhealthy foods in general and for all producers on the

market, rather than to target only a few foods or some producers, which may only lead to a shift from one unhealthy food to another.

Taxes on unhealthy foods could be used to subsidize healthier alternatives. In the long-run, this may not be feasible if the production of unhealthy foods is strongly reduced, but it could function as a catalyst for transforming the food supply. Furthermore, politicians need to see beyond election campaigns if they are to impose taxes that may not be popular at first. The advocacy tool mentioned in Action 3 could function as support.

5. Young people are not actively involved in shaping their foodscape.

   Action: Listen to children and adolescents! Adults are responsible for the present foodscape. To implement changes that are efficient and sustainable, children and adolescents must be involved. This could promote engagement in health and society among adolescents, knowing their opinions matter to adults. One suggestion is to use schools as a platform to collect stories and ideas from school children and adolescents concerning the (un) sustainable foodscapes surrounding them, as initiated by the Municipality of Säffle. Knowledge about how student engagement can be achieved should then be shared among schools and municipalities to find successful concepts that work in different settings.

Summary

In summary, the need for a shift in the foodscape surrounding children and adolescents towards a more sustainable supply was illustrated by representatives of the Municipality of Säffle; it was further developed by retail and public health authorities and discussed amongst workshop participants. Both hard and soft policy measures were discussed. One main focus was on how to promote co-creation between different foodscape actors, e.g., politicians, retail and multiple local stakeholders, in order to move the foodscape in a given context to become healthier and more sustainable. The Municipality of Säffle served as a real-life example of a municipality that has recognized the problems in the current foodscape and that intends to change it for the better, possibly by building on some of the recommendations from this workshop.

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References

1. Vonthron S, Perrin C, Soulard CT. Foodscape: A scoping review and a research agenda for food security-related studies. PLoS One. 20 maj 2020;15(5):e0233218.
2. Matmiljöns betydelse för vår hälsa — Folkhälsomyndigheten [Internet]. [citerad 14 november 2022]. Tillgänglig vid: https://www.folkhalsomyndigheten.se/publikationer-och-material/publikationsarkiv/m/matmiljons-betydelse-for-var-halsa/
3. Backholer K, Gupta A, Zorbas C, Bennett R, Huse O, Chung A, m.fl. Differential exposure to, and potential impact of, unhealthy advertising to children by socio-economic and ethnic groups: A systematic review of the evidence. Obesity Reviews. 2021;22(3):e13144.
4. Swinburn BA, Kraak VI, Allender S, Atkins VJ, Baker PI, Bogard JR, m.fl. The Global Syndemic of Obesity, Undernutrition, and Climate Change: The Lancet Commission report. The Lancet. 23 februari 2019;393(10173):791–846.
5. Nobles J, Summerbell C, Brown T, Jago R, Moore T. A secondary analysis of the childhood obesity prevention Cochrane Review through a wider determinants of health lens: implications for research funders, researchers, policymakers and practitioners. Int J Behav Nutr Phys Act. 10 februari 2021;18(1):22.
6. Obesity and overweight [Internet]. [citerad 07 november 2022]. Tillgänglig vid: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight
7. Värmland-Säffle-ENG.mp4 [Internet]. 2022 [citerad 14 november 2022]. Tillgänglig vid: https://vimeo.com/761819330
8. VicHealth | The Victorian Health Promotion Foundation [Internet]. [citerad 15 november 2022]. Tillgänglig vid: https://www.vichealth.vic.gov.au/

A Global Health Perspective on the Future of Meat

Annsofie Wahlström, Ylva Carlqvist Warnborg, Matthew Kessler

Background

Questions about what the future of meat should look like encompass all of the typical food systems problems as well as some unique ones. People have different levels of access to healthy, nutritious and culturally appropriate foods. 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 centre of many environmental challenges, such as increasing greenhouse gas emissions and biodiversity loss, 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 is estimated that more than one billion people across the world have livelihoods dependent on or related to livestock production[1]. Livestock are also important contributors to sustainability, as they can graze on non-arable lands and convert non-edible by-products of agriculture into food. They act as landscape managers and play a role in the nutrient cycling of ecosystems and agroecosystems[2]. There are also debates surrounding whether livestock can be used to manage soils to increase and store additional carbon to mitigate the impacts of climate change[3]. Ultimately, meat production and consumption can be seen as either part of the problem or part of the solution.

Objectives

What type of future for meat and livestock do you desire? Does a sustainable future look the same in Nordic countries as it does in Brazil or India? During the workshop we explored four different futures for 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 favours 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. What are the drivers and vulnerabilities of each future? What is important to consider if this is the future we desire?

What we aimed to achieve in the workshop

In our workshop, we explored these issues connected to the future of meat in different ways. We started the workshop by addressing our values, cultures and the personal responsibilities we bring to these debates. All participants were offered the possibility to explore their view of the future of meat using a values-based quiz developed for this purpose. We invited two speakers, whose talks inspired discussions organized as a Café model workshop. First, Elin Röös, researcher in the field of sustainable food production and consumption at SLU, outlined the big picture problems and benefits of livestock and then explored whether the arguments for livestock in sustainable food systems held up to ethical scrutiny. After lunch, Nicole Rocque, senior innovation specialist at The Good Food Institute India, drew our attention to the context of the global South, zooming in on India and laying out the promise of 'smart' proteins. Following that inspirational talk, the participants were invited to a round table discussion about the drivers and vulnerabilities of the four different future scenarios.

Approach

Call to action: Drivers and vulnerabilities for the four futures.

Identifying drivers and vulnerabilities of the four different futures at a regional and a global level will help us move towards the positive aspects or away from the negative aspects of a particular future. What are the key drivers that can make the desired future achieve an equitable and healthy food system at a regional level and an equitable and healthy food system at a global level? Important also to consider here is what the health vulnerabilities are if we only commit to a single future.

PHOTO: GLORCZA, GETTY IMAGES

Listed below are the drivers and vulnerabilities of the four scenarios identified by the workshop participants.

Future scenario 1

New and novel foods are produced in indoor settings to free land from agriculture while providing protein and nutrition. "Meat" produced in these labs gradually replaces the meat that is sold at markets, grocery stores and restaurants

Drivers

Zoonoses is a constant threat to public health, and the meat industry is one of the greatest sources of it. The need to eliminate the risk for zoonoses is a driver for substituting meat from animals with meat from labs. (The risk for zoonoses from insect production may need further exploration.)

Ethical reasons, e.g., mental health, constitute an important driver for substituting meat from animals with lab-grown meat. Concerns about animal suffering and welfare as well as poor working conditions in some meat production plants would be reduced by building out an alternative 'meat' sector.

Land use would shift dramatically, as arable land used for livestock production could be transitioned to other uses. Additionally, without the need to feed livestock, less land would be used to grow animal feed and less forested land would need to be deforested to provide grazing areas.

Health aspects of red meat consumption; Recommendations from WHO as well as many national public health organizations clearly state that overconsumption of red meat is a health risk. Lab meat could be produced to contain less fat and cholesterol, making it a healthier food.

Test kitchens/ restaurants; There is a growing market for new, tasty and sustainable food as well as for innovators and entrepreneurs who are interested in producing novel foods and associated technologies.

Private sector; Continued investment from this group can jump-start the development of this sector and work to disrupt existing animal agriculture.

Subsidies in the form of public funding to lab meat and/or insect production could be a powerful driver, serving as an economic incentive to shift production to alternative protein sources. Public funding could establish a foundation for sharing knowledge around safety protocols and research, thus enabling private companies to develop safer food products faster. Finding ways to 'make it special' could possibly attract ma ny to eat lab-grown meat and/or insects, as food is a way for people to express their values and personal choices in their consumption decisions.

Vulnerabilities

Lack of knowledge; Compared to mankind's history of eating meat and its experiences of meat as good, nutritious food for us, there is a lack of research on and public acceptance of 'new foods'. There will be many sceptical comparisons with "the real thing" a long time after introducing lab-grown meat as an alternative/replacement.

Expensive; Lab-grown meat requires science, labs, specialist facilities to grow the meat cells, etc.; thus, the economical drawbacks are initially great, especially when food is produced on a smaller scale.

Energy consuming; Processing plants that produce lab-grown meat require a great deal of energy. While the environmental impacts of land use and animal feed are reduced, cultivating meat in these ways is an energy-intensive process.

Acceptable culture vs traditional meals; In some parts of the world, insects are a perfectly normal part of daily food; in others, the "yuck factor" may be the main obstacle to introducing insects as a sustainable source of protein. Moreover, in no traditional cuisine has there been a place for lab-grown meat.

Food safety- lack of regulations; Lab-grown meat as well as insects present challenges in relation to food safety, and new products may need new regulations and impact human nutrition and health in ways that we are not yet aware of.

Demand; Who wants to start eating lab-grown meat? It will depend on the pricing, the taste and the wider cultural acceptability of these products.

Future scenario 2

Livestock are being raised in environments that resemble the animals' natural habitat. People in high-income countries consume less meat. Civil society and governments are calling for smaller-scale, localized systems of farming and are urging people to eat foods that can be grown in their area rather than foods imported from abroad.

Drivers

Health; With less meat produced, less meat will be consumed. In high-income countries, there are numerous health problems related to overnutrition (e.g., often from eating too much animal-sourced foods) rather than undernutrition.

Zoonoses; With intensive, efficient meat production where animals live closely together, there may be an increased risk of zoonosis spreading. If livestock are allowed to roam in larger pastures, sick animals can potentially be isolated before a disease spreads.

Land use; Grazing ruminants do not directly compete with land that can be used to grow food for human consumption. Free-range cattle add value to areas that could otherwise not be farmed and convert landscapes that are not directly edible for human consumption into protein. Moreover, they may be of crucial value in preserving and promoting biodiversity.

Acceptability; Many people may want to eat meat, but not with the associated negative environmental and social costs of production. Systems that centre on animal welfare, use fewer antibiotics, and raise animals in landscapes that better resemble their natural habitats are desirable to some consumers.

Farmers livelihood; In many parts of the world, animal farming is a substantial part of people's livelihoods; additionally, animal farming needs continue to not risk impacting hundreds of millions of livelihoods across the globe.

Differentiated global consumption; If consumption decreases in the global North, that can allow for increased consumption of meat in the global South, where the inclusion of some meat into diets can assist in addressing undernutrition.

Vulnerabilities

Loss of farmers; With less production, profits go down and animal farming may no longer provide enough income for families and societies.

Expensive meat; If the cost of meat increases, people who already have trouble affording sufficient calories and nutrition for their family will struggle more with increased food prices.

Future scenario 3: Plant based

Environmental sustainability and animal welfare campaigns catch on globally. People turn to plant-based diets as they reconsider their relations with animals and animal agriculture. Land that produces animal feed now grows food for humans or is converted into wildlands.

Drivers

Health concerns - humans, animals and planet; Plant-based diets are in many contexts presented as healthier than those including meat.

Greenhouse gas emissions; As meat production is often mentioned as one of the main drivers of greenhouse gas emissions, a paradigm shift to a plant-based diet globally could potentially be a game changer. It is a more efficient type of production (no need to cycle crops through an animal), and there would be a significant decrease in methane production.

Lack of land and water resources; Because meat production requires a great deal of land and water, food for humans could be produced more sustainably without meat. This of course depends on the crops.

Innovation; Plant-based diets are already a wide field of innovation, with entrepreneurs launching new products and creating or catering for plant-based food preferences.

Tasty and healthy alternatives; Meat often carries the tastes of the plant-based cuisine; i.e., if a meat-like texture can be achieved, tasty and healthy vegan alternatives are in abundance.

Momentum; At this point in history, with an increasing awareness of global problems like climate change, environmental pollution and biodiversity loss, there is momentum for change.

Cost; Providing food on a plant-based basis for the global population can be achieved at a lower cost, economically, socially and ecologically.

Net protein efficiency; Turning plant proteins into animal proteins will always be a detour.

Ethics; Eating plant-based food could be an ethical choice for anyone concerned with environmental issues or animal welfare.

Social norms are changing in parts of the world. Where meat has a long-standing position as "high status food", social norms may be changing in favour of plant-based diets, which are sustainable, responsible and tasty choices to make.

Vulnerabilities

Employment; A major shift to plant-based consumption can severely impact the economies of livestock farmers around the world.

Nutrition; This could lead to some dietary health problems, especially for young children and elderly populations, as meat is better at delivering essential nutrients, including iron, zinc and B vitamins.

Feasibility; Meat is part of many cultural traditions, and there have been few examples historically of populations drastically reducing their meat consumption once they can afford it.

Future scenario 4

Technological innovation and sustainable intensification pave the way for a more efficient livestock production system. These

innovations reduce negative environmental impacts, free up land for conservation, and improve animal health. People continue to consume meat at the same rate (or more) and at the same price as they are used to.

Drivers
Precision or climate-smart agriculture; As in all fields of agriculture, the meat industry has the potential to develop new methods and technologies to increase production to meet a growing demand, at the same time as mitigating greenhouse gas emissions through an improved feed-conversion ratio, better living conditions and veterinary care for animals, and improved genetics.

Nutritional quality; Meat is food of high nutritional value, including vitamin B12 and other nutrients that are vital to our wellbeing.

Global food security; There has been significant investment in highly efficient production and distribution of animal products across the world. Through research and development, as well as animal feed subsidies, livestock production has contributed to low prices and improved productivity.

Healthy animals; Large-scale animal production can afford technologies and veterinarians to track animal health. Unhealthy animals are bad for business, meaning that the incentives are towards raising healthy and productive livestock.

Traceability; With modern technologies enabling consumers to track the meat they eat back to individual farmers, it is possible to keep eating meat if origin and animal welfare are important to you. With increasing transparency in these products, consumers can choose to purchase meat that has not contributed to global deforestation.

Vulnerabilities
Market concentrations; Due to the large numbers of animals raised together, there are increased risks if there are disruptions to transportation routes and ports or if diseases spread on large farms.

Social and environmental costs; In the pursuit of economic gain and achieving the highest output per unit of animal or land, the wellbeing of humans working in processing plants or animal welfare may not be prioritized.

Recommendations

The aim of this workshop was to explore different pathways for the future of meat and livestock. Despite having smart people in the room who have approached this issue from different sectoral, cultural and global perspectives, we were not able to solve the problem the future of meat and livestock from a global health perspective in three hours.

Instead, we advise politicians, CEOs, sustainability managers, civil society organizations, researchers and citizens to neither completely swear off animal agriculture nor invest all of our food and climate solutions in it. There is a need and an appetite to invest in a diverse set of solutions related to the four futures. We recommend that food and agriculture decisionmakers be more self-reflective and nuanced when approaching this highly complex topic.

There are no simple solutions, but there is potential for finding more common ground and agreements moving forward – regardless of one's starting point. At least in this workshop, it was clear that having better dialogues is an important tool in depolarizing this burning global issue.

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References

1. Magnusson, U., 2016. Sustainable global livestock de - velopment for food security and nutrition including roles for Sweden. Ministry of Enterprise and Innova - tion, Swedish FAO Committee, Stockholm.
2. Karlsson, J., 2022. 'Livestock as resource users and landscape managers-A food systems perspective.' PhD dissertation. Swedish University of Agricultural Scienc - es. Uppsala.
3. Garnett, T., Godde, C., Muller, A., Röös, E., Smith, P., De Boer, I.J.M., zu Ermgassen, E., Herrero, M., Van Mid - delaar, C.E., Schader, C. and Van Zanten, H.H.E., 2017. Grazed and confused?: Ruminating on cattle, grazing sys- tems, methane, nitrous oxide, the soil carbon se - questra- tion question-and what it all means for green - house gas emissions. Food Climate Research Network.

Tackling Antimicrobial Resistance for Sustainable Food Systems – How to Address the Knowledge, Practice, and Governance Gaps

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Background

Increasing antimicrobial resistance (AMR) is recognized as one of the greatest threats to global health, development, and food security. Widespread over- and misuse of antimicrobials, in combination with inadequate measures to prevent and control infections, is contributing to the global emergence of AMR.

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. Livestock and other food-producing animals constitute an integrated part of sustainable food systems. Livestock provide fertilizer (manure) for a large share of the globe's crop land and generate food from non-arable land, which globally constitutes about 25% of the land on the planet, according to current estimates. Furthermore, and most importantly, animal-source foods are rich in essential micro-nutrients, particularly for women of reproductive age and children. To optimize the use of natural resources and minimize greenhouse gas emissions, however, animals must remain healthy (Magnusson et al., 2022). Antimicrobials are important to ensuring the health, welfare, and productivity of food-producing animals. According to estimates by the World Bank Group, the decline in livestock production caused by AMR could be substantial and most pronounced in low-income countries – up to 10% in 2050 (Jonas et al., 2016). Our ability to sustainably feed and nourish a growing global population depends on our success in protecting the food systems from threats like AMR. Thus, tackling AMR is not only critical for protecting public and animal health (WHO, 2020), but also for protecting sustainable food systems.

Management of AMR in the food chain starts with primary production and continues through to consumption (FAO, 2020). Many of today's livestock-derived food systems rely on excessive antimicrobial use, which is associated with increasing risk for the emergence of drug-resistant microorganisms and antimicrobial resistant genes.

Minimizing the unnecessary use of antimicrobials in animal husbandry is a key factor in achieving national and international goals of controlling AMR and thereby sustainable food systems.

Objective of the workshop

With the target goal of Sustainable animal-derived food systems with responsible and rational antimicrobial use, the objective of this workshop was to identify solutions in different settings that can guide policy on antimicrobial stewardship. The workshop took a transdisciplinary and cross-sectoral approach, with 36 registered delegates representing 15 countries in Europe, Africa, Asia, and North America. The delegates came from academia, government agencies, private companies, and civil society, with expertise in, e.g., human, and veterinary medicine, agriculture, international development and aid, as well as disease prevention and control. The delegates had experience and knowledge of different food systems with respect to geographical, socioeconomic, and cultural settings, all of which are factors that may influence how knowledge is perceived and disseminated, what measures are chosen, and the possibilities to enforce national and international policies and regulations related to antimicrobial use.

Through group discussions, the delegates identified and prioritized challenges in achieving sustainable animal-derived food systems by responsible and medically rational antimicrobial use. Thereafter they identified and discussed required actions and solutions to tackle these challenges. Each delegate was also asked to select the three suggested actions and solutions they considered most important to achieving the target goal of Sustainable animal-derived food systems with responsible and rational antimicrobial use.

Outcomes and reccomendations from the workshop

Workshop delegates agreed on several prioritized actions and solutions to address challenges in tackling antimicrobial resistance to support sustainable food systems. These were divided into gaps related to knowledge, practice and governance, respectively. Below are the summarized policy recommendations put forward by the participants for the respective gaps in 1) knowledge, 2) practice and 3) governance. Please note that these recommendations are aggregated and not listed based on priority.

1) Recommendations targeting knowledge gaps:

Challenge: Livestock producers and policymakers have insufficient knowledge about prudent antimicrobial use and how to curb resistance. This may be tackled by:

1. Informing and educating stakeholders on the direct linkages between antimicrobial use and emerging AMR.
2. Empowering food producers through enhanced extension services that build trust and facilitate communication among relevant stakeholders, e.g., farmers, animal health professionals, food industry, consumers, and policymakers.
3. Increasing access to targeted information for different stakeholders on the importance of animal health and welfare for good productivity and low use of antibiotics, emphasizing disease prevention and control as means to reduce the need for, and promote the prudent use of, antimicrobials.
4. Adapting awareness-raising materials on AMR to the local context and involving trusted ambassadors to motivate stakeholders.

2) Recommendations targeting practice gaps:

Challenge: disease prevention is insufficient to reduce the need for antimicrobials. This may be tackled by:

1. Developing and implementing locally adapted vaccination, biosecurity and herd health programs for better disease prevention and control at the farm, sub-national and national levels.
2. Taking voluntary and mandatory measures to enhance disease prevention pursued by farmers. This may include animal health certification systems: e.g., that farms or products are certified, and products sold at a higher price based on good animal husbandry and prudent use of antimicrobials. Such branding may cause consumers to make informed choices and promote compliance with disease prevention practices.

Challenge: suitable and affordable diagnostics are inaccessible, resulting in inappropriate prescription and use of antimicrobials. This may be tackled by:

1. Establishing government-subsidized laboratory facilities and services, especially in LMICs.
2. Encouraging animal health professionals to collect and submit samples to laboratories through information campaigns.

Challenge: fragmented data on current antimicrobial use and resistance patterns. This may be tackled by:

1. Improving the infrastructure, laboratory, and epidemiology capacities in surveillance. Actions should include improved data collection, analysis, data sharing, and evaluation of the effectiveness of measures, especially in LMICs.
2. Making stepwise improvements in government-led and -financed surveillance systems, involving animal-specific pathogens in addition to indicator bacteria.

3) Recommendations targeting governance gaps:

Challenge: policies, regulations, and infrastructure are insufficient to enable legal enforcement. This may be tackled by:

1. Governments creating awareness and building trust among food producers regarding the need for more stringent regulations and policies.
2. Decision-makers taking a participatory approach to developing policies and regulations with a wide range of stakeholders for better acceptance, promotion, and applicability.
3. Establishing international trade agreements (soft laws) on higher production standards including prudent use of antimicrobials. Working with the World Trade Organization (WTO) and key national and international organizations to promote increased acceptance of and compliance with these standards.

Challenge: suboptimal coordination of donor funds and grants to tackle the complexity of AMR within and between sectors. This may be tackled by:

1. Creating synergies to improve coordination of funding for projects related to National Actions Plans (NAP) and national guidelines on AMR. Different projects can be interlinked with multisectoral coordination mechanisms to deliver a significant impact (e.g., through the Quadripartite, and the AMR Multipartner Trust Fund).
2. Performing cost-benefit analyses on effective measures to tackle AMR to guide coordination of donor funds, grants, and investments (e.g., done by the World Bank).

Tackling AMR is necessary if we are to protect human and animal health while increasing sustainability in the food and agricultural sectors. Without AMR containment, the United

PHOTO: CHARLOTTE KESL, WORLD BANK FLICKR

Nations Sustainable Development Goals are less likely to be accomplished, risking our ability to achieve the goals of ensuring food security and nutrition, ending poverty, ensuring good health and wellbeing as well as economic growth, globally.

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References and suggested reading

1. Bruno AV, Mackay C. Antimicrobial resistance and the activities of the Codex Alimentarius Commission. Rev Sci Tech. 2012 Apr;31(1):317-23. doi: 10.20506/rst.31.1.2122. PMID: 22849286.
2. 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.
3. Magnusson, U., Boqvist, S., Doyle, R., Robinson, T. 2022: Animal health and welfare for sustainable livestock systems. Rome, Italy: Global Agenda for Sustainable Livestock.
4. World Health Organization, "Antibiotic resistance factsheet", 2020. Accessed 10 March 2022, https://www.who.int/news-room/fact-sheets/detail/antibiotic-resistance

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