

SCIENCE POLICY

Global food and nutrition security needs more and new science

Today, the number of hungry, undernourished people across the planet is increasing, with micronutrient deficiencies impairing the overall health of more than 2 billion people worldwide. Early child mortality and morbidity are unacceptably high, and problems related to unsafe food, food waste, and poorly managed agricultural systems continue, as do problems associated with overconsumption. The impacts of inadequately managed agricultural systems are damaging land, water, and atmospheric systems, which, together, are posing unprecedented threats to global food security. These problems are rooted in deficient and deeply intertwined policies and practices that need to be addressed on a global scale. These challenges—all related to food distribution, agricultural systems, and planetary health—lie squarely in the path of achieving global Sustainable Development Goals (SDGs) and equity in the distribution of resources across global populations.

Although research related to crop cultivation has made great contributions to agricultural productivity, global leaders have begun to recognize the severity of problems rooted in inequity and the expanding demands of populations. In response, they have been increasing efforts to identify scientific endeavors to foster responsible innovation in food systems and, in tandem, shape necessary related local, national, and international policies.

Such scientific leadership has recently coalesced in the form of a global network of academies of science, medicine, and engineering called the InterAcademy Partnership (IAP). The IAP was launched in 2016 by bringing together three established networks of academies (the InterAcademy Panel, the InterAcademy Medical Panel, and the InterAcademy Council). A recent IAP project was designed to work toward the goal of promoting science that will inform societal priorities at the intersection of food/nutritional security and global environmental health. The organization brings together networks of experts from Africa, Asia, America, and Europe to analyze food systems at national, regional, and global levels (<http://interacademies.org/37646/Food-and-Nutrition-Security-and-Agriculture>) to apply research-based evidence to transform current practices to sustainably feed the planet in the context of global environmental change (1).

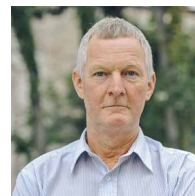
To date, the IAP has published five reports that clarify controversial issues, identify potential best practices across regions, and shed light on cross-cutting policy concerns. The authors strike an unusual balance by developing a consensus on many critical recommendations related to food and nutrition security while acknowledging the

profound regional differences in agricultural productivity and cultural preferences. The reports powerfully clarify the urgent need for investment in research infrastructure together with the obligation by participants to share robust and verifiable data related to population health, nutrition, agricultural practices and outputs, climate change, ecological systems and sustainability, and human behavior.

Policy-makers must aggressively push for additional and plentiful funding for research related to food and nutrition security because the impact of innovative science is already clear and unequivocal. For example, we already know that gene sequencing and editing can lead to improved and efficient means to breed plants and farm animals with characteristics that serve both the health of people and the environment. New advancements in science have also shown the potential for capitalizing on new understandings of diet-gut microbiome-disease linkages and expanding the use of innovative functional foods and personalized nutrition coupled with smart monitoring of individual status. Of course, the use of any advance must be grounded in stringently reformed regulatory systems that are acceptable to stakeholders.

IAP reports highlight the very large body of scientific knowledge already available to shape and promote more effective food and nutrition security. With a focus on the availability of new information, policy-makers can use this evidence to develop sustainable systems that will support healthy populations, linking these goals to other policy objectives including those related to the circular economy and bioeconomy. As a whole, the reports illuminate how research can clarify and resolve the complexities of the food-energy-water-health nexus, ranging from how social sciences research can inform and transform consumer and farmer behavior to the benefits of studying neglected crops. While focused on how empirical evidence can drive effective policy, the reports reaffirm the central importance of basic and applied science in driving policy, underscore the imperative to address knowledge gaps through increased international collaboration, and ardently articulate the imperative to prioritize education across all topics.

But this is not enough: Research outputs must also be integrated coherently into addressing the SDGs, climate objectives, and other agreed upon societal priorities, a task mandating a redesign of the science-policy interface for food, nutrition, and agriculture. The issues for food and nutrition security are relevant to multiple SDGs. There is an urgent need for additional science-informed



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analysis of the interactions among SDGs in support of decision-making for systems in transition in an uncertain and rapidly connected world. Policy-makers will, we believe, greatly benefit from taking a broader sweep of research evidence available to them, including the valuable lessons learned in the institutions of the European Union and African Union that stress the benefits of strengthening science-policy connectivity at regional and global levels. Capitalizing on scientific opportunities is something that should pervade public policy widely, beyond those funding and prioritizing the research agenda.

Following this, we see substantial value in constituting an international panel on food and nutrition security and agriculture focused on shaping policy choices and strengthening governance mechanisms. Such a panel would draw on the related large scientific community and could be clearly charged with addressing the most pressing food and agriculture questions as the global challenges continue to mount, particularly those related to population, climate, human nutrition, and sustainable use of land and water resources. These questions are extraordinarily diverse in nature and complexity,

ranging from how best to balance the difficult trade-offs between nutritional and environmental goals, to how to collect, verify, and use data in global scientific analyses, to how to attract and incentivize consumers to prefer healthy sustainable diets. In summary, achieving healthy populations requires national actions supported by new international approaches to improve food systems' functioning underpinned by an increasingly robust and ambitious science base.

– Robin Fears, Volker ter Meulen, Joachim von Braun

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1. The InterAcademy Partnership, Opportunities for future research and innovation on food and nutrition security and agriculture. The InterAcademy Partnership's global perspective. (2018); available on <http://www.interacademies.org/37646/Food-and-Nutrition-Security-and-Agriculture>.

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