

Meeting Report

Proceedings of a Workshop on Characterizing and Defining the Social and Economic Domains of Sustainable Diets

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Abstract: Global challenges associated with a growing demand for food in the face of finite natural resources and climate change have prompted concerns about the sustainability of our current food systems. As formulated by the Food and Agriculture Organization, the four principal domains of sustainable diets are health, economics, society, and the environment. While emphasizing the environmental cost and health impacts of current diets, the research literature has virtually ignored the vital economic and social aspects of sustainability. Without these components, critical inputs for decision-making about global challenges related to climate change and a growing demand for food are missing. National Dairy Council convened experts in sociology, economics, human nutrition, food systems science, food security, environmental health, and sustainable agriculture for a one-day workshop to define the social and economic domains of sustainability in service of better characterizing food-based dietary guidance that is both healthy and sustainable. The consensus recommendations were to (1) select social and economic indicators to complement the existing environmental and health ones, (2) better define appropriate concepts, terms, and measures to foster discussion across scientific disciplines, (3) reframe the focus on sustainable diets towards the goal of “achieving healthy dietary patterns from sustainable food systems”, and (4) complement the four domains, and incorporate the notions of geography, time, and cross-cutting considerations into sustainability frameworks. This publication summarizes the presentations, discussions, and findings from the 2019 workshop, and aims to catalyze further action to advance sustainability research and practice in the context of food-based dietary guidance and the Sustainable Development Goals.

Keywords: sustainable diets; sustainable food systems; social domain; economic domain

1. Introduction

The Food and Agriculture Organization of the United Nations (FAO) has defined “sustainable diets” as those with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations [1]. The four domains of sustainability, health, economics,

society, and the environment, were integral to the original 2010 definition. Sustainable diets were described as healthy, safe, affordable for consumers and profitable for producers, acceptable, accessible, able to contribute to food security, protective of biodiversity, and sparing of natural resources [1]. The health domain includes, but is not limited to, aspects such as food quality and nutrient density, the economic domain includes aspects such as relative affordability and value chain profitability, the social domain is focused on the value of food systems to society, whereas the environmental domain deals with the interactions between agriculture and variables such as greenhouse gas emissions, water quality and quantity, land use, and energy use. A comprehensive, transdisciplinary science base that integrates all four domains of sustainability is needed to make informed recommendations for food-based dietary guidance (FBDG).

1.1. Sustainable Diets: Issues, Challenges and Opportunities

Even though the FAO definition recognized the social and economic aspects of sustainable diets, most sustainability-related dietary guidelines have tended to rely narrowly on evidence from the health and environmental domains. On the health side, there is considerable literature linking individual nutrients, food groups, food patterns, and diet quality metrics with mortality and an array of health outcomes, including the risk of obesity and other non-communicable diseases [2]. On the environmental side, a well-accepted life-cycle assessment (LCA) methodology has been deployed to develop such indicators as land use, water use, and greenhouse gas emissions (GHGe). By contrast, metrics and measures for the social and economic aspects of sustainability are less well-established, and those considerations are typically not included in most food systems modeling [3]. While the impact of current (and future) diets on GHGe, land, and water use has been well characterized, less is known about the societal and economic aspects of proposed dietary interventions.

The more holistic focus on food systems has provided researchers with more opportunities for transdisciplinary research and for developing tools that fully integrate the four domains [4], however, integration in research and translation continues to fall short. Understanding the impacts of the production and consumption of different dietary patterns beyond health and the environment are needed, yet there is no agreed upon approach to do so.

Cross-sector solutions are essential to address global challenges related to climate change and a growing demand for food. In October 2019, FAO and WHO released a publication entitled “Guiding Principles for Sustainable Healthy Diets” (SHD) [5]. An aim of SHD is they “must combine all the dimensions of sustainability to avoid unintended consequences.” Accounting for multiple dimensions means trade-offs. The EAT-Lancet Commission proposed a dietary pattern to support human and planetary health [6], but it was not assessed for some social and economic parameters such as dietary affordability. One analysis, based on multi-country food prices from the World Bank, showed that this diet was not affordable for the world’s poor and may be out of reach for 1.58 billion people [7].

Current literature reviews further illustrate this imbalance. A 2016 systematic review of 113 papers on sustainable diets revealed 73% of studies focused on environmental outcomes, whereas fewer than 30% focused on social or economic outcomes [8]. A 2019 review of 52 sustainable diet publications found approximately 70% of studies focused on human and/or environmental health outcomes, while fewer than 15% of the studies focused on social or economic ones [9]. In addition, substantial heterogeneity between studies was found in the terminology, indicators, and metrics used to characterize the social and economic domains of sustainability [9]. A 2020 analysis confirmed that social, and in some cases economic, dimensions “continue to receive insufficient attention” in studies of food system sustainability [10]. When evaluating global drivers of food system change, another study found that the strongest positive correlation with food system sustainability was economic (i.e., change over time in merchandise and services trade per capita). Drivers related to climate change, on the other hand, were only weakly correlated with sustainability [11].

A comparative lack of global perspectives is another shortcoming of the existing literature. Low- and middle-income countries (LMICs) are not well-represented in the research on sustainable diets

and food systems. One review found 92% of studies that evaluated sustainable diets were conducted in high-income countries (HICs) [8]; another found 90% of studies were conducted in HICs [9]. Due to the differences in local and regional politics, economics, social structures, and food systems between HICs and LMICs, much of the sustainability research is not transferable to LMICs.

The body of evidence on sustainable diets and sustainable food systems indicates that these factors can be interdependent, dynamic, and are heavily influenced by geography and regional or local economic conditions [8,12,13]. As the contributions and interactions of the four pillars are not being adequately characterized and captured, it is plausible the collective understanding of these systems is flawed. Evidence-based, integrated approaches are needed.

1.2. Background: Workshop on the Social and Economic Domains of Sustainable Diets

In March 2019, National Dairy Council (NDC) convened a workshop in Rosemont, IL, USA to engage experts in better characterizing and defining the social and economic domains of sustainable diets. The initial goal was to develop a framework that integrated all four domains of sustainable food systems science to better define what constitutes healthy and sustainable dietary recommendations. See Box 1 for the list of workshop objectives. During the course of the meeting, Objectives 1–3 were met and, while indicators and additional components of a conceptual framework were identified per Objective 4, more work is still necessary to complete this step (see Conclusion).

Box 1. Workshop objectives.

1. Expand and balance scientific discussions on sustainable diets and food systems to include evidence from all four domains of sustainability: health, economics, society, and environment;
 2. Select and assess various indicators from the social and economic domains of sustainability to better understand their usefulness and applicability in the context of developing a framework to evaluate the sustainability of different diets across the four domains;
 3. Use dairy as a case study with which to evaluate selected social and economic indicators;
 4. Develop a framework that will help advance research and practice in the fields of diets and food systems in the context of FBDG and the Sustainable Development Goals (SDG).
- NOTE: The group focused on dairy for the case study during the workshop; however, the long-term objective of the group is to develop a framework relevant for dietary guidance including all foods and beverages.*

This workshop built upon a meeting convened by Global Dairy Platform (GDP) in June 2016, which was summarized in the *Frontiers in Nutrition* paper, “The Chicago Consensus on Sustainable Food Systems Science” [14]. A primary finding from this meeting was that researchers and policymakers need to take a multidisciplinary approach to sustainable food systems decisions, and this approach should integrate evidence from all four sustainability domains, rather than relying on single indicators (e.g., GHGe) or individual domains (e.g., environment).

For the 2019 workshop, a total of seven experts were invited to participate based on their expertise in one or more of the following areas: sociology, economics, environmental health, human nutrition, food systems, food security, and sustainable agriculture. This group included participants from the 2016 GDP meeting (Drewnowski, Griffin, Ingram) as well as additional representatives from academia, international research centers, and non-profit research organizations. As limited social and economic indicators of sustainability are available in the published literature [9,10], NDC convened a transdisciplinary team of experts to begin the development of an integrated framework to include these factors. In addition to the subject matter experts, a group of seven scientists and health professionals from NDC attended as presenters and observers.

These proceedings are not intended to serve as a comprehensive overview of the subject, rather, they aim to summarize the expert panel’s comments, discussions, and conclusions.

2. Summary: Workshop on Social and Economic Domains of Sustainable Diets

2.1. Workshop Format

The workshop opened with each expert participant delivering a brief presentation based on his or her work on the social and economic domains of sustainable diets and food systems. Each speaker put forth a list of indicators or other components to be considered for inclusion in a comprehensive framework, based on their expertise and knowledge of the relevant scientific literature. The presentations served as a stimulus to meet the workshop objectives during the one-day meeting format.

Participants then discussed considerations for aligning on the objectives and boundaries for an integrated framework. The indicators and other integral food system components were catalogued as a starting point and used for a discussion on how to prioritize indicators and fill gaps within an integrated framework.

The group then completed a case study thought exercise to test how social and economic indicators could help evaluate dairy impacts across the value chain in dietary patterns and food systems. The broad expertise represented by the scientific participants, however, led to deeper and more nuanced insights about the interconnections between, and the contributions from, social and economic perspectives, such as the importance of cross-cutting factors and integrating outcomes over time and space. More work was identified as necessary to complete Objective 4 during this discussion. The workshop closed with a discussion outlining the next steps in the process of selecting the most appropriate indicators and developing the framework.

2.2. Identifying Indicators

The expert group dedicated approximately half of the workshop to identifying social and economic indicators that could be used in a framework (Table 1). The group agreed there is little consistency in the literature on what social and economic indicators are included, how they interact, and how they are prioritized and measured.

Table 1. Panel discussion summary: Social and economic domains, cross-cutting factors, and proposed indicators.

Social	Economic
<ul style="list-style-type: none"> Food access (socially and physically accessible) Community food security Food patterns Worker well-being and safety (across food supply chains) Continued focus on health outcomes Social change for resilient food systems Inclusive food distribution channels Urban food systems for better diets, nutrition, and health Social access Taste and enjoyment of food Role in religious ceremony Cultural identity 	<ul style="list-style-type: none"> Food affordability (financially accessible) Costs of food production Productivity throughout the food system Economic resilience of producers Producer livelihoods and profits Distribution of risks/benefits of sustainable outcomes Wages (including farm income) Livelihoods/welfare of post-farmgate food system workers Economic impact on producers and other food systems workers of reduced food loss/waste Carbon costs (attach GHGe costs to individual foods and to total diets)
Cross-cutting Factors	
<ul style="list-style-type: none"> Power Ethics and morals Gender Food safety Choice (job opportunities for food system workers and food for individuals to choose from) Triple burden of malnutrition Equity (social and intergenerational) Stocks and flows of various kinds of capital (financial, social, natural, human, and physical) 	

2.3. Economic Indicators

Economic indicators are better established than social, but they are not routinely linked to healthy dietary patterns. The panel listed economic indicators that could be used to evaluate dietary patterns, such as food price, affordability, supply chain profitability, agricultural productivity, market growth, and income.

Ongoing work on the relation between diet quality and cost has used such metrics as calories per unit cost and nutrients per unit cost [15]. Relative affordability of foods is often measured as price in relation to the prevailing incomes either at the household or the national level [16].

2.4. Social Indicators

The panel also assembled a list of social indicators to evaluate dietary patterns. Among social indicators driving food choices are cultural values, religious beliefs, and traditional preferences. There is also considerable social value to the continued viability of farming and food production. Dietary choices and nutrition economics can also impact community interactions, broader food sovereignty issues, labor, and workers' rights. Although the social domain encompasses a large and diverse set of indicators, there is no single, agreed upon way to define and evaluate the social impacts of dietary change relative to the other three domains.

Social well-being was discussed as a possible frame for the social domain of sustainability. Well-being, based on the capability approach [17], has been operationalized by the Organisation for Economic Co-operation and Development (OECD, [link](#)) to measure well-being beyond GDP. Although well-being is broader than diets and food systems, several groups have linked it to sustainability concepts [18–20]. The well-being concept, therefore, may have value to characterize the social domain of sustainability and link it to food production and food consumption questions.

2.5. Interconnections between Domains

Due to the interconnected nature of the four domains, social and economic indicators may also have a bearing on the health and environmental domains, thus current research paradigms may not account for all consequences resulting from changes in dietary patterns.

One example is that better nutrition often comes at a higher monetary cost. Grains, for example, are the caloric basis for human diets globally. Refined grains along with added sugar and vegetable oils contribute to obesity, particularly in HICs. These crops are also produced on a sizable portion of arable croplands, and this footprint has multiple environmental impacts. By contrast, higher prices for more nutrient-rich foods are the reason why such foods are less accessible to consumers living in low-income areas with less purchasing power. Although occupying a much smaller land base, these crops are characterized by higher labor inputs and in most instances, more intense use of inputs like irrigation. Nutrition and food security for all depend on the hierarchy of food prices and nutrition economics. Improving social indicators such as workers' rights, working conditions, and other protections may be associated with improved worker health but also may drive up production costs.

By using a transdisciplinary approach including all domains to inform practical frameworks and models, relevant trade-offs, synergies, and unintended consequences would better be captured and addressed

2.6. Cross-Cutting Factors

Several factors that interact with food systems and dietary choices do not fit into a single domain, but rather cut across multiple domains. The panel identified some “cross-cutting” factors such as food safety, power, gender equity, ethics, and innovation as important components of a framework that accounts for all four domains (Table 1).

Cross-cutting factors may have intergenerational and time-dependent effects that influence future food systems and dietary patterns. Intergenerational effects such as the transmission of poverty, cultural

values, and epigenetic programming (i.e., when parental experiences, such as malnourishment or stress, are passed to offspring without changing the DNA sequence) may all perpetuate socioeconomic imbalances and detrimental health outcomes.

3. Additional Considerations for Framework Development

In addition to identifying social and economic indicators relevant to diets and food systems, the panel named other considerations for building a framework, described below.

3.1. Shared Terminology, Methodology, and Framing

A barrier for developing a framework using a transdisciplinary approach is the lack of shared and commonly understood vocabulary related to these topics across various disciplines. Each expert studying this topic brings to it a perspective colored by his or her academic training, which may differ significantly in research philosophy, methods, metrics, and vocabulary. For example, the definitions of “sustainable diets” and “sustainable food systems” may be difficult to tease apart since they share many of the same elements, yet their meanings can differ considerably based on the context in which they are used [3]. One approach to enhance the consistency of research translation and adoption would be to develop a shared lexicon for sustainability across health, economic, social, and environmental disciplines.

The panel also agreed there are limited options of a shared and standardized methodology to be used for this purpose. The group noted there are few consensus approaches between (or even within) disciplines for the study design, data collection, indicator selection, metrics, or analysis. These inconsistencies encumber cross-study comparisons and can lead to very different outcomes and conclusions arising from the same research question.

The panel recognized the value of shifting to a focus on “achieving healthy dietary patterns from sustainable food systems” to include both food production and consumption objectives that are environmentally, economically, and socially sustainable.

3.2. Supporting Decision Making and Avoiding Unintended Consequences in Food Systems

Recognizing and understanding interactions between and across sustainability domains opens the door to improving research and practice related to dietary guidance and food systems. Synergies and trade-offs that may not otherwise be apparent may come to light, supporting the ultimate goal of minimizing or avoiding unintended consequences. In this regard, it will be important that evidence-based changes to guidance about healthy dietary patterns and sustainable food systems be consistently monitored and measured, and the assessments of these changes be shared. A key conclusion of the evaluation of sustainable food systems by Bene et al. [10] is that “the research agenda on sustainable food systems needs to focus on better understanding the trade-offs of food system sustainability and helping societies navigate these more efficiently and equitably.” These trade-offs result from the interplay between sustainability’s multiple domains.

3.3. Integrating Temporal and Geographic Considerations

Dietary and food system effects occur over time and vary by geography, and therefore any major decisions or changes may not show up in the same region or season in which they were put into practice. Global dietary patterns and food systems could look very different in 30 years, by which point Earth’s population is expected to reach nearly 10 billion people, with projected concurrent increases in wealth, urbanization, and globalization as well as new methods of producing food. Agricultural practices differ across countries and may improve with time.

A temporal dimension in the framework may help capture these types of potential shifts and their consequences over time—in both near and distant futures. A wide variety of dietary patterns and food systems exist in different regions and can co-exist within the same geographical space. Geographic

considerations can also capture differences in food system objectives, capabilities, and issues between HICs and LMICs.

4. Thought Exercise: Dairy as a Case Study

The panel used the dairy food group for a case study thought exercise to apply the framework concepts and better understand how they could be put into practice for assessing questions related to social and economic outcomes. The group used a short list of five indicators and components selected from Table 1 to test how they could fill the gaps in research and practice regarding dairy impacts in dietary patterns and food systems. The components and potential indicators are captured in Table 2.

Table 2. Dairy case study: Selected social and economic domain components and indicators.

Social and/or Economic Domain Components	Potential Indicators
Food Access	Dairy product availability, affordability, physical accessibility, allocation, and distribution
System Productivity	Milk produced per cow, herd size, amount of milk produced per worker
Livelihoods	Sector size, sector economic value, number of employees across the dairy value chain, average income per worker, income stability, job safety, job satisfaction
Triple Burden of Malnutrition	Stunting rates, wasting rates, nutrient deficiencies, hunger, overweight and obesity
Preferences	Cultural background, religion, taste preference, dietary diversity, consumer satisfaction, allergies and intolerances

The case study generated discussion on the challenges of agreeing on a limited number of indicators. The group agreed on the need for a consistent vetting process to select appropriate indicators from the complete list for a framework that integrates all four domains.

5. Conclusions

A summary of key findings from this workshop are reported below (Box 2). To ensure future recommendations for healthy dietary patterns from sustainable food systems represent the full spectrum of sustainability, more research using a multidisciplinary, systems-based approach that acknowledge all four domains is needed. Currently, conceptual indicators and metrics for dietary patterns and food systems for the environmental and health domains are better developed than the economic domain, and all three are better defined and developed than the social domain, likely due to the difficulties in observing, isolating, and quantifying sociocultural variables. All four domains can be interconnected so that changes to one domain may result in synergies and trade-offs across the others. These changes may occur over both space and time and may be influenced by cross-cutting factors such as gender, power, and ethics, among others.

The next steps to build upon the 2016 Ecosystem Inception Meeting and 2019 Social and Economic Domains of Sustainable Diets Workshop are to (1) review other sustainability literature for social and economic indicators and then align on indicators for inclusion, (2) develop the framework, including indicators for all four sustainability domains and striving to capture temporal and spatial considerations as well as cross-cutting factors, (3) engage the research community, industry, and governments to fund and apply research that includes multiple domains (e.g., the “Food System Impact Valuation Initiative” FoodSIVI (<https://www.eci.ox.ac.uk/research/food/fsivi.html>)), and (4) socialize the framework to educate scientists, policymakers, and other stakeholders about the role of different food groups in achieving healthy dietary patterns from sustainable food systems.

Box 2. Summary of Findings.

1. There is little consistency in the literature regarding social and economic indicators, how they interact, and how they are prioritized and measured. These inconsistencies encumber cross-study comparisons and can lead to very different outcomes and conclusions arising from the same research question;
2. The panel recognized the value of shifting from a focus on “sustainable diets” to a focus on “achieving healthy dietary patterns from sustainable food systems” in order to incorporate both food production and consumption objectives that are environmentally, economically, and socially sustainable;
3. Several factors that interact with food systems and dietary choices do not fit into a single sustainability domain (health, economic, social, environmental), but rather cut across multiple domains. By using a transdisciplinary approach inclusive of all domains to inform practical frameworks and models, relevant trade-offs, synergies, and unintended consequences can be better captured and addressed;
4. A major barrier for developing a sustainability framework using a transdisciplinary approach is the lack of a shared and commonly understood vocabulary related to these topics across various disciplines. The development of a shared lexicon for sustainability across health, economic, social, and environmental disciplines would greatly enhance research quality, output, translation, and adoption.

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