



# Aligning the Food System to Meet Dietary Needs:

## Fruits & Vegetables

Hosted by the

**UCDAVIS**  
WORLD FOOD CENTER

in collaboration with



**Program in International  
and Community Nutrition**

and



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# Agenda: Friday, June 2, 2017

8:15 AM	Registration & Light Breakfast		<b>SESSION 2: IMPROVING THE AVAILABILITY OF FRUITS AND VEGETABLES</b>
9:00 - 9:15 AM	Welcome Remarks: Amy Beaudreault, UC Davis Jan Hopmans, UC Davis	1:30 - 1:35 PM	Introduction to Session Session Chair: Emmy Simmons, Global Panel on Agriculture and Food Systems for Nutrition
	<b>SESSION 1: OPTIMAL NUTRITION AND THE CONSUMPTION OF FRUITS AND VEGETABLES</b>	1:35 - 2:05 PM	Fresh Produce and the Diet Transformation in Africa: Challenges to Ensuring a Safe and Fresh Supply to Growing Urban Populations (virtual) David Tschirley, Michigan State University
9:15 - 9:20 AM	Introduction: Session Chair: Kathryn Dewey, UC Davis	2:05 - 2:35 PM	Artichoke to Ziziphus: Using Agrobiodiversity to Improve the Availability of Fruits and Vegetables Gina Kennedy, Bioversity International
9:20 - 9:50 AM	Supply, Demand and Projected Nutritional Need for Fruits and Vegetables Timothy Sulser, IFPRI	2:35 - 3:05 PM	Reducing Losses and Extending Availability of Fruits and Vegetables After Harvest Elizabeth Mitcham, UC Davis
9:50 - 10:20 AM	The Potential for Food Systems Approaches to Enhance Fruit and Vegetable Consumption in Low- and Middle-income Countries Andrew Jones, University of Michigan	3:05 - 3:35 PM	Processing Strategies for Stabilization Perishable Produce and Formulation into Staple Foods Mario Ferruzzi, North Carolina State University
10:20 - 10:50 AM	Producing Enough Fruits and Vegetables to Meet Dietary Recommendations in the United States Zach Conrad, USDA, Agricultural Research Service	3:35 - 3:50 PM	Break
10:50 - 11:20 AM	Potential Impacts of Increasing Supply of Specific Fruits and Vegetables on Nutrient Adequacy Joanne Arsenault, UC Davis	3:50 - 4:45 PM	Facilitated Group Discussion
		4:45 PM	Reception
11:20 - 11:40 AM	Break		
11:40 - 12:30 PM	Facilitated Group Discussion		
12:30 - 1:30 PM	Lunch		



# Saturday, June 3, 2017

## About the Workshop

Join us for an engaging workshop discussing the role of fruits and vegetables to improve nutrition. The workshop is divided into three sessions looking at 1) Optimal Nutrition and the Consumption of Fruits and Vegetables, 2) Improving the Availability of Fruits and Vegetables and, 3) Metrics to Evaluate and Improve Diet Quality. The objective of this workshop is to provide recommendations for development strategies to improve the availability, affordability and demand of fruits and vegetables.

We hope to have a wide array of attendees from academia, government, industry and NGOs from the nutrition and agricultural communities. The program is designed to have speakers present within sessions and allow time in each session for a fruitful discussion.

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8:30 - 9:00 AM

**Light Breakfast**

### **SESSION 3: METRICS TO EVALUATE AND IMPROVE DIET QUALITY**

9:00 - 9:05 AM

Introduction to Session

Session Chair: Reina Engle-Stone, UC Davis

9:05 - 9:45 AM

**Metrics to Evaluate and Improve Diet Quality: Defining and Measuring Diet Quality Worldwide and Generating Accessible Indicators for Affordable and Nutritious Diets**

Anna Herforth, Columbia University

9:45 - 10:15 AM

**Food Environment Metrics of Produce Desirability, Diversity, and Quality to Support Healthy Dietary Patterns**

Selena Ahmed, Montana State University

10:15 - 10:45 AM

**A New Metrics Toolbox to Assess the Cost and Geographic Distribution of Healthy Diets**

Anju Aggarwal, University of Washington, Seattle

10:45 - 11:00 AM

Break

11:00 - 11:45 AM

Facilitated Group Discussion

11:45 - 12:00 PM

Closing Remarks

Amy Beaudreault, UC Davis

12:00 - 1:00 PM

Lunch

# Abstracts

## Session 1: Optimal Nutrition and the Consumption of Fruits and Vegetables

Supply, Demand, and Projected Nutritional Need for Fruits and Vegetables

Timothy Sulser, International Food Policy Research Institute

The International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) of the International Food Policy Research Institute (IFPRI) is an integrated system of linked economic, climate, water, and crop models that allows for exploration of the future of supply, demand, trade, and critical aspects of the global agricultural system. IMPACT generates projections for over 60 commodities produced in 158 countries out to the year 2050. Fruits and vegetables (F&V) are a critical element of future diets that face particular challenges. Baseline projections indicate that total global consumption will nearly double from 2010 to 2050 while average per capita availability will only increase by about 40 percent. Most of this growth takes place in the developing world. The daily World Health Organization (WHO) healthy diet target of 500g of F&V per person per day is achieved, on average, by 2030 across most of the globe except in Africa South of the Sahara (SSA). While other regions continue to improve general availability of F&V out to 2050, SSA is projected to lag behind and continues to fall short of this target. In addition, distributional effects are important in all regions as significant portions of the population will not be able to consume adequate amounts of F&V even if the regional average meets the WHO target. Modeling the future of F&V and their role in healthy diets presents interesting challenges for the IMPACT development team. Better representation of the different types of F&V is being actively pursued. How to model healthy diets and the distributional effects in a structural model, such as IMPACT, is an important area of development in addition to working on how to best communicate these results and their implications to policy-makers.

**The Potential for Food Systems Approaches to Enhance Fruit and Vegetable Consumption in Low- and Middle-income Countries**  
**Andrew Jones, University of Michigan**

Dr. Jones will discuss the contribution of fruits and vegetables to the diets of populations in low- and middle-income countries, as well as the socio-cultural and environmental barriers to meeting recommended dietary intakes of fruits and vegetables in these contexts. He will also discuss the evidence for how policies and programs aimed at transforming food systems may modify fruit and vegetable consumption, and the sectoral synergies and trade-offs that may be faced through these actions with implications for both human health and the environment.

**Producing Enough Fruits and Vegetables to Meet Dietary Recommendations in the United States**  
**Zach Conrad, United States Department of Agriculture, Agricultural Research Service**

Poor diet is the predominant risk factor for the leading causes of mortality in the US. Accordingly, Americans are regularly advised to increase their consumption of fruits and vegetables. Yet little is known about whether the US agricultural system can produce enough food to achieve this goal on a national scale. There are also limits to how quickly the agricultural sector can adapt to shifting food demands. Logistically and economically, producers are motivated to maintain production levels of their current suite of crops, and supply chain infrastructure is often inflexible to change. Biologically, every crop has its own growing conditions that need to be met in order to thrive, so the availability of suitable cropland for each crop can limit the availability of certain foods for consumers. And there is a circular problem to increasing fruit and vegetable production: while food production on a large scale can enhance ecosystem services, it also has the potential to deplete or degrade natural resources, threaten environmental sustainability, and reduce yields, thereby limiting the agricultural capacity to accommodate improved dietary patterns. Increasing fruit and vegetable production on a large scale and in a sustainable way presents system-level challenges that require system-level solutions. Public health nutrition and sustainable agriculture are too related to be successfully pursued in isolation, and increased opportunities to bridge these domains are urgently needed to solve our most pressing problems.

**Potential Impacts of Increasing Supply of Specific Fruits and Vegetables on Nutrient Adequacy**  
**Joanne Arsenault, University of California, Davis**

This presentation describes an analytical framework for assessing the nutritional adequacy of national food supplies and the potential for agricultural diversity and increased production of fruit and vegetable crops to address micronutrient gaps. The micronutrient contents of national food supplies of three countries (Bangladesh, Senegal, and Cameroon) were calculated using national food balance sheet data. Population-adjusted nutrient requirements were estimated and nutrient short-falls in the food supply were identified, defined as not meeting the requirements of at least 80% of the population. Linear programming modeling was used to determine a mix of crops that could fill the nutrient gaps for several nutrients while minimizing additional land use. Out of eight micronutrients included in the present analysis, six were identified as inadequate in Bangladesh and Senegal (vitamins A and C, riboflavin, folate, calcium, and zinc) and three were in inadequate in Cameroon (vitamin A, calcium, and zinc). Adequacy of some micronutrients, such as vitamins A and C, could potentially be met with reasonably small additional land required by increasing production of a few fruit or vegetable crops that are particularly dense in these nutrients (e.g., carrots or guava). Folate adequacy could be improved with increased production of legumes and green leafy vegetables, but with a higher amount of agricultural land required. Other micronutrient gaps would likely need to be met by other means, such as enhanced livestock production, food fortification, biofortification, or imports. While fruits and vegetables cannot meet all nutrient needs in a population, increased production and crop diversification could potentially close the adequacy gap for some key nutrients.

## Session 2: Improving the Availability of Fruits and Vegetables

**Fresh Produce and the Diet Transformation in Africa: Challenges to Ensuring a Safe and Fresh Supply to Growing Urban Populations (virtual)**  
David Tschirley, Michigan State University

Not received in time for printing.

**Artichoke to Ziziphus: Using Agrobiodiversity to Improve the Availability of Fruits and Vegetables**  
Gina Kennedy, Bioversity International

Fruits, vegetables and nuts are gaining increasing attention with the global shift in focus from food quantity to food quality as a requirement to end all forms of malnutrition. Some 5,538 plant species are being used today for food according to the Royal Botanic Gardens in Kew (RBG, 2016). Out of this portfolio, 539 vegetables (232 genera) and 645 fruit indigenous species (214 genera) can be found in Africa alone (PROTA, 2010). There is a remarkable, yet untapped potential to better utilize genetic diversity in both wild and cultivated species of fruits and vegetables. Specific advantages that could be conferred from greater use of fruit and vegetable biodiversity include smoothing seasonal availability, providing a wide range of choice to meet consumer taste and culture preferences and selecting for specific characteristics such as nutritional content or desired culinary use. Much of the natural bounty in diversity is underutilized and poorly conserved yet there is great potential to use these untapped resources to increase fruit and vegetable availability. Case studies will be used to illustrate the potential for agrobiodiversity to boost fruit and vegetable availability, including how governments can create an enabling environment for mainstreaming biodiversity of fruits and vegetables.

**Reducing Losses and Extending Availability of Fruits and Vegetables After Harvest**  
Elizabeth Mitcham, University of California, Davis

While consumption of fruits and vegetables offer many nutrition benefits, these commodities are much more perishable than legumes and grains, especially when handled fresh. Losses of 30 to 80% are common, and vary depending on the product, environmental conditions and degree of care in handling. In the developing world, produce losses occur mainly between the farm and the market while in developed countries losses occur at the retail and consumer level. Particularly in developing countries, poor postharvest handling results from a lack of awareness and training; lack of infrastructure including cold storage, improved roads, and transportation vehicles; and lack of incentives to improve practices. The most important improvements needed involve harvest timing, protective packaging, introduction of cold-chain practices, and storage facilities or simple processing methods to stabilize the products for off-season availability.

**Processing Strategies for Stabilization Perishable Produce and Formulation into Staple Foods**  
Mario Ferruzzi, North Carolina State University

Post-harvest losses of perishable fruits and vegetables remain a critical hurdle to consistent delivery of nutrient dense plant foods to at-risk populations in Sub Saharan Africa. Current efforts within the USAID Feed the Future Food Processing and Post Harvest Innovation Lab (FPL) seek to leverage food processing as a means to drive the value chain and deliver products with stabilized and improved nutritional characteristics. We have an integrated research and product development strategy with the goal to address demand for affordable, convenient and nutritious products by application of food processing to stabilize high value fruits and vegetables and to develop new products to deliver nutrient dense fruit and vegetable micronutrients. This presentation will briefly review solar drying and low cost extrusion as means to stabilize high value fruits (mango, carrot and papaya) and nutrient dense indigenous plants (moringa, baobab and hibiscus). The applicability of these technologies alone and in combination will be described in terms of generation of ingredients suitable for formulation into new processed food products such as instant cereals that serve to stabilize and diversify the fruit and vegetable product options for at risk consumers. Micronutrient recovery, impacts to micronutrient bioaccessibility and final product quality parameters will be described.

## Session 3: Metrics to Evaluate and Improve Diet Quality

**Metrics to Evaluate and Improve Diet Quality: Defining and Measuring Diet Quality Worldwide and Generating Accessible Indicators for Affordable and Nutritious Diets**  
Anna Herforth, Columbia University

This presentation begins with the question of how to define a healthy diet, which is the basis for subsequent discussion about how to measure (a) diet quality and (b) cost of healthy diets. A question of major importance to public health nutrition is how food environments (including food prices) affect diet quality, and how each can be improved, but the discussion is hampered by the fact that we have little data on either.

Diet quality is the largest risk factor in the global burden of disease, and the common factor among malnutrition in all its forms. To date, however, no internationally comparable indicators of diet quality are measured across countries. Gallup, Inc., has proposed to develop a diet quality (DQ) module to include in the Gallup World Poll, which is implemented in 160 countries. Ideally, such a module would be simple to administer, yield indicators that are easy to interpret and reflect multiple facets of DQ, and be comparable across countries. A review of international and national definitions of diet quality yielded a set of elements of healthy diets that appear to be consistent and important across all regions of the world. Development of the module will use these elements as the basis for indicators that would capture both “adequacy” and “moderation” components of diet quality. A DQ module would enable tracking of trends over time, better information for policy and program formulation, and analyses about the causes and consequences of poor (or healthy) diets.

Food prices are a major determinant of food choice and dietary quality. While food prices are a topic of much international discourse and analysis, the basket of foods tracked typically consists of staple foods or economically important commodities, and bears little relationship to the cost of healthy diets. Therefore the food price indicators currently in use are not fit for purpose to understand the impact of policies and time trends on the cost of healthy diets. The IANDA Project uses existing food price monitoring systems to reflect the cost of nutritious diets. Working in Ghana and Tanzania, we have piloted four indicators: Cost of Nutrient Adequacy (CoNA), Cost of Recommended Diets (CoRD), Cost of Diet Diversity (CoDD), and a Nutritious Food Price Index (NFPI). The central innovation of these indicators is that they are designed to use existing data, and therefore could be rapidly scaled up and compared across countries. Such indicators can better inform research, discourse, and action on how to increase access to nutritious diets.

**Food Environment Metrics of Produce Desirability, Diversity, and Quality to Support Healthy Dietary Patterns**  
Selena Ahmed, Montana State University

The food environment, defined as the context that encompasses the availability, affordability, convenience, and desirability of food, is recognized to influence consumer food choices and dietary patterns. However, there is a lack of generalizable metrics to evaluate the key food environment component of desirability. This study presents three generalizable food environment metrics to assess fruit and vegetable (FV) desirability and availability including parameters of sensory desirability, diversity, and quality. These tools were developed and pilot tested by the Montana State University Food and Health Lab in rural and urban built food environments in the frontier state of Montana towards elucidating access gaps to desirable and diverse produce based on rurality of location. Findings demonstrate that FVs procured from rural built food environments in the study area have significantly lower scores for parameters of sensory desirability, diversity, and quality compared to those in more urban sites. The presented metrics can be applied in diverse socio-ecological contexts to better evaluate, modify, and monitor food environments in complement to existing food environment tools. Further research is being carried out to examine the relationship of findings from the presented food environment metrics to food choices, dietary quality, and health outcomes.

**A New Metrics Toolbox to Assess the Cost and Geographic Distribution of Healthy Diets**  
Anju Aggarwal, University of Washington, Seattle

Aligning global food production systems with population-wide energy and nutrient needs requires a closer look at the multiple drivers of food choice. Whereas some consumer food decisions are thought to be under individual control, others clearly are not. Taste, cost, convenience, variety, health concerns and multiple attitudes and behaviors affect day-to-day food seeking behaviors, diet quality, and health outcomes. Each of these domains has its metrics and measures that can be deployed to quantify physical, economic and psychosocial access to healthy foods. Merging dietary intakes data with retail food prices at both local and national levels allows for new studies of diet quality in relation to diet cost, assessed at the individual rather than household levels. These studies led to the concept of nutrition resilience, operationalized as the ability to eat better for less. Geo-localizing addresses of study participants by tax parcel allows for new studies in spatial nutritional epidemiology. The ability to geocode the place of food acquisition and consumption, and thus map geographic disparities in behaviors, diets and health is a new approach to nutritional epidemiology. These metrics leverage cutting-edge GIS technologies and spatial techniques that can, potentially, be used outside the United States. By the end of the talk, we will explore the utility of this toolbox to measure access to healthy foods in LMIC and in high income countries.

# Biographies

Anju Aggarwal, PhD, University of Washington, Seattle

Dr. Anju Aggarwal is a Nutritional Epidemiologist, working on interactions among socioeconomic, psychosocial, and environmental drivers of food choices and their collective impact on diet quality. A graduate in International Health from the Johns Hopkins School of Public Health, she has worked on socioeconomic disparities in nutrition and health in both high income and in low and middle income countries (LMIC). Her current research interest lies in matching food supply and food retail systems to neighborhood- level metrics of food demand.

Dr. Aggarwal, currently Assistant Professor in the Department of Epidemiology at the University of Washington School of Public Health, is a leading member of the food environment research team at the Center for Public Health Nutrition (CPHN). Supported by continued funding from the National Institute of Health, the team has developed novel tools and metrics to measure physical and economic access to healthy foods, using cutting-edge GIS techniques and novel methods of geospatial analysis. The team has developed the capability to map diet quality and obesity rates by census block; some of the newly developed methods may be portable domestically and worldwide. Dr. Aggarwal is an active member of IMMANA-funded (Innovative Methods and Metrics for Agriculture and Nutrition Actions) Food Environment Working group led by The London School of Hygiene and Tropical Medicine in the UK. Following her MSc. in Nutrition from India, Dr. Aggarwal has managed federal programs and budgets in coordination with Ministry of Women and Child Health in India.

**Selena Ahmed, PhD, Montana State University**

Selena's research, teaching, and outreach interests are at the intersection of the ecological, cultural, and health aspects of food systems. She has carried out transdisciplinary food systems research in a range of ecological and cultural contexts in China, India, Morocco, Venezuela, Belize, the Dominican Republic, and Native American communities in the United States. Selena co-leads the Montana State University Food and Health Lab ([www.montana.edu/foodandhealthlab/](http://www.montana.edu/foodandhealthlab/)) with the objective to carry out and provide training on basic, behavioral, and applied research to explore food environment-nutrition-health linkages. She is particularly interested in identifying the socio-ecological determinants of environmental and human wellbeing in the food system. This work involves quantifying the influence of environmental factors on ecosystem services, food quality, food access, and diets in the context of global change. The ultimate translational goal of this work is to develop evidence-based plans to promote biodiversity and mitigate risk of food insecurity and diet-related chronic disease towards sustainable food systems.

**Joanne Arsenault, PhD, University of California, Davis**

Joanne Arsenault is an Associate Project Scientist in the Program in International and Community Nutrition at UC Davis. She is a nutritionist with training in international nutrition, epidemiology, and dietetics. Her area of expertise is dietary intake assessment, and she is interested in food-based strategies to improve dietary adequacy, nutritional status, and health in low-income populations. She has served as a consultant to various organizations, including the World Health Organization, the NY Academy of Sciences, and the International Food Policy Research Institute. She is also a Registered Dietitian with the Academy of Nutrition and Dietetics, and a part-time instructor in the US Military-Baylor Graduate Program in Nutrition.

**Amy R. Beaudreault, PhD, University of California, Davis**

Dr. Beaudreault is the director of nutrition and health at the University of California, Davis' World Food Center. She focuses on the intersection of nutrition, food and agriculture in strategy development, program implementation and management, and collaboration locally and globally. Prior to UC Davis, she was Associate Director at The Sackler Institute for Nutrition Science, a program at the New York Academy of Sciences, which advances evidenced-based nutrition science research through convening and coordinating global experts and funding of scientific research. She also managed the Ohio State University Extension Agricultural and Safety Health Program; worked in communication at Nationwide Children's Hospital in Columbus, OH, translating research to practice; and directed several U.S. Department of Education contracts in Washington, DC. She has organized more than 25 international scientific conferences/workshops with organizations such as WHO, the World Bank Group, the World Food Prize, the American Society for Nutrition, and the Institute of Medicine. She holds a BS in Journalism from Ohio University, and an MS and PhD from The Ohio State University.

**Zach Conrad, PhD, United States Department of Agriculture, Agricultural Research Service**

Dr. Conrad is a food systems scientist and nutritional epidemiologist. His research utilizes large datasets and modeling techniques to examine the effects of population-level nutrition interventions on health outcomes and sustainable food production. He earned his undergraduate degrees in biology and anthropology from Trent University in Ontario, focusing on human health and food systems. He earned his Masters of Public Health with a specialization in Nutrition, and his Masters of Science with a specialization in sustainable food systems, from Tufts University in Boston. Dr. Conrad completed his PhD in nutrition and food systems at Tufts University, focusing on the agricultural capacity to accommodate fruit and vegetable dietary recommendations in the US. He remained at Tufts for a postdoctoral fellowship in nutritional epidemiology. Dr. Conrad is currently a Postdoctoral Research Nutritionist at the USDA Human Nutrition Research Center in Grand Forks, North Dakota.

**Kathryn Dewey, PhD, University of California, Davis**

Kathryn Dewey is a Distinguished Professor in the Department of Nutrition and Director of the Program in International and Community Nutrition at the University of California, Davis. Her research focuses on maternal and infant nutrition, including clinical and community-based research in the United States, Mexico, Costa Rica, Honduras, Guatemala, Peru, Ghana, Malawi, and Bangladesh. Her professional service includes consultation for WHO, UNICEF, PAHO, NIH, and the National Academy of Medicine, scientific advisory committees for the Bill & Melinda Gates Foundation and the UK Medical Research Council, member of the Board for the Global Alliance for Improved Nutrition, and serving as President of the Society for International Nutrition Research and of the International Society for Research on Human Milk and Lactation. Dr. Dewey has mentored more than 40 graduate students and produced more than 350 publications. She has received several national and international awards, including the Kellogg Prize for International Nutrition, the Macy-György Award from ISRHML, and the E.V. McCollum International Lectureship.

**Reina Engle-Stone, PhD, University of California, Davis**

Dr. Engle-Stone's research is in global public health nutrition, with a focus on micronutrient nutrition among women and young children in low-income settings. Research themes include planning, monitoring, and evaluation of food fortification programs; cost-effectiveness and coherence among micronutrient intervention programs, and nutritional assessment.

**Mario Ferruzzi, PhD, North Carolina State University**

Dr. Mario G. Ferruzzi is a Professor in the Plants for Human Health Institute and the Department of Food, Bioprocessing and Nutrition Science at North Carolina State University. He received his B.S. (1996) in Chemistry from Duke University and Ph.D. (2001) in Food Science and Nutrition from The Ohio State University. Dr. Ferruzzi most recently served as a Professor in the Department of Food Science at Purdue University (2004-2016) and as a Research Scientist with Nestlé Research & Development (2001-2004). His research focuses on understanding the impact of food formulation and processing on bioavailability, metabolism and biological activity of plant bioactives and nutrients.

**Anna Herforth, PhD, Columbia University**

Anna Herforth is an independent researcher and consultant specializing in the links between agriculture, food systems and nutrition. She leads a project on Indicators of Affordability of Nutritious Diets in Africa (IANDA) with Tufts University, and consults for several organizations including FHI360, FAO, and Gallup. She is also an adjunct Research Scientist at Columbia University. Dr. Herforth has worked in Africa, South Asia, and Latin America, including in many rural and indigenous communities. She holds a Ph.D. from Cornell University in International Nutrition, an M.S. in Food Policy from Tufts, and a B.S. in Plant Science from Cornell University. She co-organizes and co-founded the Agriculture-Nutrition Community of Practice, a professional community of over 4,000 members from 90 countries.

### **Andrew Jones, PhD, University of Michigan**

Andrew Jones is a public health nutritionist, interested in understanding the influence of agriculture and food systems on the nutritional status of women and children in low- and middle-income countries (LMICs). His research examines: i) how agricultural and landscape biodiversity influence diet quality and food security among smallholder farming households in LMICs; ii) the role of livestock value chains in contributing to anemia among women and children through diet, infection, and environmental exposures; iii) how food systems changes associated with the “nutrition transition” in LMICs potentiate the risk of concurrent undernutrition and obesity, and the impacts of urbanicity and household food security in mediating these dynamics; and iv) the implications for food systems of aligning dietary recommendations with goals for environmental sustainability. He has ongoing research projects in Ghana, Ethiopia, Kenya, Vietnam, Zimbabwe, Bolivia and Peru.

Andrew is currently the John G. Searle Assistant Professor of Nutritional Sciences in the School of Public Health at the University of Michigan (U-M), and Research Assistant Professor in the Center for Human Growth and Development at U-M. Andrew received his PhD in International Nutrition from Cornell University, and holds BA degrees from the Pennsylvania State University in Geography and Film Production.

### **Gina Kennedy, PhD, Bioversity International**

Dr. Kennedy is a Senior Scientist with Bioversity International and team leader in the Healthy Diets from Sustainable Food Systems Initiative. She is an international public health nutrition specialist. Her research interests include measurement of dietary diversity and diet quality and assessment of nutritional problems in developing countries. For the past ten years she has worked on nutrition assessment in developing countries, including assessing the contribution of agricultural biodiversity on nutrient intake. Prior to joining Bioversity she worked for the Nutrition Division of FAO on food-based indicators for use in food and nutrition security programs, nutrition assessment and nutrient requirements. She also managed a research project studying the impact of food security interventions combined with nutrition education on use of locally available foods to improve nutrient intakes, micronutrient status and growth of young children. Prior to working for FAO, she worked for GIZ in Guinea, West Africa and the public health system in the Republic of Kiribati. She received her PhD in public health nutrition from Wageningen University and her Master of Public Health from University of Alabama, Birmingham.

### **Elizabeth Mitcham, PhD, University of California, Davis**

Dr. Elizabeth Mitcham is director of the Horticulture Innovation Lab (<http://horticulture.udavis.edu>), a USAID-funded program managed by the University of California, Davis, that advances fruit and vegetable research to support the needs of smallholder farmers in developing countries. As part of the U.S. government’s Feed the Future initiative, the program has collaborated with more than 18 U.S. universities and 200 organizations in Latin America, Africa, and Asia with projects spanning the horticultural value chain. Mitcham is also a postharvest physiologist on the faculty of the UC Davis Department of Plant Sciences and has helped train professionals from more than 40 countries as part of the Postharvest Technology Center. She currently serves as the Vice President-Elect for the international division of the American Society for Horticultural Sciences and was previously honored as the ASHS Outstanding International Horticulturist. Mitcham joined the UC Davis faculty in 1992 as a UC Cooperative Extension specialist, and holds degrees in horticulture from the University of Maryland (Ph.D. and B.S.) and North Carolina State University (M.S.).

### **Emmy Simmons**

Emmy Simmons is an independent consultant on international development issues with a focus on food, agriculture, and Africa. She serves as co-chair of AGree, an initiative that brings together a diverse group of interests to transform U.S. food and agriculture policy to meet the challenges of the future, and as a non-resident senior advisor to the CSIS Global Food Security Project. She is a member of the Global Panel on Agriculture and Food Systems for Nutrition, an international group focused on developing evidence-based policies to increase access to healthy, safe, and affordable diets. She also serves on the boards of several organizations engaged in international agriculture and global development more broadly, including the World Vegetable Center, the Partnership to Cut Hunger and Poverty in Africa, and she sits on several advisory committees for initiatives focused on agricultural development in sub-Saharan Africa and South Asia. She completed a career of nearly 30 years with the U.S. Agency for International Development (USAID) in 2005, having served since 2002 as the Assistant Administrator for Economic Growth, Agriculture, and Trade, a Presidentially-appointed, Senate-confirmed position. Prior to joining USAID, she worked in the Ministry of Planning and Economic Affairs in Monrovia, Liberia and taught and conducted research at Ahmadu Bello University in Zaria, Nigeria. She began her international career as a Peace Corps Volunteer in the Philippines from 1962-64. She holds an M.S. degree in agricultural economics from Cornell University and a B.A. degree from the University of Wisconsin-Milwaukee.

### **Timothy Sulser, MS, International Food Policy Research Institute**

Timothy Sulser works as a scientist at the International Food Policy Research Institute with Global Futures and Strategic Foresight, a CGIAR system-wide initiative. Tim has worked with long-term structural models for projecting global agricultural supply, demand, net trade, and food security issues for over a decade. He has a background in biology, rural community development, and agricultural & resource economics. Tim has extensive global experience working with colleagues in Latin America (Ecuador, Mexico, Chile), Asia (Indonesia, India, China), and Sub-Saharan Africa (Ethiopia, Uganda).

## **Notes**

### **David Tschirley, PhD, Michigan State University**

David Tschirley is Professor, International Development in the Department of Food, Agricultural, and Resource Economics at Michigan State University, and Co-Director of the department's Food Security Group. He is also a member of the Core Technical Team of MSU's Global Center for Food Systems Innovation. He has over 20 years of experience in applied food security research, mentoring of developing country researchers, and active policy outreach. His work emphasizes three main areas:

- agrifood system transformation in Africa focusing on diet change and its implications over a range of policy and programmatic issues, including employment;
- the intersection of food aid, staple food markets, and emergency response, including extensive work on monetization, local and regional food aid procurement, and the role of food trade and government policy in emergency response, and
- institutional approaches to linking smallholder farmers to cash crop markets such as cotton and fresh produce.

He is the author of over 20 journal articles, several book chapters, one edited book volume, and dozens of working papers. Dr. Tschirley has consulted for and otherwise served the World Food Program, USAID, World Bank, Food and Agriculture Organization of the U.N., International Fund for Agricultural Development, the Bill & Melinda Gates Foundation, and The MasterCard Foundation. Fluent in Spanish and Portuguese, Dr. Tschirley has had long-term assignments in Ecuador (1987–1990) and Mozambique (1995–98) and works most actively now in East and Southern Africa.

