Advancing Nutrition and Dietetics Research in Global Food and Nutrition Security: A Roundtable Meeting Report

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ABSTRACT

Food and nutrition security remains a relevant issue globally, impacting nutritional status and other health outcomes. This is further complicated by various environmental factors that impact stable access to, availability of, and utilization of nutritious foods. Nutrition and dietetics practitioners play an important role in the identification and treatment of food and nutrition security and are also well positioned to advance research that can support food and nutrition security solutions. To address this important issue, the Academy of Nutrition and Dietetics' Council on Research convened a Global Food and Nutrition Security Research Task Force (Task Force). To leverage existing information and expertise in this area and identify the need for future evidence, the Task Force hosted a virtual roundtable with key internal and external stakeholders. This 2-day event included discussions on research gaps, potential entry points for nutrition and dietetics practitioners, and important equity considerations in the area of food and nutrition security research. The identified research gaps included the need for standardized terminology for consistent data collection, the need for validated screening and assessment tools that can be used across settings and also assess diet quality, additional translational and implementation science research, multisectoral and multi-pronged approaches, interdisciplinary collaboration with community partners, incorporation of research into policy development, and additional evidence on food systems approaches to target food and nutrition security. To more clearly identify the entry points for practitioners, five examples from various countries were included to identify food and nutrition security issues and how nutrition and dietetics practitioners can be involved in research to address food and nutrition security. The Task Force would like this information to inform a research agenda and be leveraged by the larger scientific community to drive future funding and research opportunities for food and nutrition professionals on this topic.
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MALNUTRITION IN ALL ITS forms is a worldwide concern that can lead to a myriad of complex health and economic issues.[1] Its continued existence implies the need for evaluation of the appropriateness and effectiveness of existing programs and the development of new strategies to address ever-changing causal factors. Strong evidence shows that food security is key for ensuring adequate food consumption and achieving a healthy nutrition status at the household level.[1] Similarly, guaranteeing access to quality foods in sufficient quantity is essential for improving the well-being of the global population. Because of their extensive knowledge of nutritional sciences and the ability to translate research into application, nutrition and dietetics practitioners are uniquely positioned to improve food and nutrition security at country, community, household, and individual levels and contribute in unique and valuable ways to advance a research agenda.[2] To that end, the Academy of Nutrition and Dietetics' (the Academy) Council on Research established the Global Food and Nutrition Security Research Task Force (GFNSR Task Force).

The GFNSR Task Force comprised both internal and external stakeholder groups that are involved in research generation, implementation, or dissemination of evidence and best practices to improve nutrition and food security. The groups internal to the Academy included the Council on Research, Hunger and Environmental Nutrition Dietetics Practice Group, the International Affiliate of the Academy of Nutrition and Dietetics, and the Global Member Interest Group. External groups included the Food and Agriculture Organization (FAO), World Food Programme (WFP), and Save the Children. More details regarding task force composition can be found in Figure 1.

In February 2022, the GFNSR Task Force assembled during a virtual roundtable to

1. Determine how nutrition and dietetics practitioners can equitably advance food and nutrition security research
2. Identify gaps in the existing body of research to promote a research agenda focused on global food security that will inform future research, including implementation science and policy development

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World Food Programme	Rossella Bottone
Academy of Nutrition and Dietetics' Global Member Interest Group	Jen Brewer, MA, RDN
International Affiliate of the Academy of Nutrition and Dietetics; Taibah University	Ahlam Badreldin El Shikieri, PhD, MBA, PgDip, BSc
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Figure 1. Global Food and Nutrition Security Research Task Force composition.

3. Achieve consensus on a flexible conceptual framework that will serve as the foundation for a global food and nutrition security research plan and call to action for nutrition and dietetics practitioners

DEFINITIONS

The GFNSR Task Force acknowledged that multiple definitions for food and nutrition security currently exist. The definition that the GFNSR Task Force used for *food and nutrition security/insecurity* included elements of food security (as defined by the 2014 Committee on World Food Security's Global Strategic Framework for Food Security & Nutrition)[3] and nutrition security (as defined by the FAO's 2020 "The State of Food Security and Nutrition in the World").[1] According to the Committee on World Food Security's 2014 framework, "Food security exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life. The four pillars of food security are availability, access, utilization, and stability." The FAO's 2020 definition of *nutrition security* is: "A situation that exists when secure access to an appropriately nutritious diet is coupled with a sanitary environment and adequate health services and care, in order to ensure a healthy and active life for all household members." The GFNSR Task Force acknowledged that to date, there is no definition for food and nutrition security that harmonizes the two separate definitions and advocates for an evidence-based definition to be published in the future that provides a more comprehensive approach. Additionally, the term *nutrition and dietetics practitioners* is used to collectively refer to registered dietitian nutritionists (RDNs); nutrition and dietetics technicians, registered (NDTRs); and their international equivalents. For the purposes of this article, the term *nutrition and dietetics practitioners* has a research focus and refers to nutrition experts engaged in research activities.[4] Other terms reflecting the same roles include *food and nutrition practitioners* and *food and nutrition professionals*.

BACKGROUND AND ROUNDTABLE OPENING REMARKS

The 2-day roundtable began with Marianella Herrera, MD, PhD, framing the conversation as having a focus on food and nutrition security, the role of nutrition and dietetics practitioners in research, and equity within low-resource settings globally. Francoise Kazimierczuk, PhD, RDN, LD, ATC, CSCS, NSCA-CPT, FAND, also emphasized the far-reaching health and social implications of global food insecurity. Kazimierczuk noted that nutrition and dietetics practitioners are obligated to ensure the health and well-being of their communities and to collaborate to address disparities and protect human rights, specifically access to safe and nutritious foods, as part of the nutrition and dietetics practitioners' code of ethics. In addition, Kazimierczuk said evidence is needed to guide appropriate and effective nutrition interventions and implementation approaches. Although gaps need to be addressed to direct food and nutrition security interventions,

there are also ways that nutrition and dietetics practitioners can address those gaps. Kevin Sauer, PhD, RDN, 2021–2022 president of the Academy, highlighted that the Academy has elevated food and nutrition security to a top priority. The Academy's strategic plan emphasizes the importance of food and nutrition security, including advocating for equitable access to safe and nutritious food and water and more efficient, inclusive, sustainable, and resilient food systems. Research to support advocacy efforts is vitally important, and the Academy has recently updated its research priorities to reflect both the advocacy and food and nutrition security focus.[5] Sauer noted:

> *The aims of this roundtable are to identify evidence gaps and opportunities for [nutrition and dietetics practitioner] researchers to contribute meaningfully to the area of food insecurity. This evidence can then be leveraged in setting a focused Academy global research agenda and to support our advocacy work. These efforts are directly in alignment with the needs of the organization and the strategic plan of the Academy.*

Becky Dorner, RDN, LD, FAND, chair of the Academy of Nutrition and Dietetics' Foundation (Foundation), emphasized that the Foundation recognizes the value of research conducted by nutrition and dietetics practitioners. The Foundation has a long-standing commitment to supporting food and nutrition security both here in the United States and around the world. The Foundation consistently partners with the Academy to build a body of work that will empower food and nutrition professionals as well as students and practitioners, with tools, research, and model programs to optimize global health.

Elizabeth Campbell, MA, RDN, previous senior director of Legislative and Governmental Affairs for the Academy, outlined several opportunities for the GFNSR Task Force to collaborate with the Academy's Policy Initiatives and Advocacy team to impact future policy efforts. Food and nutrition security has risen to the top of many policymakers' agendas, both domestically and internationally, creating more opportunities for nutrition and dietetics practitioners to further expand their work as part of the solution. Examples of upcoming legislative opportunities within the United States include Child Nutrition Reauthorization and the Farm Bill. Campbell also noted an opportunity to elevate gaps in research and the need for larger investment in domestic spending on human nutrition research. Finally, Campbell noted that nutrition and dietetics practitioners must be at the table to discuss sustainable food systems and help bridge the concept of food and nutrition security to ensure access to nutritious food, proper health care, and nutrition services for all.

Food and nutrition security has become increasingly problematic for families and individuals because of the negative economic conditions caused by rising inflation and significant disruptions in food system supply chains.[6] These unprecedented issues affect families in all nations, including the United States.

OVERVIEW OF THE ROUNDTABLE

The 2-day virtual roundtable featured a variety of topics and subject matter experts. On day 1, an advisory group panel discussion was convened to highlight current research gaps related to food and nutrition security, the role of the nutrition and dietetics practitioner in research, and considerations for equity in this landscape. Herrera moderated the panel, which included members from the GFNSR Task Force. Additional presentations during day 1 focused on the current approaches to food and nutrition security research, nutrition and dietetics research efforts targeting food and nutrition security, and the importance of implementation science. On day 2 of the roundtable, there was a presentation on the importance of standardized terminology for food and nutrition research, and an in-depth review of existing food and nutrition security frameworks. Finally, breakout sessions were conducted each day to discuss entry points for nutrition and dietetics practitioners and potential food and nutrition security frameworks to serve as a foundation as the GFNSR Task Force works to develop a research agenda and plan.

Identifying General Gaps in the Food and Nutrition Security Literature

A primary focus of this roundtable was to highlight the gaps in the food and nutrition security literature. During the advisory group panel discussion, panelists noted several areas where gaps exist. Andrea Garcia, representing Save The Children, said current health and intervention services may not meet the needs of communities. Garcia noted the importance of coordination between sectors when considering concrete actions that are needed for different populations to access food and nutrition security. With nutrition as the ultimate goal, Garcia stressed the importance of considering activities from other sectors and involving the community in identifying, prioritizing, implementing, and sustaining goals. Patrizia Fracassi, PhD, MA, MSc, pointed to FAO's mandate to eradicate hunger, food insecurity, and all forms of malnutrition. According to Fracassi, a gap exists between policy recommendations and the ability to translate those recommendations into programs and investments. Fracassi noted the effects of the COVID-19 pandemic are translating into an increased number of food-insecure people, with a disproportionate impact on women. In 2021, 31.9% of women in the world were moderately or severely food insecure compared with 27.6% of men—a gap of more than 4 percentage points, compared with 3 percentage points in 2020.[6] All subregions in Africa and in Latin America and in the Caribbean and most subregions in Asia experienced an increase in food insecurity during the pandemic year.[6] Novel research that will enable a timely response to adequately meet the nutrition needs of the most vulnerable populations will be essential. Rossella Bottone, representative from WFP, described research opportunities in food and nutrition security measurements. One issue that the WFP faces is providing accurate statistics on the number of people who are food insecure. Several indicators assess the *quantity* of the diet, but assessing nutritional *quality* is difficult. This concern was echoed by many of the speakers. Bottone stressed the need to develop a tool that can measure diet quality rapidly using new technologies, as well as the need for clear and actionable responses. Elizabeth (Betsy) Anderson Steeves, PhD, RD, highlighted two main gaps in research: (1) having consistent and appropriate terminology and validated measures in food and nutrition security research; and (2)

using a system-science approach and systems thinking when developing comprehensive frameworks to understand the complex nature of food and nutrition insecurity. To address the need for more data on individual food consumption, FAO and the World Health Organization (WHO) are working toward a Global Individual Food consumption data Tool (GIFT) that would provide information for food-based indicators and food consumption data around the world.[7] Anderson Steeves emphasized that the field needs to identify and consistently use terminology that appropriately captures food and nutrition security for a wide spectrum of stakeholders. Steeves noted that there are validated measures for measuring domestic food insecurity using the US Department of Agriculture (USDA) Household Food Security Modules; however, this set of measures does not include robust information on individual diet quality that would be relevant to understanding nutrition security.[8] In a 2021 viewpoint on prioritizing nutrition security, the USDA called for the careful evaluation of validity, reliability, and feasibility of appropriate screening tools.[9] Consistent common language and validated measures are needed to provide benchmarks on how to measure success.

Silvia Alayón, MS, RDN, director of Measurement with the US Agency for International Development's (USAID's) Advancing Nutrition (USAID's flagship multi-sectorial nutrition project) contributed to the discussion on research gaps. During Alayón's presentation on multi-sectoral approaches to target food and nutrition security, three areas were noted with the biggest gaps in current data and research to inform programs: life cycle, dietary information, and food systems. In terms of the life cycle data, there is a gap in data available on adolescent boys and men, younger adolescent girls, and adults older than 49 years. In terms of dietary information, available metrics are associated with adequacy of the diet, whereas fewer metrics relate to dietary risk factors associated with chronic diseases, although work is ongoing in this area to address this gap; one example is the global diet quality project.[10] Furthermore, limited data are available on micronutrient intake and micronutrient status globally (except for iodine, vitamin A, iron and, folic acid) and a paucity of nutrient-related biomarkers for reliable measurement of macro and micronutrient status. Regarding food systems, data and research are available on production, exports, and sales, but data are lacking that link food systems and diets as well as consumer behaviors in the market.

Globally, there is a lack of consensus on what a healthy diet entails and how to measure it beyond adequacy. Localized food composition tables are produced in some countries, but they are not always available, complete, or up to date, requiring one to rely on regional or USDA food composition data (an issue that the FAO and WHO are working to address through the GIFT platform).[7]

In addition to the gaps in literature identified by the presenters, research gaps also were discussed during breakout discussions during day 1 of the roundtable. These gaps were discussed by life cycle and are presented in Figure 2.

Role of the Nutrition and Dietetics Practitioner in Food and Nutrition Security Research

When asked about the role of nutrition and dietetics practitioners in food and nutrition security research, Anderson Steeves said:

> *Practicing dietitians and nutrition professionals can lead the field of food and nutrition security by applying consistent terminology and measures to screen, diagnose, and address food and nutrition security.*

Having a mechanism to report food and nutrition security data is needed to build the evidence base around the prevalence of these issues across diverse populations as well as build evidence-based protocols for what to do when patients or clients screen as having food and nutrition security issues.

According to Alayón, nutrition and dietetics practitioners have an important role to play in addressing research gaps. This includes conducting research in low- and middle-income countries[11] to provide data on nutrition status and food and nutrient intake with a specific focus on men, adolescents, or older adults, because fewer of these data on these populations are currently available. In addition, more evidence is needed on different coping strategies used to face food and nutrition security (eg, skipping meals or purchasing food not aligned with preferences) and how these might differ by lifecycle and different environmental contexts.[12] On a structural level, nutrition and dietetics workforce capacity is limited in some countries, thus limiting their ability to conduct research and serve as key informants. Nutrition and dietetics practitioners could help develop locally relevant food composition tables and participate in workforce development opportunities (including research partnerships, curriculum development, and introducing or strengthening preservice nutrition and dietetics training). According to Alayón, these activities would be a significant contribution to the field.

Considerations for Health Equity and Health Disparities

During the panel discussion on day 1, advisory group members reflected on what equity and health disparities meant for their respective organizations. Garcia stressed the importance of involving members of the community when considering how people use and access services, indicating that Save the Children cannot think, speak, or write about equity without listening to the voices of the community. Fracassi noted that women are disproportionately impacted by food insecurity. Targeting programs and policies to respond to their needs by addressing context-specific determinants and risk factors is important. Bottone shared that the WFP objective is food security for all people at all times, with a focus on inequality and the people who are most vulnerable (women, indigenous peoples, and refugees). Anderson Steeves added that, as researchers, it is important to have appropriate measures and methods that do not exacerbate health disparities, which includes thinking carefully about what questions are asked, how they are asked, and how the data are collected. Interpreting findings in a way that contextualizes results rather than highlighting potentially harmful or unnecessary comparisons is also important. Furthermore, working with

Lifecycle	Research gaps identified
Infants, toddlers, children, and adolescents	• Family and individual-level research and how each level is impacted by the environment/community • Trauma associated with experiencing food insecurity • Transitional health from adolescents to young adulthood (men and women) • Epigenetic markers • Cycle of obesity and undernutrition • Qualitative studies • Long-term interventions • Representative large sample-sized studies, validation of assessment tools at individual and household levels
Adults	• Linking food systems with research and consumers • Gender and biological-sex specific data • Assessing exposure and its impact on nutritional status (eg, food assistance, food fortification, exposure to non-program influences) • Inclusion of farmers, ranchers, and other food producers in discussions about climate and nutrition
Pregnant and lactating women	• Pregnancy- and lactation-related outcomes as a result of nutrition education in schools • The role of nutrition and dietetics practitioners in providing education to primary health care professionals • Trials in implementing more varied diets with locally sourced food • Food security surveillance at the global level • Food patterns of communities, individuals, indigenous peoples, etc
Older adults	• Country data on how older adults are fed, how they access food, and what nutritional needs they have • Evidence-based solutions • Shared measures/metrics that the scientific community can agree on • What programs are currently available in various countries? What is their reach and what is the evidence of these programs?

Figure 2. Research gaps related to food and nutrition security by lifecycle.

community experts is necessary to interpret findings in a meaningful and productive way that considers systems and social determinants of health (SDOH) that reinforce those inequitable outcomes that might be found. Other roundtable participants also discussed the importance of highlighting and considering the implications of racial inequities and structural racism on food and nutrition security and health outcomes when conducting and communicating research, something that was exacerbated during the COVID-19 pandemic.[13-17]

Importance of Implementation Science Research

As Fracassi noted during the advisory group panel discussion, and highlighted in the Academy's Research Priorities,[5] attention to implementation science is equally important as generating new evidence. Lisa Moloney, MS, RDN, with the Evidence Analysis Center at the Academy, provided an overview of implementation science. According to Moloney, evidence-based practice (EBP) has the potential to improve quality of care, establish standards of practice, set criteria to measure health care performance, reduce cost, and ultimately improve patient and community outcomes; however, despite the vast amount of available EBP guidelines, recommendations are not routinely implemented in daily practice. Only approximately half of published guidelines for medical health care are operationalized in daily practice.[18] This is also seen in the implementation of nutrition care guidelines by nutrition and dietetics practitioners, where there is a need to continue to build the evidence base on barriers and facilitators for implementation of EBP guidelines in nutrition practice.[19-22] According to Moloney, incorporation of implementation science into the cycle of evidence-based health care is one potential solution to close the evidence to practice gap.

Implementation science is traditionally defined as "the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services and care."[18] However, other perspectives exist and there has been a call for a broader definition.[23] An article written by Brownson and colleagues suggested that implementation science

is a response to decades of evidence that have not been translated to equitable health care improvements and is uniquely positioned to accelerate progress to achieve health equity goals.[24]

Moloney offered several key takeaways on implementation science. Nutrition and dietetics practitioners should embrace implementation science because it should always accompany EBP and research. Furthermore, implementation training opportunities should be made available and provided to nutrition and dietetics practitioners and incorporated into dietetics curriculum. Evaluation of implementation contextual factors at various levels (systems, organization, community, individual) to identify potential barriers and responsive strategies are necessary for the promotion of equitable care. Future nutrition research should consider a hybrid approach that evaluates nutrition interventions, the process of integrating interventions in daily practice, and the impact on implementation, nutrition, and health outcomes. Implementation science encourages stakeholders to consider multilevel contextual factors that may help improve the uptake, adoption, implementation, and impact of nutrition interventions and programs that address food insecurity.

Using a Multisectoral Approach to Target Food and Nutrition Security

Alayón's presentation discussed multisectoral approaches, data and research gaps, and the potential role for the nutrition and dietetics researcher. Alayón mentioned the goal of USAID's Advancing Nutrition is to scale up high-impact nutrition interventions and services, strengthen country commitment and capacity for multisectoral nutrition programming, and generate evidence and facilitate learning and innovation for improved nutrition. The USAID multisectoral nutrition conceptual framework is an extension of the UNICEF Conceptual Framework on Malnutrition with elements related to food and nutrition security. This framework highlights that achieving a good nutritional status goes beyond the act of sufficient food intake but also includes having adequate sanitation and hygiene practices and equitable access to health and nutrition care. This is all impacted by several environmental factors such as gender equality, country's commitment and capacity, and sociocultural, economic, environmental, and political context.[25]

The multisectoral approach is currently being implemented in seven countries (Mozambique, Krygyz Republic, Tanzania, Ghana, Burkina Faso, Niger, and Kenya).[25] Much of the work supports governance, policy, and planning and multisectoral coordination at the national level (eg, convening multiple ministries to work together on strategies or resource mobilization). They engage with multiple sectors, including nutrition and health systems/ministry of health, food systems (eg, ministries of agriculture, ministries of fisheries and livestock), and in some countries, early childhood development services.

Data are used throughout the program cycle in helping to design, implement, and evaluate multisectoral nutrition programs. Nutrition and dietetics practitioners can play a key role in supporting research evidence generation in these areas.

Nutrition and Dietetics Practitioner's Efforts Targeting Food and Nutrition Security

The European Federation of the Association of Dietitians and the International Confederation of Dietetic Associations (ICDA) are partner organizations that represent country-level organizations of dietitians. They have a unique perspective of representing dietitians across the globe. On behalf of the European Federation of the Association of Dietitians, Elena Carrillo-Alvarez, PhD, RD, presented on the situation and response to food insecurity in Europe and the challenges and new directions for dietitians to contribute to tackling food insecurity in the region. Seventy million people experience moderate or severe food insecurity in Europe.[26] However, most European countries do not include the collection of food insecurity data in national surveys. Looking to studies conducted within the region, most research on food insecurity in Europe has measured access to food; however, food insecurity is difficult to measure because of its multifaceted and context-dependent nature. According to Carrillo-Alvarez, affordability is a key issue that is emerging for food and nutrition security. Current measurement scales need to be complemented with data on dietary quality, food literacy, and determinants of food insecurity. Carrillo-Alvarez said there is a lack of political instruments to guarantee adequate food and nutrition to all because welfare policies and social assistance measures vary considerably among European Union (EU) countries.

Carrillo-Alvarez noted several challenges and new directions for nutrition and tackling food insecurity in the future, including:

1. raising awareness that food insecurity exists in the EU and is a serious problem
2. producing knowledge about food insecurity in the EU
3. developing food literacy among citizens
4. participating in the development of policy instruments and interventions that allow adequate food and nutrition
5. partnering with experts, welfare providers, local authorities, and nongovernmental organizations in comprehensive, intersectoral, and integrated ways
6. advocating for the right to nutrition and food as the backbone of the policies within respective countries and regions

Danielle Gallegos, PhD, spoke on behalf of the ICDA, an international organization of 52 national dietetics associations with more than 200,000 dietitian-nutritionists. One of the projects all members of the association are contributing to is the ICDA sustainable food systems project, led by Liesel Carlsson, a project aligned with the focus of this roundtable. This project began with a Delphi Inquiry across the world to identify barriers dietitians face working in food systems and food systems sustainability. As a basis of that inquiry, the team developed a final report and toolkit providing capacity-building resources for nutrition professionals to incorporate sustainability perspectives into their work.[27,28]

To impact food and nutrition security, Gallegos emphasized the need for nutrition and dietetic researchers to understand SDOH. Many countries do

not have a food safety net and rely completely on charitable food relief. Gallegos said co-designing solutions with communities and families is vital from an implementation science point of view. This can include nutrition and dietetics practitioners gaining more knowledge and experience with community-based participatory research and asset-based community development, which uplift community voices and expertise to provide equitable and long-lasting interventions.[29,30] Furthermore, Gallegos suggests looking at a food sovereignty approach with a human rights point of view, recognizing that people should have control over their food system. Cultural food security is an important area in which information is currently lacking. Cultural food security exists when there is availability, access, utilization, and stability of cultural foods.[31]

In the future, what will be the role of dietitians? According to Gallegos, dietitians must be systems thinkers. "We are the group that can stitch together food systems with health systems with welfare systems and we need to be thinking across all of those systems in order to create healthier environments," stated Gallegos. Future nutrition and dietetics practitioners will need to be equity champions, food systems navigators, and food systems activists who will drive change to protect the health of the community through food and nutrition.

Making the difference includes diversification of the nutrition and dietetics practitioners' role outside relevant and common areas such as clinical nutrition. This expansion includes nutrition and dietetics researchers working in public policy, public health, and epidemiologic research.

Importance of Standardized Terminology for Food and Nutrition Research

"While there has been a push, specifically in the United States, to address food insecurity, gaps still exist. Gaps in health care terminology have not allowed us to document food insecurity consistently and comprehensively," explained Constantina Papoutsakis, PhD, RD, a senior director in the Nutrition and Dietetics Data Science Center for the Academy. Day 2 of the virtual roundtable kicked off with a presentation from Papoutsakis, who presented on the Gravity Project, a collaboration to develop standardized language and tools to address food insecurity.

In 2017, experts in SDOH data in health care, community health, and health information technology convened around collective and comprehensive coding standards in electronic health record systems. The data experts determined there is a need to capture SDOH data related to health risks in a standardized and structured way to

1. promote collection and use of SDOH data
2. facilitate sharing of data across organizations
3. support payment for SDOH data collection and intervention activities

The Gravity Project was initiated as a multi-stakeholder, public collaborative with the goal of improving how to use and share information on SDOH.[32] Experts use a conceptual framework to guide the work, including a model of how screening, diagnosis, goal setting, and intervention are represented in the health care ecosystem, taking into account stakeholders, technology, and at the center, the person who benefits from health care. Experts acknowledge the importance of bringing key stakeholders together to determine the proper terminology and definitions, which should include comprehensive terminology that can be selected to be applicable in a variety of contexts.

Specific to food insecurity, an extensive review of definitions and measurements was conducted and used to craft a person-level definition based on the work of other organizations, including the WHO and the USDA. The final definition was crafted and approved by consensus. *Food insecurity* was defined as "uncertain, limited, or unstable access to food that is adequate in quantity and nutritional quality, culturally acceptable, safe and acquired in socially acceptable ways." Aligning with the 2014 Committee on World Food Security's Global Strategic Framework for Food Security & Nutrition, the definition is meant to address the four main pillars: access, availability, utilization, and stability.[32] The Gravity Project's definition differs slightly from the one used by FAO and others, but it is an important first step in meeting the gap identified by Andersen Steeves for standardized terminology.

The Academy has been involved as terminology lead for the food insecurity focus area and worked with Gravity leadership and stakeholders in the development of terminology, as well as a dataset to represent discrete terms to address food insecurity in the areas of screening, goals, diagnosis, and intervention. In addition, the Academy supported the international and US-level application and acceptance to SNOMED International, a not-for-profit organization uniting health systems and enabling them to communicate with and understand one another. As of October 2021, a food insecurity code has been an active International Classification of Diseases, Tenth Revision (ICD-10) documentation code option for health care professionals.

Using definitions and standardized terminology, such as what is being developed through the Gravity Project, are vital when identifying subgroups of patients that are high need in primary care settings. In a 2020 study, among persons with elevated hemoglobin A1c, food security was the most prevalent determinant of health.[33] In major nutrition-related diseases, food security has a very high prevalence.[34] Through the use of standardized food and nutrition security terminology, clinicians and researchers can use population analytics and algorithms to better understand and treat their patients.

Food and Nutrition Security Frameworks

Detailed presentations were conducted on potential frameworks the GFNSR Task Force could use to highlight aspects of food and nutrition security. Alayón presented on two food and nutrition security frameworks—USAID Food for Peace Conceptual Framework for Food and Nutrition Security and US Government Global Food Security Strategy Results Framework. Marie Spiker, PhD, RDN, assistant professor, epidemiology, at the University of Washington School of Public Health, then presented several frameworks, including public health, food and nutrition security, and food systems. Both speakers deconstructed select

frameworks in terms of their functions and then further described how professionals are engaged in each of these frameworks with an eye toward specific entry points for nutrition and dietetics researchers. In gathering these frameworks together, individuals can begin to see the evolution of key issues that are interrelated. As the Academy works through developing a specific framework, Spiker recommends making special considerations around conceptualizing entry points for nutrition and dietetics practitioners, as well as the overarching goal and purpose of what the group is hoping to accomplish.

Selected food and nutrition security and food systems frameworks are presented in Figures 3 and 4 with a brief description of the framework and the perceived entry points or role of nutrition and dietetics practitioners.

Directions for the Future and Learnings from the Roundtable Discussion

Research Gaps in Food and Nutrition Security and Entry Points for the Nutrition and Dietetics Practitioner. Throughout the roundtable discussion, key gaps and opportunities were repeated by speakers from both domestic and international settings. These are summarized in Text Box 1.

Within all the gaps identified, the most discussed entry points for nutrition and dietetics practitioners included data collection, data interpretation, and surveillance; informing and implementing programs; and conducting community-based participatory research (CBPR).

Individuals trained in nutrition and dietetics have unique expertise in collecting, interpreting, and monitoring food and nutrition insecurity and vulnerability data at the individual, family, community, and national levels. Opportunities to further contribute to research include instrument development and validation to measure diet quality in ways that are more detailed than food group consumption and assessment of dietary factors associated with chronic disease risk, not just adequacy. Furthermore, research on how to comprehensively aggregate data from different sources could help to fully demonstrate impact and change through program implementation. In many countries, there is a lack of workforce capacity for nutrition and dietetics practitioners; therefore, although researchers from this field need to lead the development of instruments and implementation techniques, the output must be feasible for practitioners at all levels.

Nutrition and dietetics researchers have the training and education to inform, lead, and evaluate implementation of nutrition-focused projects and programs. They have a distinct understanding of food systems knowledge and how it translates into practice, particularly as it applies to food safety and food hygiene. With these skillsets, there is a unique opportunity for the profession to contribute to and conduct both collaborative interdisciplinary and CBPR. More specifically, CBPR involves all stakeholders throughout the research process and has been successful in engaging underserved populations and advancing health equity.[52] This type of focus provides an approach for nutrition and dietetics practitioners to contribute to patient-centered outcomes research. In addition, there should be an audit or landscape analysis of not only the unique skills of nutrition and dietetics practitioners but also the skills that are needed to operate successfully within food and nutrition security research. This can help guide the education, training, and development of current and future practitioners. Globally, there is a paucity of nutrition and dietetics practitioners engaging in research; specifically, within the United States, approximately 4% of credentialed practitioners have a doctoral degree,[35] and of those even less actively pursue research in food security.

ADVANCING THE ROLE OF THE NUTRITION AND DIETETICS PRACTITIONERS IN RESEARCH: EXAMPLES OF GLOBAL FOOD SECURITY ISSUES

To maximize the full impact of nutrition and dietetics practitioners in advancing food and nutrition security research, it is necessary to understand not only the current global context but also their current roles in this landscape. To better exemplify how nutrition and dietetics practitioners can support food and nutrition security research, the GFNSR Task Force developed five examples of food and nutrition security issues in various countries: United States, Spain, Saudi Arabia, Venezuela, and Tanzania. These examples were developed after the roundtable to provide a brief introduction to the food and nutrition security-related issues, a relevant intervention, and the role of the nutrition and dietetics practitioner in addressing the issue as well as implications for the future.

Example 1: United States—Structural Racism and Food and Nutrition Insecurity

In the United States, food insecurity is disproportionately prevalent in communities of color. Data collected and reported by the USDA in 2021 show that food insecurity rates of Black (19.8%), Hispanic (16.2%), and non-Hispanic households of other races (10.2%) are higher than that of Whites (7.0%).[36] The relationship between food and nutrition security and race or ethnicity is complex and interconnected with other SDOH (ie, access to employment, neighborhood food access, health care access); however, the disparities between demographic groups in the United States demonstrate the presence of systemic drivers of inequity, specifically structural racism.[37] The National Institute of Minority Health and Health Disparities defines structural racism and discrimination as "macro-level conditions (eg, residential segregation and institutional policies) that limit opportunities, resources, power, and well-being of individuals and populations based on race/ethnicity and other statuses."[38] Structural barriers, such as housing segregation, redlining, employment segregation, mass incarceration, and employment and health care discrimination[39–41] are all examples of historic policies and systems that disadvantage communities of color and are pervasive in our society today.

Addressing inequities in existing policies and systems is one key component of addressing structural racism in the United States. The USDA has a renewed commitment to promoting nutrition security,[42] through emphasizing equity and addressing long-standing health disparities by working within four pillars:

Food and nutrition security framework	Description of framework	Entry points/roles for nutrition and dietetics practitioners
United States Agency for International Development Food for Peace (FFP) Conceptual Framework for Food and Nutrition Security[35]	Maintains the core of the FFP's 2006 framework but updates it to better reflect emerging challenges and knowledge, including the importance of nutrition-sensitive factors such as water and sanitation, climate change, and off-farm as well as on-farm labor productivity. It also highlights what is likely to be the main difference between FFP's 2006 strategy and FFP's current thinking: the recognition that to be relevant across emergency and development contexts, stable availability, access, and utilization must refer to action or change at both an individual and a systems level.	• Assessing policy environment related to food and nutrition security such as analyzing agricultural policies, economic and tax policies, and potential impact on nutrition • Assessing the quality of services, especially nutrition services through implementation research, fidelity to program design, etc. • Interdisciplinary collaboration with economists could contribute to research related to cost of a healthy diet and consumer behavior related to food purchases. • Health and behavior outcomes, including consumption, food availability, access, and utilization
US Government Global Food Security Strategy Results Framework[36]	Describes food security as a national security imperative. Overarching goal is to sustainably reduce global hunger, malnutrition, and poverty, with three main objectives: 1. Inclusive and sustainable agriculture-led economic growth 2. Strengthened resilience among people, communities, countries, and systems 3. A well-nourished population, especially among women and children	• Can support and contribute to global food safety and hygiene, including access to water. Provide a unique role as practitioners trained in food safety, particularly in countries where other practitioners may have health backgrounds such as nursing, midwife, or doctors.
Food and Agriculture Organization Four Dimensions of Food Security[4,37]	Presents the pillars or dimensions of food security: 1. Availability 2. Access 3. Utilization 4. Stability Clapp and colleagues (2021) have recently suggested the addition of two pillars or dimensions: 5. Agency 6. Sustainability	• Entering or convening at each of the four pillars or dimensions and thinking across all the four dimensions to promote healthy diets for all

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Figure 3. Food and nutrition security frameworks and entry points or roles for nutrition and dietetics practitioners.

Food and nutrition security framework	Description of framework	Entry points/roles for nutrition and dietetics practitioners
UNICEF Conceptual Framework for Malnutrition (1990) and UNICEF Conceptual Framework for Malnutrition (2014)[38,39]	Shows the causes of malnutrition in terms of basic, underlying, and immediate causes, as well as how those causes manifest in malnutrition. Causes include structural factors, household characteristics, maternal characteristics, care, child's initial health status, disease, and feeding practices. Updated framework from 1990 with connections to the social ecological model. The updated framework builds on the 1990 conceptual work, acknowledging the increasing burden of malnutrition, while highlighting the role of diet and care as immediate determinants of maternal and child nutrition.	• Spanning across each of the levels of causation as well as the linkages between them
Lancet Series Framework for Action to Achieve Optimum Nutrition[40,41]	Presents the causes and benefits of optimum fetal child nutrition and levels of intervention. The framework outlines the dietary, behavioral, and health determinants of optimum nutrition, growth, and development and how those are affected by underlying food security, caregiving resources, and environmental conditions.	• Nutrition-specific interventions, nutrition-sensitive interventions, and interventions to build an enabling environment • Practitioners as researchers can enter at any point of the framework's whole spectrum from downstream to upstream causes.

Figure 3. *(continued)* Food and nutrition security frameworks and entry points or roles for nutrition and dietetics practitioners.

- Providing nutrition support throughout all stages of life
- Connecting all Americans to safe, affordable food sources
- Developing, translating, and enacting nutrition science through partnerships
- Prioritizing equity and equitable systems every step of the way

Building resilient, equitable systems supports nutrition security and prioritizes reaching historically underserved and marginalized populations. At the federal level, the USDA is evaluating its hallmark programs such as the thrifty food plan and adjusting Supplemental Nutrition Assistance Program benefit levels; updating school nutrition standards; revising the Special Supplemental Nutrition Program for Women, Infants, and Children food package to align with National Academies of Sciences, Engineering, and Medicine recommendations; and providing nutrition education strategies that reflect the diversity of Americans and support the implementation of the Dietary Guidelines for Americans.[40]

Although federal policy and programmatic changes are critical components of addressing structural racism and the associated disparities in food and nutrition security,[40] all nutrition practitioners (in the United States, RDNs) should be engaged in efforts to reduce health disparities and promote equitable food access. This can be done in many ways, including being conscious of one's own biases, acknowledging the impacts of structural racism in the health and behaviors of patients and clients, and providing culturally responsive nutrition care. RDN researchers can engage in this work through defining the scope of the issue(s) by assessing, monitoring, and reporting rates of food and nutrition security and associated health disparities and recognizing that differences seen in rates are caused by structural factors such as racism, rather than true differences among racial and ethnic groups. Furthermore, RDNs can gather evidence to identify structural barriers to food and nutrition security, such as differential access to food caused by long-term neighborhood disinvestment. Once identified, RDN researchers can listen to and empower individuals with lived experience and partner with communities to develop, implement, and evaluate strategies to address these barriers.

Acknowledging the consequences of historical and ongoing racist policies and practices and how these policies shape current food and nutrition insecurity rates is critical. Partnerships between nutrition providers, multidisciplinary health care and research teams, and impacted

Food systems framework	Description of framework	Entry points/roles of nutrition and dietetics practitioners
NOURISH Network Food Systems Map[42]	Conceptualizes the food system as a "system of systems," including biological, economic, political, social, and health systems and inputs. Shows the flows of food, nutrients, information, and natural resources between systems	• Not explicit; however, researchers can intervene and engage within any of the 5 main systems: biological, economic, political, social, and health.
Academy of Nutrition and Dietetics Framework on Multiple Domains of Sustainability[43]	Describes considerations with the four domains of sustainably, resilient, and healthy food and water systems 1. Nutrition and health 2. Social, cultural, and ethical capital 3. Environmental stewardship 4. Economic vitality	• Researchers can intervene and engage within any of the four domains.
Institute of Medicine Conceptual Model of Food Systems[44]	Assesses the effects of the food system, presenting how food and food services and information about money demand travel along food supply chains. Shows the many spheres of influence that affect food supply chains	• Impacting three of the five key spheres of influence, including: social organizations, science and technology, and policies.
Institute of Medicine Framework for Analyzing Effects of Food Systems[44]	Outlines an analytic framework. The four principles are as follows: 1. Recognize effects across the full food system 2. Consider all domains and dimensions of effects 3. Account for system dynamics and complexities 4. Choose appropriate methods for analysis and synthesis The principles need to be considered throughout each of the 6 assessment steps: problem, scope, scenario, analysis, synthesis, and report to assess the impact of the food system.	• Conducting or supporting analysis and synthesis of the impact on the food system.
United Nations High-Level Panel of Experts (HLPE) Conceptual Framework of Food Systems[45] and HLPE Food Security and Nutrition Building a Global Narrative Towards 2030[46]	Describes the components of food systems, including their individual and societal impacts such as food supply chains, food environments, consumer behavior, and diets; their underlying drivers, which include biophysical and environmental,	• Delivering services or researching linkages between each of the framework components

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Figure 4. Food systems frameworks and entry points/roles of nutrition and dietetics practitioners.

Food systems framework	Description of framework	Entry points/roles of nutrition and dietetics practitioners
	innovation, technology, and infrastructure, political and economic, socio-culture, and demographic drivers; and relevant institutional or political actions. The conceptual framework presents the driving relationships between these components. The 2020 report presents the urgent need for strengthening and consolidating conceptual thinking around food security and nutrition to prioritize the right to food, widen the understanding of food security, and adopt a food systems analytical and policy framework. It also expands on the role of systems in food production including "ecosystems, human systems, energy systems, economic systems, health systems."	
Research Agenda for Food Systems and the Environment for Nutrition[47]	Describes a research agenda for a new interdisciplinary area in terms of its nutrition research and food systems, including both quantitative and qualitative methodological approaches, points of intervention throughout the food system, and goals of intervention	• Considering these research topics of food systems in the environment to carry out this research agenda
Landscape of Population Nutrition Research[48]	Shows connections between research problems, purposes, methods, and levels of impact. This nutrition research agenda presents the different levels of society that are intervened, what sectors are involved in conducting research, and what disciplines and methods are incorporated.	• Nutritional sciences are presented as one of several key disciplines or methods needed to address and impact focal food or nutrition problems.
Skill Development Framework for a Workforce of Future Food System Analysts[49]	The framework focuses explicitly on developing and imagining a workforce of future food systems analysts. Describes skills, tools, and capabilities that will be needed in a future workforce of food system analysts. This framework is an adaptation of the "Researcher Development Framework" by Vitae.	• Skills, knowledge and understanding, and values and attitudes are all desired outcomes for nutrition and dietetics practitioners and food system analysts.
Individual plus Policy, Systems, and Environment Conceptual Framework[50]	Focuses explicitly on nutrition practitioners and describes	• Nutrition and dietetics practitioners are familiar with and

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Figure 4. *(continued)* Food systems frameworks and entry points/roles of nutrition and dietetics practitioners.

Food systems framework	Description of framework	Entry points/roles of nutrition and dietetics practitioners
	professional skills along a spectrum of prevention. 1. Strengthen individual knowledge and behavior 2. Promote community engagement and education 3. Activate intermediaries and service providers 4. Facilitate partnerships and multisector collaborations 5. Align organizational policies and practices 6. Foster physical, natural, and social settings 7. Advance public policies and legislation	regularly engage in policy, systems, and environment approaches. The addition of individual-level helps to show how aspects can fit together and make the idea of policy, systems, and environment change seem more feasible.
Academy of Nutrition and Dietetics Foundation Framework on the Role of Nutrition Professionals in Sustainable Food Systems[51]	Describes entry points for nutrition and dietetics practitioners in sustainable food systems that leverage their strengths, including entry points across cross-cutting areas of practice. The framework also presents a plan for how to operationalize those entry points within four cross-cutting areas of the profession, including: education and training, practice, policy, and research.	• Five specific entry points include: shape and deliver dietary guidance, improve food and nutrition security and water security, align food production and nutrition, optimize supply chain and food environments, and reduce waste.

Figure 4. *(continued)* Food systems frameworks and entry points/roles of nutrition and dietetics practitioners.

individuals and communities are needed to evaluate the effectiveness of equity-oriented projects and policies to close disparity gaps and address nutrition security.

Example 2: Spain—Promoting Food and Nutrition Security Through a System Approach at the Local Level: The Barcelona's Case Study

According to the FAO's "The State of Food Security and Nutrition in the World 2021" report, 10% of the European population suffers from moderate or severe food insecurity.[6] Prevalence is higher in Eastern Europe, Cyprus, and Greece.[43] A recent representative survey in Spain found that 13.3% of the households do not have regular access to the necessary amount of safe and nutritious food to ensure their normal growth and development.[44] The same survey estimated that the COVID-19 pandemic was responsible for roughly 1.5% of this figure, demonstrating that food insecurity in Spain is a structural problem, and not the product of a specific situation. In Barcelona, almost 200,000 people were users of food aid in 2020, which represents a coverage of 46% of the 419,000 people estimated to be at risk of poverty.[45] This trend has remained stable in the last 2 years.

Research shows that despite the food aid, users do not manage to cover their nutritional needs, because the aid provided is limited, it often does not cover all the members of the household, and the budget that the families can allocate to complement it is insufficient.[46,47] Individuals and families are forced to develop a series of strategies (diet change, food elimination, meal elimination) that have a great nutritional, psychological, and social impact.[48–51]

In Spain, current approaches to tackle food insecurity combine social protection policies with the development of food aid programs. Social protection schemes include benefits for unemployment, housing, illness, and disability, among others, and are established at different levels: European, Spanish, regional, and municipal. Food aid programs involve various mechanisms such as social canteens, distribution of food products, vouchers or prepaid cards, school meal grants, accompanied meals, or social cooperatives. These practices have been classified into three types[53]:

- traditional (eg, food banks, soup kitchens)
- new practices (eg, cards, donation of fresh produce, redistribution of hotel surpluses)
- alternative practices (eg, gardens social services, food cooperatives, community kitchens)

Text Box 1
Summary of Themes for Research Gaps in Food and Nutrition Security from Roundtable Discussion

- Standardized terminology to collect data consistently
- Validated tools at screening and assessment levels to be used across settings and resource levels
- Assessment tools and resources to better understand diet quality, not just quantity
- Improvement in translation of evidence through implementation science
- Multisectoral approaches to provide multi-pronged interventions that impact food and nutrition security at various levels
- Interdisciplinary collaboration and engaging community partners in research for successful and equitable solutions
- Incorporation of research findings into policy and program development to improve intervention permanence
- More evidence that provides a comprehensive approach linking food system aspects (supply chain, consumer behavior) with diet and food and nutrition security

In contrast to traditional practices, the so-called new practices and alternative practices have the value of promoting human rights, solidarity, commitment, and social bonding to a greater extent. However, most food assistance programs remain traditional practices. Although food aid programs are necessary, these programs have been criticized for being short-term and contributing to the maintenance of food poverty, in the sense that alleviating the need for food can divert attention from structural causes of food poverty by creating an acute solution to the problem, limiting the resources available to achieve long-term food security.[54] Moreover, little is known about their contribution to nutrient requirements. The way in which food insecurity is addressed is also not satisfactory for the entities and services that provide food aid.[55,56] The food aid system in Spain combines public resources with the work of third sector entities and, to a lesser extent, the private sector. It is a circuit that is not fully included in social protection mechanisms and is poorly regulated. As a consequence, there is a low professionalization of human resources and processes, which makes it difficult to pay attention to users.

Addressing the problem of food insecurity should combine population actions through structural determinants with downstream actions aimed at high-risk groups.[57] Three key principles have been identified to promote food insecurity from the basis of the system[54]:

1. a person-centered approach
2. empowering people by fostering autonomy and enabling choosing food in socially acceptable ways
3. providing opportunities for active participation, social connection, and broader support

In addition, the promotion of food security is inseparable from the promotion of sustainable and fair food systems. Examples of successful initiatives are subsidies and promotions in healthy foods to ensure their affordability, promotions in the food trade, the development of policies that promote the provision of healthy food aid, and social responsibility initiatives that increase dignified access to healthy and affordable food. Possibly, then, these initiatives exceed the scope of food aid, extending to the entire food system. Learning from these experiences, there is a strong case for government leadership, for action within and between governments, and effective engagement with other sectors to provide a coordinated, collaborative, and cooperative response to find ways to get out of food insecurity.

In recent years, several initiatives have been launched in the city of Barcelona to achieve a healthier, more sustainable, and fairer food system. Examples are the Food Charter of the Metropolitan Region, all the deployments carried out in the context of the Barcelona World Capital of Sustainable 2021, and the Sustainable Food Strategy 2030. The Network for the Right to Adequate Food was born in 2016 as a space promoted by the Citizens' Agreement for an Inclusive Barcelona and integrates social and third-sector organizations, governmental structures such as the Public Health Agency, the institute of social services, the area of social rights, the direction of social economy and consumption, the Metropolitan Strategic Plan, food operators including Mercabarna (the Barcelona's wholesales market) or smaller cooperatives, and members of academia. One of its main purposes is deploying the collaborative model to guarantee the right to food suitable for the city of Barcelona.[58] The model promotes a socialized approach to the right to adequate food integrated into the food chain and address food waste by advancing in the reorientation of food use policies. In this sense, it considers the structural determinants of food insecurity, so that it is dignified and promotes the person, through nine criteria:

1. Conceptually and strategically differentiate the food surplus, food waste, and poverty reduction policies
2. Reduce food waste
3. Promote maximum normalization and inclusion
4. Give comprehensive and global responses
5. Guarantee the sufficiency of income of citizens
6. Promote the autonomy and empowerment of people
7. Promote local consumption
8. Guarantee the right to healthy food
9. Creation of employment and socio-labor insertion

In 2020, the Alimenta project was born as a social innovation initiative driven through a public–private initiative that is implementing the principles of the Collaborative Model by promoting not only an adequate diet, but also the necessary social and work conditions to make it sustainable over time.

Ensuring that all citizens have access to safe, nutritious, and enjoyable food

in socially adequate ways requires actions that improve the purchasing power and affordability of healthy diets, as well as actions that guarantee that the resources provided to those that cannot access it are adequate. Policymakers need evidence-based information to regulate them. Because of their multidisciplinary competencies, which combine elements of basic nutrition, food science, medicine, human behavior, and social sciences, and particularly when specialized in public health, nutrition and dietetics practitioners hold a privileged position to contribute to produce, interpret, and transfer such data. Their involvement can be unique when conducting analysis of the cost of healthy diets for different target groups, including healthy and pathophysiological situations; assessing the contribution of food aid to meet the nutritional needs of food aid recipients; evaluating food insecurity through validated, rigorous, and meaningful approaches that reflect not only access difficulties but also nutritional adequacy; participating in the evaluation of the cost-effectiveness of different interventions, taking into consideration nutritional adequacy; designing and evaluating implementation plans; and providing data to enhance the processes to guarantee food and nutrition security, identifying barriers, facilitators, challenges, and opportunities from various stakeholders to address food and nutrition insecurity.

In the last decade, several steps have been taken by the city of Barcelona to move forward toward healthier, fairer, and more sustainable food systems. Despite the traditional lack of competences of local governments in this area, a wide range of policies and actions have been developed, with an outstanding implication of stakeholders from the quadruple helix: science, policy, industry, and society. These actions directly influence the possibility of exerting the right to adequate food and nutrition by the whole population and entail substantial improvements in the phenomenon of food and nutrition insecurity in the city. RDN research constitutes an unmissable piece to articulate the actions developed by the multiple stakeholders involved, placing adequate nutrition as a cornerstone for decision-making.

Example 3: Saudi Arabia—Does Food Insecurity Exist in a High-Income Country?

The Kingdom of Saudi Arabia, the largest country in the Persian Gulf region, has an approximate area of 2,149,690 square km[59] and is classified as a high-income country.[1] The country is critically facing limited fresh water and land resources, which do not meet the daily domestic requirements.[60] According to the 2021 Global Hunger Index, Saudi Arabia ranks 29 out of 116 countries, with a score of 6.8, which is classified as "low."[61] Hunger is no longer an issue in the country; instead, there is a nutrition transition to westernized eating habits. Hunger in the current context refers to food deprivation and not the hidden hunger associated with micronutrient deficiency. The latter is still prevalent among vulnerable groups such as pregnant women, adolescents, and older adults. The change in eating patterns is accompanied by an increased prevalence of overweight and obesity (70% for adults >18 years) and chronic diseases such as diabetes mellitus.[62] Also, the country is suffering from excessive food wastage of cooked and uncooked foods.[63]

A paucity of studies focus on food or nutrition insecurity, the relationship between food and nutrition security and obesity, or the impact of nutrition interventions on these conditions in Saudi Arabia at the individual or population level. In addition, research studies assessing food insecurity, its prevalence, or relevant intervention programs, including a large, representative sample across various regions and sectors, are scarce. One of the few nationwide studies that studied the largest number of Saudi adults older than 18 years (n = 2,454) reported that the prevalence of food insecurity at the individual and the household levels were 6.8% and 26.7%, respectively.[63] The severity of food insecurity at the household level was attributed to the increased number of older adults and children.

The country lacks foundational data to measure the prevalence of insecurity and diet quality, such as surrogate measures to assess the nutritional status across the lifespan, food composition tables, analytical programs, or dietary reference values to help determine the dietary intake of individuals. Moreover, among nutrition and dietetics practitioners, assessing food insecurity is not one of their priorities for hospitalized patients and is rarely conducted among vulnerable groups such as older adults. Nutrition and dietetics practitioners in Saudi Arabia are not routinely trained in research skills and knowledge; thus, there are few nutrition and dietetics researchers to fill the identified research gaps. In addition, most of the nutrition and dietetics practitioners are employed at health care facilities.

Nutrition and dietetics practitioners have great opportunities in Saudi Arabia. The country funds many professionals interested in continuing their postgraduate studies, especially for nutrition and dietetics practitioners working in higher education institutions. Thus, they should seek advanced training focusing on research methods that target food insecurity (assessment, prevention, and treatment) in various settings. To conduct this research, nutrition and dietetics practitioners should receive the necessary training to collect, analyze data, and disseminate results validly and reliably. Capacity-building initiatives performed by experienced researchers could assist in this matter, notably, the development of appropriate intervention programs targeting the prevention and treatment of food insecurity, reducing food wastage, and reducing the prevalence of obesity and chronic diseases.

The country is undertaking a significant transformation in the health care sector into a comprehensive, effective, and integrated system to meet Saudi Arabia's vision. For instance, Objective 3 in the 2030 vision focuses on promoting health risk prevention, including chronic disease prevention. In addition, the Indirect objective coded 5.4.1 focuses on ensuring developmental and food security.[64] Furthermore, the vision promotes digital and e-health information technologies. This excellent opportunity enables nutrition and dietetics practitioners to reach many people virtually, targeting those with chronic diseases such as diabetes mellitus and those who are food insecure, especially because people find the latter a sensitive issue to discuss.

Nutrition and dietetics practitioners require specialized training in research,

development, and enhancing capabilities. There is also a need to increase the number of nutrition and dietetics practitioners working in the community and the health care sectors. Because sectors interrelate, there is a necessity for up-to-date university curriculums that focus more on developing intervention programs, reducing food insecurity, and establishing sustainable programs that serve the community and promote health. One way of achieving this would be through postgraduate training locally and internationally, and attending courses, advanced workshops, and webinars. The nutrition and dietetics practitioners must also work collaboratively with the Saudi Arabian government to fill these gaps.

Example 4: Venezuela—Economic Sanctions and the People's Wellbeing

Since 2015, Venezuela has been immersed in a complex humanitarian emergency. This crisis is not the result of an armed conflict nor of a natural disaster, but rather political, institutional, and economic downturns that have contributed to deprivation, poverty, and health deterioration for most of the population. Recent nationwide surveys report that 94.2%[65] of the population are experiencing food insecurity to some degree. In 2020, the WFP reported that 9.3 million Venezuelans are living in moderate or severe food insecurity[66]; thus, 30% of children younger than 5 years old are reported to be stunted, and malnutrition is present in 50% of low-income pregnant women.[67] Deterioration to health system infrastructure and health services access and poor nutritional status particularly impact vulnerable groups such as children younger than 5 years and pregnant and lactating women.[68]

The Humanitarian Office of the United Nations has implemented a platform for the humanitarian architecture by area of intervention: food security (FAO); nutrition (UNICEF), WASH (water, sanitation, and hygiene) (UNICEF); however, because of the imposed economic sanctions, the already deteriorated commercial and financial situation has been decreasing potential employment and impairing the delivery of humanitarian assistance by the lack of fuel, impacting the transportation of goods. A petition for greater flexibility on economic sanctions, particularly those impacting the oil industry, has been made to the US government to allow the operations of US and European oil enterprises in Venezuela. This petition would increase employment and fuel availability as first outcomes, thus alleviating food transportation, particularly to remote, rural areas,[69] and improving food access and allowing RDN professionals to reach places where they are supposed to be performing their jobs, particularly gathering accurate data on anthropometric measures and delivering attention to undernourished people. In other countries, such as Iraq, economic sanctions had a catastrophic effect on the population and economy. An example of the catastrophic effects is the impact on the under-5 mortality rate, which had declined from 117 per thousand live births in 1960 to 40 in 1990, then increased to 103 in 1998.[70]

Politics, policy, and health are not always easy to align. Determining whether a political action might impact people's wellbeing should be challenged. This is particularly true if evidence suggests that the political action, such as sanctions, may result in impairments of health status, life expectancy, and food security of civilians.[71] There are tremendous opportunities within this landscape for nutrition and dietetics researchers, including investigating food security and diet quality data in the context of sanctions. The piece ensuring data in the context of sanctions has proven to be a challenging one; therefore, nutrition and dietetics practitioners have the capacities for embracing this task. What food and nutrition security indicators should be measured? Do we need to challenge the traditional parameters? Is this feasible? Immersed in a humanitarian emergency, donors request data for justifying funds for the design of interventions aimed at improving food security and nutritional and health status, and to contribute to the wellbeing of civilians. When taking actions to improve interactions between partners who deliver interventions, a human rights framework should be used, with professional ethics, transparency, and independence from political urges. Making the social values, including health and nutrition, the central part of the actions needs the inclusion of nutrition and dietetics practitioners, because key personnel in the team that will embrace these challenges.

Example 5: Tanzania—Food and Nutrition Insecurity for a Nation in Transition

Tanzania is a country navigating important transitions throughout economic, social, and human development sectors that impact food and nutrition security. In 2020, it achieved a World Bank lower-middle-income country classification from a previous low-income country classification; however, family income distribution became more unequal from 2000 to 2017 (Gini Index coefficient = 34.6 to estimated 40.5, respectively).[72] Female labor participation was 80% in 2019, one of the highest in sub-Saharan Africa; by 2021, Tanzania had appointed its first-ever female president. Tanzania's rural-to-urban internal migration continued unabated, with an additional 13% of the population crowding into a few urban centers in just the last two decades (urban population proportion = 35% in 2020). Although the total disease burden remains consistently high in Tanzania, the nature of the disease burden is changing. The proportion of noncommunicable diseases is ever-increasing (communicable = 39%; noncommunicable = 41% in 2017).[73] This shifting dual disease burden strains the Tanzanian health care system, which was historically designed to provide curative interventions for infectious diseases and maternal or child health conditions. The insufficiency of preventative or managing types of nutritional care is underscored by the fact that nutrition is considered the single most important disease burden risk factor, accounting for almost half of Tanzania's disease burden attributable to risk factors. Despite many encouraging Tanzanian advances, malnutrition is predicted to remain a major public health problem and a top cause of death into 2040.[74]

Although Tanzania is considered largely food secure, experiencing only occasional food shortages at regional, district, and household levels,[75] nutrition security remains a challenge. The WFP estimates that 10% of Tanzanians

live below the food poverty line, nutritious diets remain unaffordable for most households, and suboptimal feeding practices negatively impact many infants and young children, resulting in one third being chronically malnourished.[75] These circumstances are important drivers of the Tanzanian triple burden of malnutrition characterized by

1. undernutrition presenting as stunting (chronic or recurrent malnutrition), wasting (recent and severe malnutrition), underweight (stunted, wasted, or both) or low birthweight
2. multiple micronutrient deficiencies (including iron, vitamin A, iodine, zinc, folic acid)
3. overweight or obesity[76]

The Tanzanian National Multisectoral Nutrition Action Plan approach to achieving food and nutrition security focuses on strategies to minimize the triple malnutrition burden and create an enabling nutrition environment through legal and policy actions that strengthen linkages within food systems; increase financial investment, especially in evidence-based low-cost and high-impact nutrition interventions; focus on nutrition research, development, and innovation; and further strengthen nutrition coordination at all levels. Example strategies for the prevention, control, and management of micronutrient deficiencies focus on dietary diversification, food fortification, supplementation, parasitic control, WASH (water, sanitation, and hygiene), malaria control, health education, and counseling. Within this context, a specific strategy may include increasing nutrition security awareness in men toward the benefits of micronutrients. This may be done by developing educational materials targeting men and identifying and highlighting their important role and in supporting male participation in reproductive, maternal, newborn, and child health at male-friendly clinics. Another specific strategy may be to establish nutrition clubs in schools to focus on increasing the production of micronutrient-rich foods on family plots and school gardens.

To create an enabling environment to tackle malnutrition associated with food and nutrition insecurity, sufficient high-quality data are needed to inform evidence-based decisions.[76] These data need to come from basic science through operational research, and the nutrition and dietetics researcher has an important opportunity to contribute in every aspect. For example, the nutrition and dietetics researcher should provide technical knowledge in study design to identify, capture, and interpret unambiguous nutrition indicators (eg, biomarkers, dietary intake) that enable surveillance of key nutrition outcomes. The training foundation of nutrition and dietetics researchers, including competencies across multiple domains (eg, biological, nutritional, and social sciences) enables nutrition and dietetics researchers to engage in complex systems approaches to facilitate conceptualization and data acquisition across multiple sectors that impact food and nutrition security at the household, community, regional, and national levels. Nutrition and dietetics researchers with unique perspectives and problem-solving skills should develop and test innovative research ideas to uncover dynamic determinants and drivers of food and nutrition insecurity, including identifying potential solution pathways. Nutrition and dietetics researchers with doctoral training are most likely to be well-positioned to develop and lead food and nutrition security-focused research projects. However, research contributions are needed from nutrition practitioners at all levels and include nutrition expertise that is essential to research project management and implementation (eg, contributing to human resource capacity building via training personnel in nutrition research methods, research dissemination, and field data collection).

Tanzania set a target to achieve middle-income country status by 2025.[76] To do this, Tanzania recognized that malnutrition is a development issue and a serious threat to further progress; thus, Tanzania has stated a goal to end hunger and all forms of malnutrition. This will be difficult given the complexity of the malnutrition burden in Tanzania and the current reality. However, they have publicly committed to tackling malnutrition with the same vigor as other development barriers, including corruption and tax collection. Although Tanzanian national resources have been sequestered to aid this effort, success for this country in transition will be impossible without the ongoing support of development partners, civil society organizations, and the private sector. To offer Tanzania the best chance of achieving their goals, particularly in a world continuing to realize long-term consequences of the COVID-19 mitigation strategies and other geopolitical events that are impacting global stability, nutrition and dietetics researchers must work collaboratively with government, nongovernmental groups, and the private sector to develop and evaluate interventions targeting the triple burden of malnutrition that will ensure food and nutrition security for all Tanzanians.

DEVELOPING A GLOBAL FOOD AND NUTRITION SECURITY RESEARCH FRAMEWORK

At the conclusion of the 2-day meeting, no consensus was reached on a food and nutrition security framework. However, participants agreed on the need for a globally focused, yet flexible framework that can serve as the foundation for a global food and nutrition security research plan for action for food and nutrition practitioners. Research questions will help to guide field researchers in conducting food and nutrition security research. The Academy aims to use an existing framework and apply concepts and entry points of the nutrition and dietetics researcher to bring together the dietetic and nutrition community at large. The Academy and the GFNSR Task Force place emphasis on prioritizing health equity, as well as acknowledging the importance of social justice. Social justice should be incorporated in all research to advance health equity and disrupt current systems that allow for power imbalance and resistance to necessary change. As such, any framework that is developed should have statements of principles that clearly help nutrition and dietetics practitioners identify the root causes of problems that impact uneven distribution of power, resources, and outcomes. Although the framework should be relevant to context with limited public spending capacity, such as low-income countries and

lower-middle–income countries, it also should be recognized that health disparities persist also in upper-middle–and high-income countries.

In addition, when developing a framework to address the complex nature of food and nutrition security, nutrition and dietetics practitioners are encouraged to use a systems-thinking approach. Addressing food and nutrition security is a complex problem that intersects with several other factors (ie, SDOH, government policies, climate, environment, economic forces, and historical factors such as structural racism). Being able to contextualize these factors collectively and how they operate synergistically is necessary to make progress on these issues.

When thinking about a system's approach and how it fits within the food and nutrition security agenda, it is important to not only focus on production but to think about the impact pathway to support the promotion of healthy diets. A system's approach allows us to identify entry points into the system to increase accessibility and affordability of nutritious food (through either the market or social protections). Nutrition and dietetics researchers must understand all the inputs (eg, policy, systems, environmental, biological, dietary, physical), processes, and outputs for individuals or groups to implement and evaluate effective nutrition strategies and use standardized terminology to document the entire spectrum of work.

CALL TO ACTION

Nutrition and dietetics practitioners are in a unique position to use their training and hands-on expertise to address food and nutrition security through research. Coordination, education, and application of multi-level intervention approaches are critical elements of success and can be applied across the research spectrum and in a variety of settings, including humanitarian, clinical, community, and advocacy. The importance of food and nutrition security research was echoed by the recent White House Conference on Hunger, Nutrition, and Health, which highlighted the importance of advancing evidence on the intersection between climate change, food security, and nutrition.[77,78] There is a substantial need for research dedicated to understanding systems and policies that disproportionately impact marginalized communities. Through this roundtable, we have identified multiple key areas where researchers in the field of nutrition and dietetics can play pivotal roles in filling research gaps and leading food and nutrition security research. Furthermore, we have highlighted the importance of working on the evidence and emerging policy and programming opportunities that derive from recognizing the nexus between climate change, biodiversity, and nutrition.

> *[Nutrition and dietetics practitioners] play key roles in addressing food insecurity and are uniquely positioned to make valuable contributions through competent and collaborative practice, provision of comprehensive food and nutrition education and training, innovative research related to all aspects of food insecurity, and advocacy efforts at the local, state, regional, and national levels.*[2]

Based on these discussions, the authors would like to offer the following call to action:

1. Increase the number of nutrition and dietetics practitioners that engage in research from broad and diverse backgrounds. This may include advancing training for nutrition and dietetics practitioners that maximizes the understanding of nutrition screening and assessment tools and their development, food science and dietary patterns, implementation science, and identification of all forms of malnutrition.
2. Provide more opportunities for nutrition and dietetics practitioners to collaborate in food and nutrition security research. This includes engaging in multidisciplinary projects to provide nutrition expertise while conducting food and nutrition security research.
3. Provide more funding opportunities aimed at addressing the food and nutrition research gaps that have been outlined. This includes having grant funding opportunities from various sources (eg, government, foundation, industry) to be able to advance food and nutrition security research done by nutrition and dietetics practitioners.

CONCLUSION

The GFNSR convened representatives from multiple global and domestic organizations to identify key gaps and opportunities for the nutrition and dietetics research community. These gaps are key barriers in improving nutrition and food security, and nutrition and dietetics practitioners are uniquely qualified to address them. Vital first steps in advancing work within food and nutrition security are collaboration and partnerships within and external to the dietetics community. However, to fully address the gaps, nutrition and dietetics practitioners must understand the nature of the research that exists and collaboratively build on that foundation to develop better tools and terminology for nutrition screening and assessment, develop methodology to understand implementation barriers and facilitators, and work with local and global organizations to evaluate nutrition programing. The Academy recognizes the domestic and international research strategies that are currently being studied and implemented and acknowledges the opportunity for organizations to coalesce and come together to elevate the work of nutrition and dietetics research community and to identify solutions that mitigate and minimize food and nutrition insecurity worldwide.

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STATEMENT OF POTENTIAL CONFLICT OF INTEREST

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