Meeting the Dietary Needs of Older Adults: Exploring the Impact of the Physical, Social, and Cultural Environment: Workshop Summary

DETAILS

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EXPLORING THE IMPACT OF THE PHYSICAL, SOCIAL, AND CULTURAL ENVIRONMENT

WORKSHOP SUMMARY

Anne Brown Rodgers and Maria Oria, *Rapporteurs*

Food and Nutrition Board

Health and Medicine Division

The National Academies of
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[1]The National Academies of Sciences, Engineering, and Medicine's planning committees are solely responsible for organizing the workshop, identifying topics, and choosing speakers. The responsibility for the published workshop summary rests with the workshop rapporteurs and the institution.

Reviewers

This workshop summary has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published workshop summary as sound as possible and to ensure that the workshop summary meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the process. We wish to thank the following individuals for their review of this workshop summary:

CONNIE W. BALES, Duke University School of Medicine
RICHARD BLACK, formerly with PepsiCo
JEAN L. LLOYD, retired from the Administration on Aging
SAMARA JOY NIELSEN, University of Pittsburgh

Although the reviewers listed above have provided many constructive comments and suggestions, they did not see the final draft of the workshop summary before its release. The review of this workshop summary was overseen by **Derek Yach,** The Vitality Group. He was responsible for making certain that an independent examination of this workshop summary was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this workshop summary rests entirely with the rapporteurs and the institution.

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Introduction and Background[1]

BACKGROUND AND CHARGE TO THE COMMITTEE

Older adults are a growing demographic group in the United States, and a range of physical, social, financial, and cultural factors affect their nutritional status. Metabolic and physiologic changes that accompany normal aging modify the nutritional requirements of older adults. An examination of evidence is needed to better understand how nutritional status is associated with aging and risk of mortality or chronic disease among older adults. Underpinning many, if not most, nutritional problems in older adults is socioeconomic status. Therefore, understanding access challenges to healthy food, including geographic, financial, and transportation barriers, also is needed to better understand how to meet the nutritional needs of older adults.

On October 28-29, 2015, the Food and Nutrition Board convened a workshop, Meeting the Dietary Needs of Older Adults, in Washington, DC. The workshop was designed to examine factors in the physical, social, and cultural environment that affect the ability of older adults to meet their daily dietary needs.

The workshop planning committee highlighted several areas of focus

[1] The planning committee's role was limited to planning the workshop, and the workshop summary has been prepared by the workshop rapporteurs as a factual summary of what occurred at the workshop. Statements, recommendations, and opinions expressed are those of individual presenters and participants, and are not necessarily endorsed or verified by the National Academies of Sciences, Engineering, and Medicine, and they should not be construed as reflecting any group consensus.

for the workshop: (1) describe the rapid increase in older adult populations and the need for new paradigms to meet their needs and examine new understandings of the meaning of "healthy aging"; (2) describe emerging insights into the changing physiology of aging and how that affects nutrient needs; (3) describe ecological insights about factors that influence food choices and nutritional status of older adults; (4) review national programs designed to address dietary and nutrition needs of older adults; (5) explore how community, retail, and nonprofit organizations are instituting programs and projects to meet older adults' nutrition needs; and (6) examine research priorities and gaps. This document summarizes the presentations and discussions from the workshop, focusing on each session and highlighting issues raised by presenters and attendees.

Gordon Jensen, Senior Associate Dean for Research, Professor of Medicine and Nutrition, University of Vermont, and Chair of the Planning Committee on Meeting the Dietary Needs of Older Adults, opened the workshop. Jensen explained that the current workshop was built on two previous initiatives of the Food and Nutrition Board on nutrition and aging, and that he had participated in both initiatives. The first was a January 2000 report titled *The Role of Nutrition in Maintaining Health in the Nation's Elderly: Evaluating Coverage of Nutrition Services for the Medicare Population* (IOM, 2000). The report addressed issues related to nutrition interventions for Medicare beneficiaries, provided recommendations for nutrition services for the elderly, and considered how Medicare's coverage policy should be considered and implemented.

The second initiative was a March 2012 Workshop Summary titled *Nutrition and Healthy Aging in the Community* (IOM, 2012). The workshop addressed community-based delivery of nutrition services for older adults and identified nutrition interventions and model programs that support the transition to home care as well as healthy and independent living in the community.

PERSPECTIVES FROM THE AARP FOUNDATION

Lisa Marsh Ryerson, President of the AARP Foundation, noted that the AARP Foundation has worked very closely with the National Academies of Sciences, Engineering, and Medicine over the years on a number of issues. She expressed her pleasure that this partnership was now extending to a new issue—nutrition and the older adult.

Ryerson stated that this workshop will deepen the knowledge base concerning the dietary needs of the rapidly growing older population and will help to broaden the base of individuals and organizations working to meet those dietary needs.

The AARP Foundation and Low-Income Older Adults

Ryerson went on to explain that the AARP Foundation addresses the needs of low-income adults ages 50 and older by investing in and advancing effective solutions that attack the root causes of the many challenges they face: the need for adequate and nutritious food, for functional and affordable housing, for steady income, and for strong and sustaining bonds to family, friends, and community. The AARP Foundation emphasizes and builds upon the links among the four core issues of hunger, housing, income, and social isolation. For example, the AARP Foundation tries to ensure that vulnerable older adults have the information they need about proper nutrition. It also is working to promote efficient distribution systems that will reduce cost and increase availability and access to healthy and nutritious foods. Ryerson suggested that this will strengthen food knowledge to enhance buying power, purchasing habits, and cooking skills that result in healthy, nutritious, and age-appropriate meals.

More than 10 million Americans ages 50 and older are at risk of hunger every day. Ryerson noted that the scope of the problem and other ill effects affecting so many vulnerable low-income older adults is recognized and that a real sense of optimism is beginning to emerge because the 50+ demographic is finally starting to be understood by corporations, by nonprofits, by government, and others. Older adults are not only the fastest-growing segment of our population, but also one that warrants much greater attention as health care costs and chronic disease rates continue to rise.

Ryerson noted a growing awareness that a new model, with new strategies and tactics, is needed to combat hunger and food insecurity among older adults. She then described a new organization, the Root Cause Coalition, launched by the AARP Foundation. The Coalition is a nonprofit that brings together health care providers, insurers, the food and agriculture sectors, and other nonprofits to establish a national framework for programs, policies, and research to address the problem of hunger as a health issue in a proactive and systematic way. This means creating sustainable business models, promoting education, providing incentives for healthy eating and carrying out cutting-edge research. Ryerson added that charity can also play an indispensable, life-saving role in fighting hunger.

Time for a New Paradigm

But, she stated, it is time for a new paradigm that not only embraces a charitable response but that puts science in the forefront of the effort to meet the nutritional needs of older adults. Understanding what constitutes good nutrition for older adults is essential to this approach. This workshop is important, she explained, because it connects an informed understanding

of the elements of good nutrition with programs and initiatives designed to meet these dietary needs. It also helps to identify gaps in knowledge that require further study. This new paradigm will need a greater focus on the nutrition needs of older adults in the development of food products, in the retail setting, in federal assistance programs and nutrition guidance, and in community initiatives. For example, the AARP Foundation is working on a food insecurity nutrition incentive program in Mississippi and Tennessee. With a grant from the U.S. Department of Agriculture (USDA) and additional support from United Healthcare, Supplemental Nutrition Assistance Program (SNAP) beneficiaries in those states can go to participating grocery stores and farmers' markets. They can spend up to $10 buying fruits and vegetables with their SNAP benefits card and receive deep discounts on future purchases of fruits and vegetables. The AARP Foundation also is exploring food by prescription through partnerships, pilots, research, and collaboration with the health care community. The Affordable Care Act's (ACA's) emphasis on prevention and keeping people healthy at home rather than in medical or institutional settings provides a strong impetus for these efforts.

Ryerson continued by saying that new collaborations between nutritionists, nurses, food producers, and family caregivers also would be helpful to make sure vulnerable people have access to healthy foods and health care. Particular attention is needed for two overlapping population groups who face an equally acute food insecurity problem. One group is people between the ages of 50 and 64. They are too young for Medicare but they are not too young to have chronic diseases that can severely impair their health and undermine their finances and therefore undermine their futures. The other group is multigenerational households. These households are almost three times as likely to be food insecure as households without grandparents.

CONSUMER BEHAVIOR

David Donnan is a partner at A.T. Kearney, a global management consulting firm that works across all industries, including food manufacturers, retailers, and restaurants chains. In its work with food industries, A.T. Kearney collaborates with a variety of nongovernmental organizations to find sustainable business models for hunger relief that can continue into the future and adapt to many of the major trends and changes that are occurring in the world.

The "Age Quake"

Donnan explained that the world is facing what is often called an "age quake." This "age quake" is characterized by two major trends. The first is that even though the world's overall population is increasing from 7.2 billion people today to 9 billion people in 2050, the birthrate is slowing in every country, including China and India. As a result, fewer young people are being added to populations. The second trend is that through advances in medicine and nutrition, people are living longer. This means the world has a growing older population that is living longer and a shrinking number of young people available to help support the aging population. In 2014, four countries—Germany, Greece, Italy, and Japan—had populations in which those older than age 65 represented more than 20 percent of the total population. In 2020, nine countries will join that list. By 2030, 34 countries, including the United States, will have at least 20 percent of their population older than age 65 (Johnson, 2014). Moreover, the fastest growing age cohort in the United States currently is people age 100 or older. By 2025, 119,000 consumers will be age 100 or older. By the year 2050, more than 1 million people will be age 100 or older (Baum, 1999). Donnan then noted that these 1 million people turned age 65 in 2015. They are alive today, and the challenge is ensuring that they are healthy and vibrant and living decent lives as they age.

Today, advertising and media focus to a large extent on the Millennial generation, but as Donnan explained, significant spending power rests with the Baby Boomers and older adult groups. He noted that the age 50 and older population is expected to spend close to 50 percent of the dollars spent on consumer packaged goods, yet less than 5 percent of advertising is aimed toward this group. In the United States, $3 trillion is spent annually by consumers older than age 60; globally it is $15 trillion. He further explained that simultaneously, the United States is facing an economic challenge in that 29 percent of older adults have no defined benefit plan or retirement savings.

Understanding the Consumer Preferences of Older Adults

Donnan then described an A.T. Kearney Global Maturing Consumer Study where more than 3,000 consumers ages 60 and older were interviewed in person in seven countries that represent 60 percent of the world population. The survey asked them about their perceptions on consumer shopping, products, and related issues. Donnan noted that these consumers have distinct characteristics that are different from those of younger groups (and will be different than the million people age 100 who will be shopping by 2050).

- They buy different product categories and enjoy shopping more.
- They shop often in smaller stores close to home.
- They are more loyal and demanding when it comes to quality.
- They watch for promotions but do not find them adapted to their needs and desires as much as they could be.
- Their priorities also change as they age. A person age 60 is different than one age 70, who is different than one age 80.

Donnan summarized the three main themes that emerged from the survey: (1) older adults are not being served well by retailers, customer service, or the products, (2) navigation in shops can be a real challenge and the supercenter shops that are increasingly common are not designed well for older adults, and (3) product packaging is still a big problem, as older adults have difficulty opening, reading, and using packages.

Survey findings revealed other differences between older adults and other age groups:

- Mature consumers spend less of their income on clothing and transportation. Older adults use cars less and public transportation more.
- They spend more of their income on food, beverages, and health care.
- They enjoy shopping and often shop as part of their daily routine. But not all are mobile enough to go out and shop, and meeting the needs of these consumers is a challenge for retailers.
- Though they do not necessarily always shop in smaller stores that are closer to home, they express a preference for doing so because of perceived easier navigation in the store, better customer service, and ability to walk to the store.

Donnan stated that these findings present both challenges and opportunities for retailers and service providers. For example, businesses have opportunities in providing transportation alternatives, such as Uber and Zip Car, to older adults who do not drive or in providing connectivity technology through mobile devices. Millennials who are already comfortable with technology will come to expect it as they age. Many existing approaches are based on old technologies and old conceptions about behaviors.

A.T. Kearney has conducted research in collaboration with the AARP Foundation on senior nutrition and meeting the needs of economically disadvantaged seniors. This research has shown that efforts to reach the mature consumer should take into account affordability, participation in nutrition assistance programs, new sources of food (such as drug stores), the availability and understandability of food and nutrition information,

and new approaches for delivering nutritious food. Donnan also stated that it will be difficult to depend on government for funding and other types of assistance in the future so it will be necessary to find ways of working on sustainable ways to use the vast amount of available expertise and help those in need. There is a way to achieve the "three bottom lines," he said: be sustainable, be socially responsible, and be profitable.

Meeting the Needs of Older Adults in Innovative Ways

Using its knowledge of the older adult consumer, Donnan described ways in which industry should look at ways to leverage existing approaches and technologies to build a new and innovative model of outreach in three areas: food sourcing, food preparation, and food to consumer. For food sourcing, he asked whether there is a way to leverage the collective food purchases of older adults to buy produce less expensively. Could organizations such as Feeding America®[2] work with AARP, Meals on Wheels™, and other groups to consolidate their purchases? For-profit companies use this approach, noted Donnan. He suggested that establishing a central kitchen that could prepare baskets of nutritious food and have them delivered to people who are economically disadvantaged could also be a new approach to food preparation for older adults. An innovative food to consumer approach might leverage the existing U.S. Postal Service (USPS) network to deliver nutritious food.

Donnan concluded his remarks by noting that with the coming "age quake," older consumers will need help accessing healthy food. In concert with traditional approaches to food distribution, such as industry donations from distributors and wholesalers, community food drives, and food purchased using donated money, innovative ideas about how to deliver food to older adults in need will be significant (see Figure 1-1). Partnerships between for-profit companies and nonprofit organizations could provide an opportunity for generating innovative ideas.

Question and Answer Session

Following Donnan's presentation, the floor was opened for questions. In response to one participant's question about a role for government at different levels, Donnan responded that government definitely has a role to play. He noted that the AARP's recent Hunger Summit included representatives from the USDA in addition to food manufacturers, agricultural

[2] Feeding America® is a nonprofit, nationwide network of food banks that provides more than 3.6 billion meals to virtually every community in the United States through food pantries and meal programs.

FIGURE 1-1 A new model for food re-distribution.
SOURCE: Presented by David Donnan on October 28, 2015 (A.T. Kearney).

companies, food retailers, and nonprofit groups, such as Feeding America® and Ella's Kitchen™.[3] All these groups worked together to generate ideas for ways to address hunger. One idea that emerged was to work with a local nonprofit to use SNAP benefits to support infrastructure for a company like Peapod[4] to enter an inner city market. A major cost for home food delivery is the route stops. Therefore, this infrastructure support would give the company enough fixed cost coverage to allow them to increase their business beyond areas that already can pay for delivery. This example demonstrates one way in which government, industry, and a nonprofit could partner on an initiative that all parties would benefit from.

A second question for Donnan dealt with the perception that food manufacturers tend to market more to the millennials than to older consumers. Donnan replied that this is true, but that this is beginning to shift because of changing understanding around assumptions about brand loyalty. The traditional assumption is that once a brand loyalty is established, people tend to stick with that brand. Manufacturers focus on millennials because their brand loyalties are still being molded. Donnan stated that this traditional assumption is being challenged now because manufacturers are finding that many older consumers may change their brand preferences. He noted that so many new products are coming out, there are so many different ways of being introduced to a product, and people are now more willing to experiment with new taste and flavors and types of foods.

WHAT IS HEALTHY AGING?

Simin Meydani, Director of the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, opened her presentation by

[3] Ella's Kitchen™ is a company that makes organic baby and toddler food that is sold in supermarkets internationally.

[4] Peapod is an online grocery delivery service.

reiterating that with the population getting older it becomes important to develop a strategy that can enhance the health of older adults and help them live longer and healthier lives.

Meydani noted that to develop a strategy, two concepts that are fundamental to the concept of successful aging and that have evolved over the years must be considered:

- The first concept is that aging and age-associated diseases cannot be completely separated from each other.
- The second concept is that age-associated disabilities are an inevitable part of the aging process and controlled mainly by genetic factors. However, current research indicates that genetics might not have as important a role in aging as lifestyle and other environmental factors. This is good news in terms of being able to intervene and change the course and the trajectory of aging.

Definitions of Successful Aging

Meydani explained that gerontologists and geriatricians have not yet come to a consensus on what components are essential in successful aging. Early definitions of successful aging were focused on a lack of disease or an absence of negative attributes. The current understanding is that healthy aging is not really the opposite of aging with disease or of functional impairment. Rather, Rowe and Kahn (1987) one of the first research teams to describe successful aging, suggested that it involved freedom from disability, high cognitive and physical functioning, and social and productive engagement. They later added resilience, the ability to adapt to, and recover from, unpredictable events, such as the loss of a loved one or an accident, to this definition. Rowe and Kahn identified modifiable factors that could influence successful aging, including osteoporosis, cognitive function, psychosocial factors, and bereavement and relocation. Later, other groups, such as the National Institute on Aging (NIA), the White House Conference on Aging, and the World Health Organization (WHO), also emphasized that healthy aging goes beyond the absence of disease and disability. More recently, the Canadian government went even further in their definition, describing healthy aging in holistic terms as "a lifelong process of optimizing opportunities for improving and preserving health and physical, social, and mental wellness, independence, quality of life, and enhancing successful life-course transitions" (Health Canada, 2002). Meydani went on to show how others have defined successful aging as the degree to which older adults "adapt to age-associated changes," "view themselves as successfully aging," and "are morbidity-free until the latest time point before death" (Baltes, 1997;

Bowling and Dieppe, 2005; Fries, 2002; Schulz and Heckhausen, 1996; von Faber et al., 2001).

Factors That Contribute to Successful Aging

Meydani explained that researchers have subsequently attempted to identify factors that contribute to successful aging. A 2014 study looked at determinants of successful aging together with an assessment of dietary habits in relation to the use of health care facilities by older populations living in Mediterranean areas (Tyrovolas et al., 2014). They examined three domains: (1) low probability of diseases and disability, (2) high cognitive and physical capability, and (3) active participation in social activities. The investigators developed a 10-point index of successful aging that included education, financial status, participation in social activities with friends, social activities with family, number of yearly excursions, body mass index (BMI), number of cardiovascular disease risk factors, depression, adherence to the Mediterranean diet, and frequency of physical activity.

The results of their analysis showed that higher scores on these attributes combined were associated with less use of health care services. Specifically, a 1/10-unit increase in the successful aging index was associated with 0.8 fewer health care service visits or consultations within a 1-year period (Tyrovolas et al., 2014). A closer examination of these attributes shows that the lifestyle characteristics were the main contributors to successful aging, accounting for 48 percent of the variability. Clinical factors accounted for 38 percent of the variability and psychosocial factors accounted for 23 percent. Meydani pointed out that high scores on measures of healthy diet and daily physical activity both ranked high in terms of factors that contributed to successful aging.

Meydani went on to summarize findings from a literature review of 29 studies of community-dwelling older adults, which assessed the percentage of "successful agers" (Depp and Jeste, 2006). The percent of successful agers identified in these different studies were quite varied, but the authors noted that a major source of the variability in results was the differences across studies in the definition of successful aging and its components. Other factors, including the criteria for assigning subjects to the comparison "unsuccessful" group and a bias toward negative outcomes, also contributed to some of the low successful aging rates reported. That study found that factors strongly supportive of successful aging were absence of arthritis, absence of hearing problems, better activities of daily living, and not smoking. Moderate supporters were higher amount of exercise, better self-related health, and lower systolic blood pressure. Factors that had limited support for healthy aging included higher income, greater education, current marriage, and white ethnicity.

Other studies also have looked at the literature in an attempt to identify factors that contribute to successful aging. Peel et al. (2005) found that definitions of health or successful aging ranged from the primarily biological, such as survival to old age with absence of disability, to the comprehensive, such as sustained well-being using a bio-psychosocial model. Despite the wide range of definitions used, Peel et al. (2005) found that the majority of the studies emphasized maintenance of functional independence, measured as the ability to perform basic and/or instrumental activities of daily living. Factors such as high functioning in tests of physical performance, cognitive ability, and absence of disease and psychiatric morbidity appeared less frequently. The indicators used within the domains to measure outcomes, and the way they were aggregated into summary scores influenced the resulting percentages of healthy older adults in the populations. Several behavioral determinants were associated with healthy aging: normal weight, physical activity, not smoking, moderate alcohol consumption, absence of depression, and robust social contact.

Meydani then presented findings from Young et al. (2009), who took the definition further by incorporating a person's own assessment of his or her health into determining successful aging. These researchers identified three domains that overlap and contain both physical as well as psychosocial elements (see Figure 1-2).

Meydani highlighted one particularly interesting finding, namely that social connectedness was important in determining how cognitively functional an older adult remained. Compared to people with the lowest levels

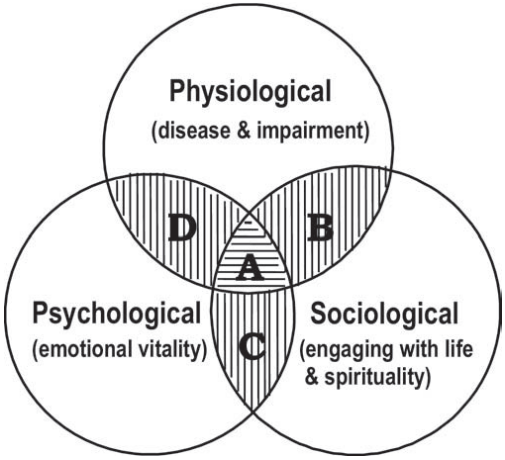

FIGURE 1-2 Assessing successful aging using three domains.
SOURCES: Presented by Simin Meydani on October 28, 2015; Young et al., 2009. Reprinted with permission.

of social integration, general cognitive decline was reduced by 39 percent among older adults with the highest number of social networks, and memory decline was halved over a period of 5 to 6 years (Haslam et al., 2014).

Meeting the Criteria for Successful Aging

Meydani noted that one challenge researchers and health care practitioners currently face is how best to use these findings to optimize cognitive health as people age. She went on to note that another way of looking at this is to break the domains of successful aging into objective definitions and subjective definitions. Researchers are finding that most older people do not meet objective criteria for successful aging while a majority of them will meet subjective criteria for successful aging. Data from Jeste et al. (2010) show that, for example, only 15 percent of people would meet the criterion of "absence of diseases," but 84 percent would meet the criterion of "life satisfaction" and 90 percent would meet the criterion of "self-rated successful aging."

Meydani summarized by stating that the criteria used are important in how successful aging is defined and in how the effectiveness of interventions will be judged. She added that a large gulf exists between how older adults identify successful aging and how researchers and physicians define it. Researchers and physicians define successful aging with more objective measures and in terms of lack of disease, whereas for older people, issues such as adaptation, meaningfulness, and connection are really important.

The question then, asked Meydani, is who should define successful aging? Should health care providers and researchers define it? Should older people define it? Or, should all of us together define successful aging? Longitudinal studies on the reliability and validity of definitions of successful aging are needed, she concluded. Another need, she noted, was for good measures of the contributions of nutrition to successful aging.

In concluding her presentation, Meydani stated that even with the different approaches to defining successful aging, some commonalities, such as high levels of physical activity and high cognitive and social engagement, emerge repeatedly. However, good ways to measure and objectively define social function and engagement are still lacking, as are ways to incorporate these measures in interventions. To move forward, Meydani urged close collaboration between biomedical scientists and psychosocial scientists, with the involvement of older adults, to develop a workable definition of successful aging and its components. She also suggested that good measures of nutritional status are lacking in many of the studies that have looked at successful aging, and this is a gap that needs to be filled. She expressed a hope that the workshop would help fill this gap by contributing to a bet-

ter understanding of nutritional factors in successful aging and ideas for including good nutrition measures in studies of aging.

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2

Emerging Insights (Physiological)

DIETARY NEEDS IN AGING POPULATIONS

Katherine Tucker, Professor of Nutritional Epidemiology at the University of Massachusetts Lowell, opened her presentation on dietary needs in aging populations by saying that she would focus her talk on a brief review of many of the vitamins and minerals of concern. She noted that diet and exercise are the major things that will help everyone live active and healthy lives without chronic diseases.

Tucker opened her review by noting changing dietary needs that occur in aging, including

- Lower energy requirements resulting from a slower metabolism,
- Less efficient absorption and utilization of many nutrients, and
- Chronic conditions and medication that affect nutrient requirements.

She then listed a number of specific age-related changes that influence nutrient requirements to reinforce the point that a major nutrition goal for older adults is to achieve a nutrient-dense diet. At the same time that older adults have higher nutrient requirements, they are dealing with issues that can make it harder to choose the right foods and to eat enough of them. Many older people experience loss of appetite, changes in taste and smell, problems with eating, dentures and oral health issues, mobility constraints, and income constraints.

Tucker then reviewed specific nutrients of particular importance to older adults (see Box 2-1). Tucker summed up this review by stating that

BOX 2-1
Nutrients of Particular Importance to Older Adults
Presented by Katherine Tucker

Protein. Adults lose muscle mass with age, and Tucker noted that a priority is to maintain it to the extent possible through a combination of adequate high-quality dietary protein and physical activity. Current protein recommendations remain the same for older adults as for younger adults, but Tucker stated that many researchers think that protein requirement should be much higher for older people because of their difficulty in maintaining muscle mass. At the same time, however, Tucker noted that other researchers express concern about raising the Recommended Dietary Allowance (RDA) for protein because of the potential that higher intakes may impair kidney function. Food consumption survey data indicate that a substantial percentage of older adults are not meeting current recommendations for protein intake, and Tucker noted that this is a major problem. She showed results from a compensation study that found that those in the highest quintile of protein intake lost 40 percent less lean mass than did those in the lowest quintile of intake (Houston et al., 2008). Other research has shown that higher protein intake also protects bone, another important issue for older adults (Hannan et al., 2000).

Omega-3 fatty acids. Tucker stated that researchers are learning more about the role of omega-3 fatty acids in preventing damaging inflammation. Intakes of omega-3 fatty acids by older adults tend to be low and out of balance with intakes of omega-6 fatty acids. Low omega-3 intake is associated with heart disease, cognitive decline, and even with asthma. It can be difficult to get enough omega-3 fatty acids because they are found in few food sources, principally fish, such as salmon, mackerel, or sardines, and also flaxseed and walnuts. Tucker noted that more men than women in the age 50 to 70 and the age 71 and older age range are below the Estimated Average Requirement (EAR) for omega-3 fatty acids. This is a concern because studies, such as the Nutrition, Aging, and Memory in the Elderly (NAME) Study, show a significant relationship between intake of omega-3s and memory score and attention score. Low omega-3 fatty acid intake also is associated with lower hippocampal volume (Scott et al., 2006).

Dietary fiber. Tucker noted that this dietary component is critical for the entire population and that researchers are learning about how important dietary fiber is to maintaining a healthy microbiota which is involved in many more physiological activities than was previously understood. Individuals need both soluble fiber, which helps protect against heart disease, and insoluble fiber, which helps keep the intestines and microbiome healthy. Very few people meet recommendations for dietary fiber.

Folate. Tucker explained that this B vitamin has been in the spotlight for the past few decades and is important for cognitive function, desoxyribonucleic acid (DNA) methylation, and preventing high levels of homocysteine. She noted that some older adults do not meet the RDA, whereas others exceed the upper limit (UL). The recommended amount is within a narrow range, so it is desirable for people to maximize folate intake from foods like beans, grains, and nuts, and to be careful to not get too much of the synthetic folic acid from fortified foods

such as breakfast cereals, and supplements. This is an issue of concern, stated Tucker, because excess intake of folic acid can accelerate and mask vitamin B_{12} deficiencies, which often go unnoticed and can cause neurological deterioration. Excess intake also has been associated with increased risk of some cancers and of cognitive decline. The most recent data show that women ages 71 and older tend to have insufficient folate from foods in their diet. Data also show that 2 percent to 4 percent of the U.S. population have folic acids intake above the recommended levels.

Vitamin B_{12}. This vitamin is important for normal functioning of the brain and nervous system, explained Tucker. Deficiency leads to peripheral neuropathy, balance disturbances, cognitive disturbances, and disability. Inadequate intakes lead to high homocysteine levels and increased risk of heart disease. Even older adults who consume the RDA may have inadequate levels because of poor absorption of the nutrient due to decreased stomach acid.

Vitamin B_6. Tucker stated that this nutrient is important for numerous metabolic reactions and its deficiency has been associated with several common chronic diseases, such as diabetes and metabolic syndrome. Inadequacy may lead to high homocysteine levels or impaired immune function and has been associated with impaired cognitive function and depression.

Vitamin D. This nutrient has received significant attention over the past decade. Vitamin D is important for bone function as well as other metabolic processes. It has been found to be associated with osteoporosis, neurologic conditions, including multiple sclerosis, diabetes, and other autoimmune diseases. Older adults are at particularly high risk of vitamin D deficiency, Tucker explained, because they have less exposure to sunlight and less capacity to synthesize vitamin D in the skin from the sun and to convert it to its active form. It can be difficult to obtain enough vitamin D in the diet because it is found in only a limited number of food sources, such as fortified milk and fatty fish.

Vitamin E. Vitamin E is an antioxidant and is important for immune function. Tucker stated that the current RDA is 15 mg of alpha-tocopherol but very few individuals meet this from diet. Data from the Jackson Heart Study show that when subjects took vitamin E supplements, blood levels of alpha-tocopherol rose, but levels of gamma-tocopherol fell (Talegawkar et al., 2007). Some scientists now believe that other tocopherols found in foods may have important roles of their own. Gamma-tocopherol, for example, has been shown to be important in controlling inflammation. This illustrates the need to be careful about which specific forms of a nutrient are being taken because one form of a nutrient may interact with other forms, resulting in different outcomes.

Vitamin K. This vitamin is important for blood clotting and for bone health. It is found in green leafy vegetables and plant oils. This nutrient is another one that many people consume in amounts below recommendations, pointing up the importance of consuming a high-quality diet.

Calcium. This mineral is well known for its important role in bone health. It also contributes to blood pressure control. A majority of older men and women have intakes below recommendations.

Magnesium. Magnesium is important in the regulation of potassium and calcium. It is a part of the structure of bones and protects blood pressure. Low

continued

BOX 2-1 Continued

intakes are associated with diabetes risk. It is also a major shortfall nutrient in the older population.

Potassium. Potassium is the main intracellular cation, and therefore important for optimizing cellular function. It affects neuronal transmission, muscle contraction, and vascular tone. Insufficient intakes contribute to hypertension, cardiovascular disease, kidney stones, and osteoporosis. Potassium is found in a wide variety of vegetables and fruits, and intakes are inadequate for almost all older adults. Tucker added that her research has found that both magnesium and potassium are associated with protecting against bone loss.

overall, older adults are not getting enough of a wide spectrum of nutrients. Each nutrient has its own functions and many of them protect against chronic conditions of great concern, such as heart disease, osteoporosis, diabetes, and cognitive decline.

Relationship Between the Quality of the Overall Dietary Pattern and Health

An emerging trend in nutritional science is to look at the quality of the overall dietary pattern and its relationships to health and disease outcomes. For example, scores on the Mediterranean Diet Score, a measure of adherence to the Mediterranean diet, have a very strong linear relationship with many mental or cognitive functions. Scores on the Healthy Eating Index, an index developed by the U.S. Department of Agriculture (USDA) that is a measure of adherence to *Dietary Guidelines for Americans* recommendations, also have a strong relationship with cognitive functions. The message here, noted Tucker, is that we need to think about the whole diet in order to ensure sufficient intakes of all of these nutrients.

Tucker then summarized healthy diet recommendations for older adults:

- First and foremost, fruits and vegetables must play a central role in the diet.
- More nuts and legumes for proteins, vitamin B_6, magnesium, and dietary fiber.
- More fish.
- More low-fat dairy products, which provide protein, magnesium, calcium, potassium, vitamin B_{12}, and vitamin D.

- More whole grains, which contribute vitamin B_6, magnesium, and dietary fiber. In some cases, fortified breakfast cereals are a good source of vitamin B_{12}.
- Fewer calories[1] and limited refined foods and foods high in sugars, solid fats, and sodium.

AGING, BODY MASS INDEX, AND MORTALITY OUTCOMES

Gordon Jensen, Senior Associate Dean for Research, Professor of Medicine and Nutrition, University of Vermont, and Chair of the Planning Committee on Meeting the Dietary Needs of Older Adults, began his talk by saying that he has become very interested in how body mass index (BMI) relates to health and mortality outcomes in older adults. He stated that one focus of his talk would be to examine whether, within this framework, obesity has any benefits. Most importantly, he noted that he would be talking about the effects of confounding variables.

Research on the Effects of Body Weight on Overall Health

How does body weight affect health? Jensen explained that obesity clearly does affect the duration of life through its association with premature disease, chronic diseases, and functional decline, especially mobility limitations. At the other end of the spectrum, the Nurses' Health Study found the lowest mortality in those weighing 15 percent below the national average (Manson et al., 1995). Jensen added that the National Institute on Aging (NIA) has been very interested in studying dietary energy restriction and metabolic outcomes and ultimately longevity.

Early studies looking at BMI and mortality outcomes were confounded by smoking and disease burden, explained Jensen. In general, however, there is a J-shaped mortality curve in relation to BMI, with elevated mortality at either end of the BMI spectrum. Obesity is associated with mortality and life expectancy, and importantly, it is a much stronger predictor of mortality at younger ages (i.e., young adults and middle-aged adults). Some recent projections have suggested that because of the current epidemic of obesity, today's children may not ultimately live as long as projected for current adults.

Obesity also is related to a host of significant comorbidities, including cardiovascular disease, hypertension, sleep apnea, diabetes, dyslipidemia, metabolic syndrome, some cancers, osteoarthritis, gout, and other disorders. Jensen added that historically, health care focused on underweight,

[1] This may not apply to all older adults. Some older adults may be advised by their health care professional to consume more calories.

frail older adults. Those who work with older people today, whether in the community, acute care, or skilled nursing facilities, know that that has changed and that there are many obese frail older persons. This obesity may be associated with profound functional decline, even to the point of becoming homebound.

BMI and Mortality

Continuing, Jensen stated that a number of papers in the scientific literature have looked at the relationship between BMI and mortality outcomes in older persons. One study examined cause-specific excess deaths associated with underweight, overweight, and obesity (Flegal et al., 2007). Using National Health and Nutrition Examination Survey (NHANES) data combined with vital statistics data, these analyses found that the BMI-mortality association varied by cause of death:

- 6,859 persons with 571,042 person years follow-up
  - BMI <18.5—more noncancer, noncardiovascular disease deaths
  - BMI 25-29.9—fewer noncancer, noncardiovascular disease deaths
  - BMI ≥30—more cardiovascular disease deaths, more cancers considered to be obesity-related

Jensen then described another study conducted in 2007 of more than 2,000 older adults who underwent exercise tolerance testing on a treadmill. BMI and body composition were measured and the outcome was 12-year follow-up all-cause mortality (Sui et al., 2007). The key finding was that fitness was a significant mortality predictor independent of adiposity.

Being fit had a dramatic mortality benefit, explained Jensen, and it is likely related to disease status and body composition, particularly lean body mass.

In a 2008 study, Wildman and colleagues used NHANES data to categorize individuals according to their metabolic risk (e.g., hypertension, lipids, fasting glucose, C-reactive proteins) (Wildman et al., 2008). The investigators found that half of the overweight and one-third of the obese were metabolically healthy while 23.5 percent of the normal weight individuals had abnormal metabolic indicators. The conclusion, noted Jensen, is that it may not be "all or nothing." A person can be overweight or moderately obese and be metabolically healthy or be underweight and metabolically unhealthy.

The "Obesity Paradox"

Jensen explained that the data he presented were a backdrop to the "obesity paradox" in older persons. Oreopoulos et al. (2009) highlighted that in the elderly, obesity is paradoxically associated with a lower, not a higher, mortality risk. An interesting 2009 study of hospitalized older adults found that fat mass was associated with reduced mortality and complications, and there was no relationship with lean mass or appendicular muscle mass (Bouillanne et al., 2009). Jensen then showed another analysis, published in 2013, which he said triggered considerable controversy (Flegal et al., 2013). This was a systematic review and meta-analysis of 97 studies, with nearly 3,000,000 individuals and 270,000 deaths. The analysis found that compared to the desirable National Institutes of Health (NIH) BMI category (i.e., 18.5 to 24.9), those with class 2 and 3 obesity had significantly greater all-cause mortality, while class 1 obesity was not associated with higher mortality. Moreover, overweight was associated with significantly lower mortality. Another way of putting this, noted Jensen, is that the lowest mortality for older persons shifts toward higher BMI with increasing age (Childers and Allison, 2010). The lowest mortality appears not to be in the desirable BMI range (see Figure 2-1). Jensen noted that a host of studies have now shown similar results (e.g., Ford et al., 2014).

Communicating Research Findings to the Public and Practitioners

Jensen raised an important concern: How to appropriately and accurately communicate the meaning of these findings to the public and the practitioners. A central factor in these findings, stated Jensen, appears to be body composition. It appears that overweight or obesity may be protective only in patients with intact lean body mass. He noted that reduced lean body mass is likely to be a proxy for chronic disease, inflammation, and relative immobility. A study from an NIA research group showed the highest mortality in those with low muscle mass in both normal and overweight study participants (Murphy et al., 2014). In addition, the normal weight participants had an elevated mortality risk compared to those who were overweight. This paradox was partly mediated by muscle size.

A variety of potential benefits have been attributed to obesity, including reduced osteoporosis, better survival in heart failure, myocardial infarction, peripheral vascular disease surgery, and nonbariatric general surgery. However, Jensen went on to state that, when confounding factors are adequately controlled, most of these advantages of being obese disappear. Is the researcher talking about individuals or a population? How is body composition measured? What measures of adiposity are used? Have age, gender, race/ethnicity, disease burden, and smoking been considered?

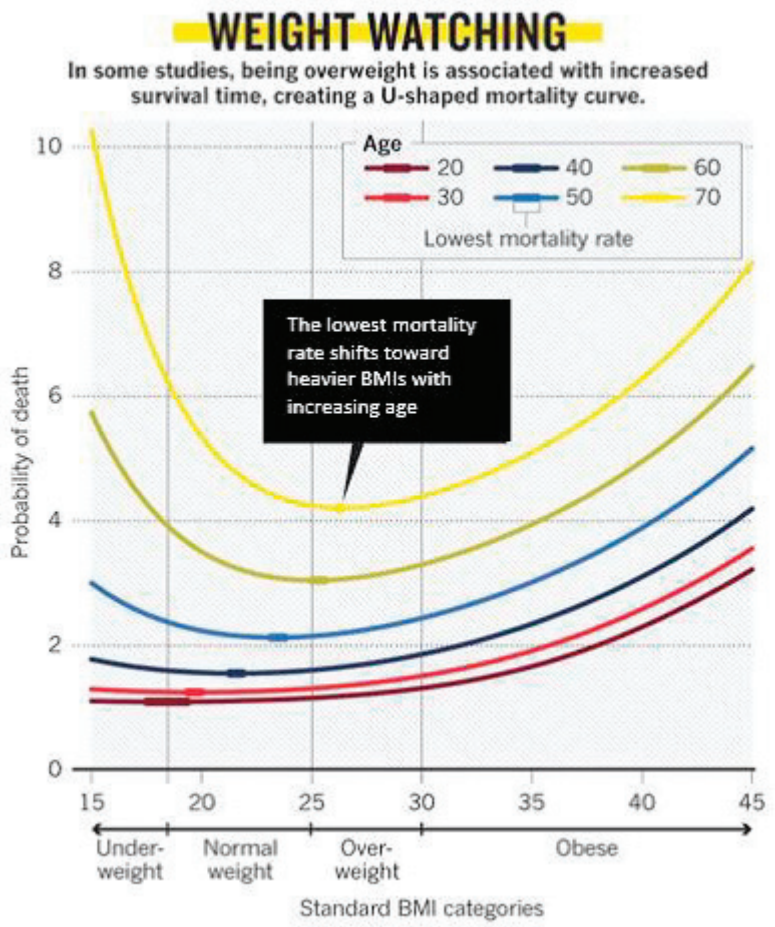

FIGURE 2-1 Lowest mortality shifts toward higher BMI for older persons.
NOTE: BMI = body mass index.
SOURCES: Presented by Gordon Jensen on October 28, 2015 (adapted from Childers and Allison, 2010).

Jensen concluded his talk with several summary points:

- Obesity does not generally confer mortality or health benefits.
- The current use of the NIH BMI guidelines warrant reevaluation for older adults. Jensen noted that it is not unusual for staff in skilled nursing facilities to tell overweight older adults that they need to lose weight when, for many, that may be the wrong advice.

- Disease burden and body composition are likely key factors in the relationship between BMI and mortality in older adults.
- Now that we are on the verge of better understanding the obesity paradox in older adults, Jensen said, there is a need to determine how best to interpret these findings for health professionals and for the public.

MUSCLE HEALTH: PROTEIN

Wayne Campbell, Professor in the Department of Nutrition Science at Purdue University, began his talk on muscle health and protein by encouraging workshop participants to recognize that dietary recommendations cannot be made based on a single organ. His talk would be focused on muscle, but recommendations are intended for a whole body response not just for muscle.

The Recommended Dietary Allowance (RDA) for protein established by the Institute of Medicine (IOM) in the early 2000s is 0.8 g/kg for all adults, both men and women, young and old (IOM, 2005). Recommendations for higher protein intake (25 percent and 50 percent higher than the RDA) have been made by other groups (e.g., American College for Sports Medicine, PROT-AGE Study Group) for athletes and older individuals.

Origins of Current RDAs for Protein Intake

To understand the current recommendation, Campbell stated that it is important to realize that the current RDAs are not based on any functional outcome but on nitrogen balance data. The next question then is whether these data apply to older adults. Campbell explained that the largest study, which was of the nitrogen balance type, confirmed that there are no apparent differences in protein requirements for young men and young women versus older men and older women and that the data are largely consistent with the current Estimated Average Requirement (EAR) (Campbell et al., 2008). An alternative way of looking at these data, however, is based not so much on new data as much as different mathematics. Campbell noted that Professor Rand, the author of the original analyses used for the current RDAs, stated that a biologically more realistic equation may be a better approach (Rand et al., 2003). Using a biologically realistic approach from essentially the same data results in an EAR about 50 percent higher. The RDA therefore goes up by about 25 percent simply by the mathematics.

But, noted Campbell, none of this is physiological. New data are emerging from an indicator of amino acid oxidation intake. This work, which has been done initially in young men, involved feeding people differing amounts of amino acids and determining that the amount of protein

intake that meets their need for synthesizing proteins and limiting oxidation of proteins is about 0.93 g/kg (Humayun et al., 2007). Nitrogen balance and isotope kinetics data consistently show that aging does not affect daily dietary protein needs, but these newer data bring into question the accuracy of the current EAR and RDA for adults of all ages. This idea, Campbell stated, is often lost in the discussion regarding protein intake recommendations.

Campbell continued by saying that age-associated differences may occur specifically with muscle. He showed data from a recent analyses of acute feeding studies where the investigators were looking at the amount of protein in a meal versus the rate at which proteins were synthesized in skeletal muscle (Campbell et al., 2008). They found that, compared to younger adults, older adults required greater single meal protein intakes to maximize muscle protein synthesis. These data show that there is no effect of aging on the maximum rate of protein synthesis and muscles, but that it might take an older adult a little more protein in the meal to get there, explained Campbell.

Alternative Considerations for Assessing Protein Requirements

Campbell then noted that current recommendations are based on how to prevent deficiencies and inadequacies but not necessarily how to optimize functional outcomes, such as health-related outcomes, balance, gait, strength and endurance, and ability to carry out activities of daily living. Those outcomes can relate to body composition and muscle size and strength.

Investigators have looked at the genetic profiles of skeletal muscle of younger and older men and found amounts of protein that span the range of adequacy, from 0.5 g to 0.75 g, which is very close to the RDA or 25 percent higher than the RDA, at 1 g (Thalacker-Mercer et al., 2010). The results from a cluster of 159 gene transcripts that are associated with protein catabolism or breakdown show that the expression of those transcripts goes up markedly when a person eats an inadequate amount of protein.

The body catabolizes muscle when it does not have enough of a substrate to draw on. In contrast, a higher protein diet promotes expression of genes related to stress responses, stimuli responses, muscle function, and organ development. Data show that achieving the RDA for protein prevents deficiency but is not necessarily an optimal amount for functional outcomes such as body composition, muscle size, strength, balance, stress response, and weight-loss. Data from a study of postmenopausal women indicate that eating about 56 percent of the RDA for protein results in a loss of lean body mass, muscle, muscle size, and strength (Castaneda et al.,

1995, 2000). One could conclude, stated Campbell, that inadequate protein intake will compromise muscle function.

Campbell then presented data from a 14-week controlled feeding metabolic balance study (Campbell et al., 2001, 2002). All the participants consumed the RDA for protein. Some of the participants were sedentary and others performed resistance exercise training. Results showed that when all of the participants met the RDA while maintaining energy balance, they did not lose weight; they gained body fat and lost fat-free mass. While consuming the RDA for protein, the sedentary participants lost skeletal muscle. However, this level of protein intake did not prevent those participants who were performing resistance training to actually increase the muscles that were trained.

Campbell also presented data from a prospective study of several thousand older adults, which concluded that participants in the highest quintile of protein intake lost 40 percent less lean mass and appendicular lean mass than did those in the lowest quintile of protein intake (Houston et al., 2008). It could be, noted Campbell, that those who were eating the lowest quintiles were actually eating less than the RDA levels. So while more protein might be better, the data also show that inadequate protein is not enough to maintain lean mass and appendicular lean mass. Indeed, Campbell continued, protein intake had no effect on changes in appendicular lean mass for the participants who were weight stable. It was only when participants were stressed with an energy deficit and were eating below the RDA that they actually were losing muscle. In contrast, participants who were gaining weight, were gaining lean mass only when they were at the highest quintile of protein intake (1.1 g/kg).

Campbell then showed data from his lab that looked at weight loss in older men and women (Kim et al., 2016). He noted that on average, as older adults lose weight, about 75 percent comes from fat mass and about 25 percent comes from lean mass. The question is, is it possible to influence that change in body composition by changing the amount of protein that is consumed? His data show that people who were eating protein at about the RDA were actually losing about 30 percent of their lean mass, whereas people who were eating about 1.4 or 1.5 g/kg actually cut their lean mass loss by one-third. Additional data support this finding that protein intake above 1 g/kg influences body composition responses to weight loss.

Protein Requirements and Exercise

Campbell presented data from a compilation of a number of studies that his group has conducted over the years. These studies have looked at how much protein older men and women were eating chronically while they performed 12 weeks of resistance training (Campbell and Leidy, 2007).

What his group observed was that at intakes of anything less than about 1 g/kg, changes in fat-free mass, at least on the linear scale, were neutral or negative. People needed to be consuming more than 1 g/kg to get a net anabolic response. He also reported on a newly published study from his research group, which assessed the effects of protein supplementation on changes in body composition and metabolic syndrome indexes in overweight and obese middle-aged adults who performed exercise training for 9 months (Campbell et al., 2015). They observed that when total protein intakes were less than 1 g/kg, the participants actually gained weight. The groups who consumed different amounts of protein did not differ in their capacity to respond to the exercise from a muscle enlargement perspective, but in their body fat. Campbell added that the study showed no advantage to eating more than 1.2 g/kg of protein compared to 1.0 to 1.2 g/kg.

Challenges in Developing Protein Intake Recommendations

With his last few minutes, Campbell stated that he would like to focus on the challenges of establishing recommendations for protein intake for older adults. For example, several groups over the past couple of years have gathered scientific experts in the field to look at issues related to protein needs and overall health. The PROT-AGE Study Group (Bauer et al., 2013) and the European Food Safety Authority (EFSA, 2012) looked at essentially the same data, that is, outcomes related to muscle in body composition, insulin sensitivity, and bone mineral density, but they approached the conclusions differently. The PROT-AGE group recommended that protein intakes greater than the RDA would lower the risk of frailty and improve muscle mass and function while the European Food Safety Authority found that the data were not scientifically strong enough to change the current recommendations. Campbell concluded that these differing conclusions are a good indication of the current state of the field.

Using a recent review article on protein intake and the effects on muscle in hospitalized older adults, Campbell quoted the authors' conclusion that "focused efforts on using nutrition to maintain muscle health during hospitalization of older adults should be geared toward the quantity (30 g high-quality protein; 3 g leucine) and quality of protein (fast absorbing, high leucine content), equality meal protein distribution (30:30:30) and timing of protein supplementation (between meals)" (Thalacker-Mercer and Drummond, 2014). Indeed, noted Campbell, the scientific foundation for that recommendation is that the amount of protein in a meal is going to determine a person's responses to synthesizing protein in muscles. Theoretically, different amounts of protein at each meal would result in different amounts of protein synthesis at those times. Rebalancing protein intake and including a protein supplement would maximize muscle protein

synthesis throughout the day. However, Campbell noted that the evidence at this stage is still mixed and it is not known whether redistributing protein throughout the day will help to maintain muscle mass in older adults.

Campbell concluded his presentation by stating that the current RDA for protein, which is based on short-term nitrogen balance studies, prevents aggressive muscle catabolism in older adults, but does not maximally promote muscle anabolism. He added that protein metabolism, muscle health, and functional outcomes data that are slowly becoming available should be critically and systematically evaluated to update the Dietary Reference Intakes (DRIs) for protein. Finally, Campbell noted, enthusiasm for prescriptive use of protein to promote the retention of muscle mass and function in older adults must be supported by high-quality longitudinal research, not just theories, hypotheses, or extrapolations from short-term studies.

AGING, VITAMIN D, AND PHYSICAL FUNCTION

Denise Houston, Associate Professor in the Department of Internal Medicine, Section on Gerontology and Geriatric Medicine at the Wake Forest School of Medicine, opened her presentation by explaining that she would focus on the relationship of vitamin D and physical function although she recognized that vitamin D affects many other health outcomes. It has long been acknowledged that vitamin D plays an important role in intestinal calcium and phosphorus absorption as well as skeletal health. Over the past two decades, a number of studies also have shown that vitamin D is associated with an assortment of different outcomes in many conditions that are prevalent in older adults, such as depression, high blood pressure, cardiovascular disease, diabetes, muscle weakness, osteoporosis, and osteoarthritis, and some cancers. Vitamin D's association with the majority of these health outcomes has been observed in observational studies, with the exception of osteoporosis and skeletal health.

DRIs for Vitamin D and Current Intakes

In 2010, the IOM updated the DRIs for vitamin D and set the RDA based on a 25(OH)D (25 hydroxy vitamin D) concentration of 20 ng/mL. The RDA was set at 600 International Units (IU)/day for adults ages 51 to 70 and 800 IU/day for adults ages 71 and older (IOM, 2010). The IOM committee's recommendations were based on bone outcomes, as few randomized controlled studies had been conducted on other health outcomes, and thus evidence was insufficient to suggest that other intake levels would be necessary for other health outcomes.

Using the 20 ng/mL cut-point, Houston showed a pie chart with the

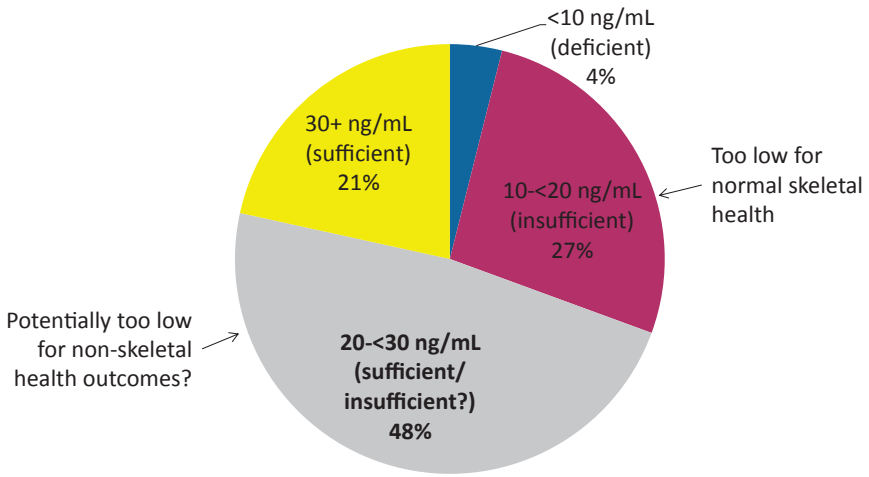

FIGURE 2-2 Prevalence of vitamin D deficiency and insufficiency among U.S. older adults. SOURCES: Presented by Denise Houston on October 28, 2015 (NHANES 2000-2004; Looker et al., 2008).

prevalence of vitamin D deficiency and insufficiency among older adults in the United States in 2000-2004 (Looker et al., 2008) (see Figure 2-2).

About one-third of older adults have vitamin D concentrations that are either insufficient or deficient (<20 ng/mL). However, controversy exists about whether the 25(OH)D cut-point of 20 ng/mL is actually sufficient for nonbone health outcomes. In that case, an additional 50 percent of older adults may be at risk for vitamin D insufficiency. However, as noted above, data for randomized controlled trials are not currently available to establish whether higher amounts are needed.

Some risk factors for vitamin D deficiency and insufficiency are specific to older adults as well as common in the population. Decreased exposure to sunlight is a problem in homebound and institutionalized older adults. A second problem is that older adults have a decreased capacity of the skin to produce vitamin D. Compared to younger adults, older adults produce about one quarter the amount of vitamin D with exposure to the same amount of sunlight. Third, inadequate dietary intake of vitamin D is common among all adults, primarily because it is found naturally in few foods. Fortified foods are the major source of vitamin D in the United States.

The most recent NHANES data on vitamin D intake from 2005-2006 show the amount of vitamin D coming from diet or food sources, and from supplements (Bailey et al., 2010). In both men and women across the adult age categories, approximately 200 IU/day of vitamin D comes from the diet.

Vitamin D coming from supplements is higher among older age groups. The average intake of vitamin D from both diet and supplements in adults older than age 70 is only about half the current RDA.

Vitamin D and Physical Function

Houston discussed the potential roles of vitamin D and physical function. Direct effects on physical function include muscle contraction, muscle cell proliferation and differentiation, and muscle growth. Vitamin D may affect muscle fiber composition by increasing type II muscle fibers which may account for the association between vitamin D and fall risk. As far as some of the indirect pathways, Houston continued, vitamin D has a role in neuromodulation and has been associated with cognitive function and, in particular, executive function, which also have been shown to be associated with physical function. Vitamin D has been shown to play a role in the inflammatory response as well. In addition, vitamin D has been associated with many of the same chronic conditions that are related to the development of functional limitations, such as diabetes, heart disease, hypertension, and osteoarthritis.

This raises the question, noted Houston, of whether 25(OH)D concentrations that are sufficient to maintain bone health are adequate for optimal physical function in older adults. One of the largest original studies that examined this question used data from NHANES 2000-2004 (Bischoff-Ferrari et al., 2004). It showed that older adults with lower 25(OH)D concentrations had lower walk speeds and lower sit-to-stand times (see Figure 2-3). Most of the difference comes in a range below the 20 ng/mL cut-point.

Other studies, such as the Health Aging, Body, and Composition (ABC) Study, looking at this same question showed that older adults with low 25(OH)D concentrations had lower physical performance scores and slower gait speeds (Houston et al., 2012). Houston noted that there appears to be a dose–response relationship, suggesting a possible advantage for physical function of having higher 25(OH)D. Similar to other studies, data from the Cardiovascular Health Study All-Stars Study show an association between low 25(OH)D concentrations and weaker grip strength (Houston et al., 2011). Somewhat of a dose response also occurred in this study, suggesting that higher concentrations may be optimal for function.

These results lead to the question of whether a 25(OH)D concentration threshold for physical function exists. Houston explained that some investigators have suggested that a concentration of 30 to 32 ng/mL may be optimal for various health outcomes (Bischoff-Ferrari et al., 2006). Early data from NHANES III show that most of the increase in walk speed and sit-to-stand time occurred in individuals with 25(OH)D concentrations between 9 and 16 ng/mL (Bischoff-Ferrari et al., 2004). Other studies have

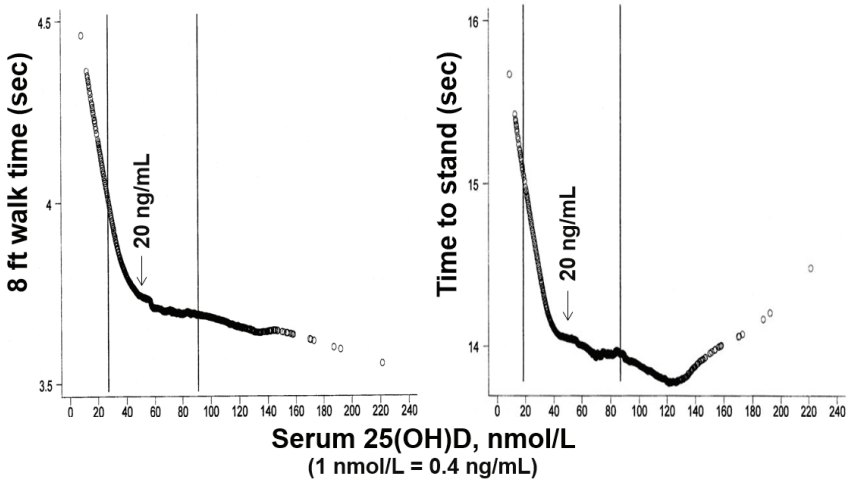

FIGURE 2-3 NHANES III: 25(OH)D status and physical performance. Lower 25(OH)D concentrations and lower physical performance. Older adults with lower 25(OH)D concentrations had slower walk speeds and sit-to-stand times.
SOURCES: Presented by Denise Houston on October 28, 2015 (adapted from Bischoff-Ferrari et al., 2004).

shown a threshold at higher 25(OH)D concentrations (Houston et al., 2012; Janssen et al., 2013; Sohl et al., 2013, 2015; Wicherts et al., 2007). Data from several cohorts from The Netherlands showed a threshold of 26 ng/mL for the short physical performance battery, which includes balance, short walks distances, and repeated chair stands (Sohl et al., 2013). They found similar results for grip strength but not knee extension strength. Houston stated that her group applied piecewise regression models to the Health ABC cohort to determine 25(OH)D thresholds across different aspects of physical performance (Houston et al., 2012). The group found that the thresholds ranged from 26 ng/mL for grip strength to 33 ng/mL for the 20 m gait speed. At concentrations below these thresholds, they found significant positive associations between 25(OH)D levels and these performance measures. However, above these concentrations, they found no association between 25(OH)D levels and physical performance and strength measures, suggesting no additional benefit of having 25(OH)D levels above the thresholds. They did not observe a 25(OH)D threshold for knee strength. Houston summarized by saying that data from the Health ABC and other studies suggest that the 25(OH)D concentration threshold for physical performance and muscle strength is between 24 and 32 ng/mL.

Houston then addressed the question of whether low 25(OH)D concentrations are associated with greater decline in physical function in older adults. She noted that longitudinal studies are mixed, showing both no effect (Bartali et al., 2008; Faulkner et al., 2006; Houston et al., 2012; Michael et al., 2011; Verreault et al., 2002) and greater declines in muscle strength and physical performance with deficient/insufficient 25(OH)D concentrations (Dam et al., 2009; Sohl et al., 2013; Visser et al., 2003; Wicherts et al., 2007). Data from the Health ABC study show that older adults with low 25(OH)D concentrations had poorer physical performance over a 4-year follow-up period, but lower concentrations were not associated with a faster rate of decline (Houston et al., 2012). In contrast, data from the Rancho Bernardo study showed that women in the lowest quartile of 25(OH)D concentration had an accelerated rate of decline in physical function (Dam et al., 2009). Importantly, noted Houston, the lowest quartile started at less than 32 ng/mL, which is a very replete vitamin D population. Houston noted that some possible explanations for the inconsistent results from the observational studies are differences in study populations, different methods to measure serum 25(OH)D and physical performance, different cut-points used to define 25(OH)D deficiency/insufficiency, differences in adjustment for potential confounders, and differences in duration of follow-up.

Houston then posed the question of whether 25(OH)D status alters the disability trajectory. Data from the Health ABC study show no difference in the rate of decline. However, if people with lower 25(OH)D concentrations start out having worse performance, then potentially they will cross the disability threshold earlier in life than those who have higher 25(OH)D concentrations. In Health ABC, those who had vitamin D insufficiency, whether using a cut-point of 20 or 30 ng/mL, had about a 30 percent greater risk of developing mobility limitations over 3 years of follow-up (Houston et al., 2013). Mobility limitation was assessed every 6 months based on self-report of having difficulty walking a quarter-mile or climbing a flight of stairs.

The next question Houston considered was whether vitamin D supplements improve physical function. She noted that results of randomized controlled trials are inconsistent, showing both no effect (Brunner et al., 2008; Kenny et al., 2003; Lips et al., 2010) as well as improvements in muscle strength and physical performance (Bischoff et al., 2003; Bunout et al., 2006; Dhesi et al., 2004; Pfeifer et al., 2000, 2009). A 2011 meta-analysis on the effects of vitamin D supplementation on balance or body sway showed about a 20 percent improvement in those who took vitamin D compared to a placebo (Muir and Montero-Odasso, 2011). No difference was apparent for muscle strength. In a subset of the Women's Health Initiative randomized controlled trial of calcium (1,000 mg/d) and vitamin

D (400 IU/d), vitamin D supplementation was not found to be beneficial in protecting older women against declines in physical performance or strength over a 7-year follow-up (Brunner et al., 2008). Possible explanations for the inconsistent results in randomized controlled trials include small sample sizes, insufficient vitamin D dose, or type and frequency of vitamin D supplementation.

Potential Knowledge Gaps and Research Priorities

Houston summarized the following knowledge gaps and research priorities:

- Observational data suggest that 25(OH)D concentrations greater than those needed for skeletal health may be optimal for nonskeletal outcomes. But questions remain:
  - Is 25(OH)D an appropriate biomarker?
  - How do physiological factors (e.g., age, BMI) affect the 25(OH)D response to dietary intake or endogenous production of vitamin D?
  - Are similar associations observed in minorities?
  - Will increasing 25(OH)D concentrations above the current IOM cut-point of 20 ng/mL improve physical function?
- Convincing evidence for nonskeletal health outcomes from sufficiently powered randomized controlled trials is lacking.
- Large randomized controlled trials under way include primary outcomes related to physical function (DO-HEALTH, n = 2,158; STURDY, n = ~1,200; EVIDENCE, n = ~200), as well as secondary outcomes related to physical function (VITAL, n = 25,874).

BRAIN HEALTH: B VITAMINS AND OMEGA-3 FATTY ACIDS

Irwin Rosenberg, Senior Scientist at the Jean Mayer USDA Human Nutrition Research Center on Aging, opened his talk by saying that he welcomed the opportunity to discuss multimicronutrient and nutrient interactions. He stated that he hoped he could persuade workshop participants that some of these interactions may be even more important than the effects of individual nutrients alone.

August D, the "poster child of Alzheimer's disease," was the subject of Alois Alzheimer's 1907 report in which he described the pathology of presenile dementia, focusing on never-before-described depositions of plaques and tangles in the brain of the seriously demented woman. The rediscovery of this study six decades later changed the entire nomenclature about senile dementia or pre-senile dementia, which had been associated with hardening

of the arteries. In fact, Rosenberg noted, he considers that relationship to the vascular system appropriate.

Rosenberg then showed a recent article published by colleagues from Oxford that reported an association between omega-3 fatty acids and B vitamins status. In this randomized controlled trial, a B vitamin intervention had a beneficial effect on the cognitively impaired elderly and to some extent on atrophy. In a retrospective analysis, this effect was particularly observed in people who had a deficiency of long chain fatty acids (Jernerén et al., 2015). Rosenberg noted that these results suggest interactions between nutrients, and that some of those interactions involve the vascular system.

He went on to illustrate the dimensions of the problem of cognitive impairment by showing a graph of the growth in the number of people with dementia in low-, middle-, and high-income countries (see Figure 2-4).

To find ways within nutrition and related activities to decrease the risk and decrease the trajectory of important problems related to aging and chronic disease could make an enormous impact on public health, Rosenberg said.

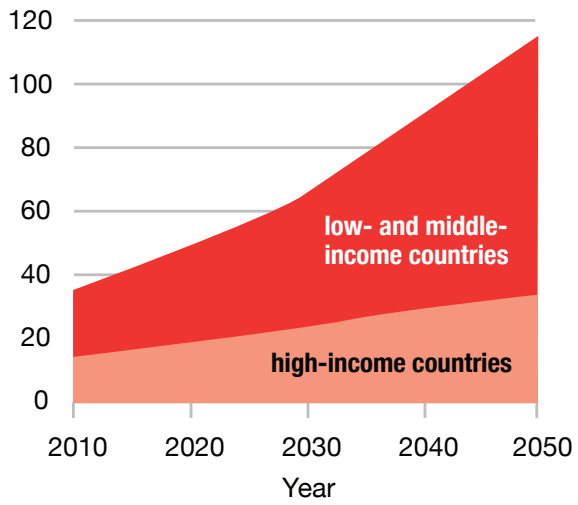

FIGURE 2-4 The growing number of people (in millions) with dementia in high-, medium-, and low-income countries.
SOURCES: Presented by Irwin Rosenberg on October 28, 2015 (Alzheimer's Disease International, 2010).

Vitamin B Metabolism, Homocysteine, and Risk of Dementia

Rosenberg pointed out that homocysteine is at a key juncture that influences at least three B vitamins, including vitamin B_6, and vitamin B_{12}. He then presented data from the Framingham Study showing that individuals with homocysteine levels in the highest quartile had a higher cumulative incidence of dementia over more than a decade. Individuals with levels in the lower quartiles had a significantly lower rate of onset of incident dementia. These data suggest that homocysteine is a risk factor for dementia, although Rosenberg noted, whether it is a factor directly in the pathogenesis, or as a reflection of its integration of B vitamin metabolism continues to be a matter for discussion. Rosenberg then showed data from the Nutrition, Aging, and Memory in the Elderly (NAME) Study that Tucker referred to earlier, pointing out that the data show a clear decline in cognitive function with higher homocysteine levels. However, this relationship is seen only in individuals with evidence of cerebrovascular disease on magnetic resonance imaging. Also, homocysteine concentration was not related to measures of memory or attention in either group (see Figure 2-5).

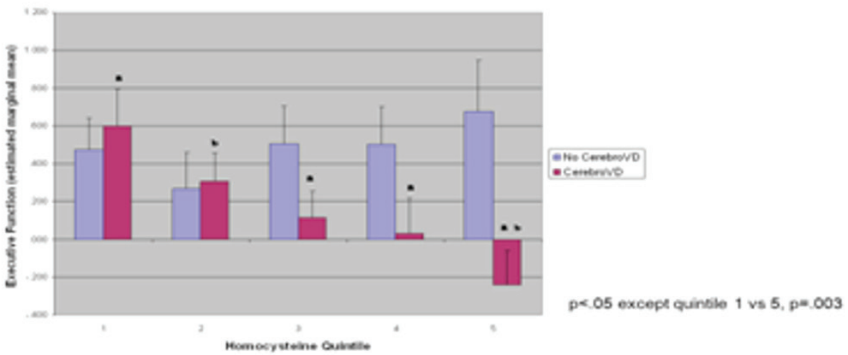

FIGURE 2-5 Relationship of plasma homocysteine concentration with cognitive function in individuals with cerebrovascular disease. Plasma homocysteine concentration is inversely related to cognitive function in individuals with cerebrovascular disease.
SOURCE: Presented by Irwin Rosenberg on October 28, 2015.

He noted that this observation points to an important role of the cerebrovascular system in cognitive decline and loss of brain health.

The Role of Lipids

The brain is particularly enriched with lipids as compared to the other organs, and these lipids play an essential role in neuronal plasticity, mitochondrial activity, and myelin integrity. Lipids also are important structural components of brain membranes and signaling molecules. Rosenberg called attention to one of the lipids in particular—phosphatidylcholine—which has a methyl group that is dependent on methylation reactions involving B vitamins.

Additional evidence of this relationship is shown in another study that examined red blood cell omega-3 fatty acid levels and markers of accelerated brain aging. Lower levels of fatty acids and high homocysteine were associated with similar white matter hyperintensities, which are believed to be associated with small vessel disease and to correlate with cognitive decline (Tan et al., 2012). Some evidence suggests that the process by which medium chain fatty acids are desaturated and elongated to be incorporated into the phospholipids of the brain is less efficient in older adults. He noted that this issue would be important as scientists look at the interaction of fatty acids and brain health, and reminded workshop participants that phospholipids are very important parts of key brain membranes, including the myelin sheath that surrounds neurons. Some work has been done to look at the ability of B vitamins or omega-3 fatty acids to affect the trajectory of cognitive loss of brain volume and loss of specific focus in memory. Studies have showed that multicomponent interventions had a greater effect than any of the individual interventions. Rosenberg concluded that we will be hearing this message increasingly in the coming years.

Rosenberg ended his talk by pointing out that higher levels of a nutrient are not always better and that dose–response effects and safety aspects should probably be considered much more in interventions. For example, considerable evidence indicates, at least in brain health, that there may be a U-shaped curve in which moderate folate intake may be helpful in decreasing the onset of disease of the brain but there may be an inflection point at which high folate intake could have an adverse effect. This may be a concern for older adults, noted Rosenberg, because considerable amounts of folic acid are being added to the food supply.

GUT HEALTH: DIETARY FIBER AND THE MICROBIOME

Lita Proctor is the Coordinator of the Human Microbiome Project for the NIH's Common Fund. She opened her presentation by noting that the

microbiome is the subject of considerable public attention today, as well as confusion about its diverse roles in the human body. It is a young field that is growing fast. She explained that she would walk through the natural history of the microbiome to show how it develops in the body and the roles it plays throughout the lifespan. This set the stage for additional comments about the role of the microbiome in the older population.

The microbiome includes bacteria, fungi, and all manner of microscopic life that turn out to be essential to health. Humans acquire their genes from their parents and they acquire their microbiome anew each generation, much like human genes. To explain, Procter showed a cluster analysis in which investigators measured the mother's microbiome in her mouth, vagina, and skin and then looked at the baby's delivery mode—vaginal or cesarean birth. They found that babies born vaginally acquire their mother's microbiome primarily from the vagina. In fact, over the baby's 9-month gestation period, the microbiome of the pregnant woman's vagina changes as it waits for the baby to pass through to receive this initial inoculation. Even when babies are born by cesarean delivery and do not come into any contact with the vaginal microbiome, they still acquire microbes primarily from the skin of their mothers and those (medical staff, family members) who handle the child. Over the first couple of years of life, microbes move in and colonize every epithelial surface of the baby (the gut lining, the skin, mouth, anus) and the microbiome continues to change and mature, becoming like the adult's microbiome.

At the same time, a person's immune system develops over the first few years of life. A baby first acquires passive immunity by receiving antibodies from the mother, and then develops adaptive immunity through producing antibodies themselves. This development of the microbiome and the immune system must occur together. Proctor explained that humans have co-evolved with the microbes that form the microbiome. The immune system cannot mature without specific bacteria. Some microbes play a critical role in maturation of the immune system because they induce pro-inflammatory responses to protect the body against invading pathogens. Other microbes induce host anti-inflammatory responses to restore immune system balance. The co-evolution of humans with their microbiome is not a random process. The gut has specific receptors that are required to be present in order for microbes to be able to colonize the human host. In fact, Proctor noted, some recent studies have demonstrated that human genetics play a major role in development of the microbiome. A study conducted in the United Kingdom comparing dizygotic twins against other members of the population found that the twins had a more similar microbiome than did other siblings pairs in the population (Goodrich et al., 2014).

The Microbiome's Role in Regulating Human Health

Proctor then summarized the various ways in which microbiota and hosts interact to regulate human health. They:

- "Educate" the immune system to recognize self from nonself.
- Digest the "indigestibles" (e.g., plant material in diet, host cells, mucus).
- Produce energy substrates for host cells (e.g., short-chain fatty acids for epithelial cells).
- Metabolize drugs/detoxify drugs.
- Produce beneficial compounds (e.g., vitamins, antimicrobials).
- Produce signaling molecules that interact with the host.
- Communicate with the brain.

Proctor concluded this portion of her talk by emphasizing that although the human microbiome is a fixed feature, it is also a variable trait that changes between generations, throughout the lifespan and in disease versus health (see Figure 2-6). The mutability of the microbiome is the most important trait that can be exploited to support health and influence disease. It is the primary mediator between the body and the environment.

To illustrate this point, Proctor noted that diet is a very important environmental factor that regulates the microbiome. She showed data from the South Dakota Hutterites, a closed religious communal society that raises all of their own food (Davenport et al., 2014). For example, they eat fresh food in the summer and canned foods in the winter. An analysis of

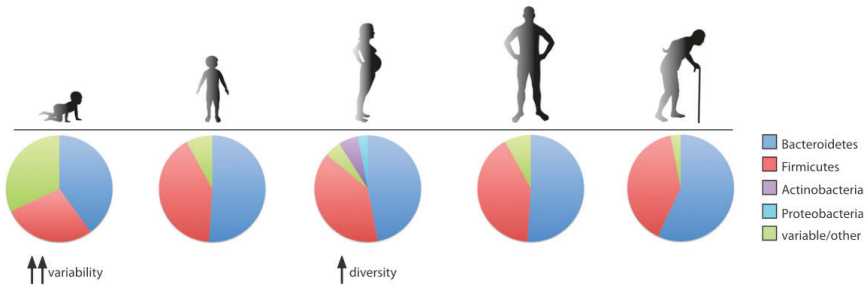

FIGURE 2-6 The natural mutability of the microbiome through the human lifespan. Though the human microbiome is a fixed feature, it is also a variable trait. It varies between generations, throughout our lifetimes, and between health and disease. Unlike the human genome, the microbiome is naturally mutable.
SOURCE: Presented by Lita Proctor on October 28, 2015 (NIH Human Microbiome Project).

their microbiome clearly shows how it changes with the seasons, reflecting changes in their diet between the seasons.

Older Adults and the Microbiome

After laying this foundation, Proctor then shifted to a discussion of the microbiome and older adults. As a point of discussion, she used the ELDERMET project, a University College Cork longitudinal cohort study that is measuring the microbiome of older adults in Ireland. Investigators are correlating the participants' microbiome with health, diet, and lifestyle indicators to develop dietary recommendations in order to improve health and to provide evidence for future studies of health, environment, and the microbiome in the elderly. Proctor presented a cluster analysis from the ELDERMET study showing clear differences in the microbiomes of healthy older adults living freely in the community versus frail older adults living in nursing facilities (Claesson et al., 2012). In fact, Proctor pointed out, the microbiomes of the healthy community-dwelling older adults were similar to young healthy study participants, who served as controls for this study.

The microbiome could be an excellent marker for, or an integrator of, various aspects of health in the elderly, said Proctor. For example, the ELDERMET study showed differences in the microbiome depended on differences in diet composition, particularly fiber intake (Claesson et al., 2012). Proctor continued, saying that fiber is a topic of interest as a growth substrate for microbes, and investigators are trying to be more precise in their definition of various diet components that specifically support microbial growth. The classification of dietary fiber is now expanding and is being included into a larger class of microbial growth compounds called prebiotics. Prebiotics are defined as "a non-digestible compound which, through microbial metabolism, modulates the composition, and/or activity of gut microbiota. This change in microbial composition or activity confers health benefit to the host" (Bindels et al., 2015). Proctor expanded on the definition by stating that it shifts the focus on the role of the gut microbiota from the effect on the host to the direct effect of the compound on the microbiota. Prebiotics are no longer strictly defined as being carbohydrates (e.g., fiber); they are compounds that provide some type of beneficial physiologic effect on the microbiota and subsequently the host.

In closing, Proctor reiterated that although the human microbiome is a fixed feature of the host, it is also a variable trait and can be exploited to support health and treat disease. She also noted that one indicator of the growing interest in the microbiome is that in 2015, President Obama chartered a committee of government scientists to conduct an analysis of microbiome research across the federal government. The Fast-Track Action Committee on Mapping the Microbiome, which was formed by the Office

of Science and Technology Policy, includes representatives from 16 agencies in 6 departments, including the USDA, the U.S. Department of the Interior, the U.S. Department of Energy, the U.S. Department of Defense, the U.S. Department of Health and Human Services as well as the Environmental Protection Agency, National Aeronautics and Space Administration, National Science Foundation, and the Smithsonian Institution. The committee was charged with conducting a portfolio analysis of federal microbiome research and reporting on the gaps and challenges to advance the field. That report is intended to inform a Microbiome Initiative in the president's fiscal year (FY) 2017 budget request.

QUESTION AND ANSWER SESSION

Following the Session 2 presentations, the floor was opened for questions and general discussion. In response to a question about the magnitude of funding for microbiome research and future research directions, Proctor stated that researchers are increasingly looking at microbiome components and their functions. She noted that she could not quote exact numbers but that the amounts of funding are increasing significantly. One reason why the field is growing so fast is because of new methods that are allowing researchers to conduct studies that were not possible before.

A participant asked Campbell whether researchers are looking at actual body weight or at ideal body weight in estimating protein requirements. Campbell replied that recommendations are truncated at a person's upper limit of their ideal body weight. Considering people's actual body weight, the proportion of older adults who are consuming an inadequate amount of protein is twofold. He went on to say that one of the things that becomes a challenge, especially with older adults, is when older people are consuming a low amount of energy and they try to restrict calories to lose weight. Even though they may be eating enough protein as a percentage of calories and think that they are within the acceptable range, they are below the RDA and closer to the EAR.

This question generated discussion about the importance of new thinking about nutrient needs among the older adult population, especially in the context of managing chronic disease, and of encouraging the consumption of nutrient-dense diets to help older adults come closer to meeting nutrient recommendations.

A final question for Campbell dealt with the best measure of a person's protein status. He replied that one of the biggest challenges in the protein field is that it does not have biomarkers. That is why studies still rely heavily on nitrogen balance and isotope kinetics. Determining protein status requires serial measurements of a blood urea nitrogen, which is responsive

to differences in protein intake. However, that also is influenced by many factors that affect older people, function in particular.

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3

Emerging Insights (Ecological)

FACTORS INFLUENCING THE 50+: CHALLENGES IN MEETING DIETARY NEEDS

Julie Locher, Professor in the Departments of Medicine and Health Care Organization and Policy at the University of Alabama at Birmingham (UAB), opened her talk by showing several models that can be used to understand the dimensions of food security, the stages of nutritional risk, and the multiplicity of influences and factors at various levels that affect the food choices and behaviors of older adults. The World Health Organization (WHO) model includes food availability, food access, and food use as "Pillars of Food Security" (FAO, 2006; WHO, 2016). Another model is an approach for identifying nutritional risk, and ultimately, various types of malnutrition. The ecological model shows all the societal and individual levels in which an individual exists: individual, interpersonal, institutional, community, and public policy (McLeroy et al., 1988) (see Figure 3-1). Finally, there is the multidimensional model (Locher et al., 2008, 2009) (see Figure 3-2).

Locher noted that one of the limitations of the final model, and indeed, much of the work that has been done in the area of nutrition and aging, is that it is based on individual self-report of dietary intake. The other thing she explained about the model is that it assumes that the relationships between eating behaviors and health outcomes operate in the direction shown in the model. In fact, however, these relationships are not so straightforward, and the effects could go in the opposite direction.

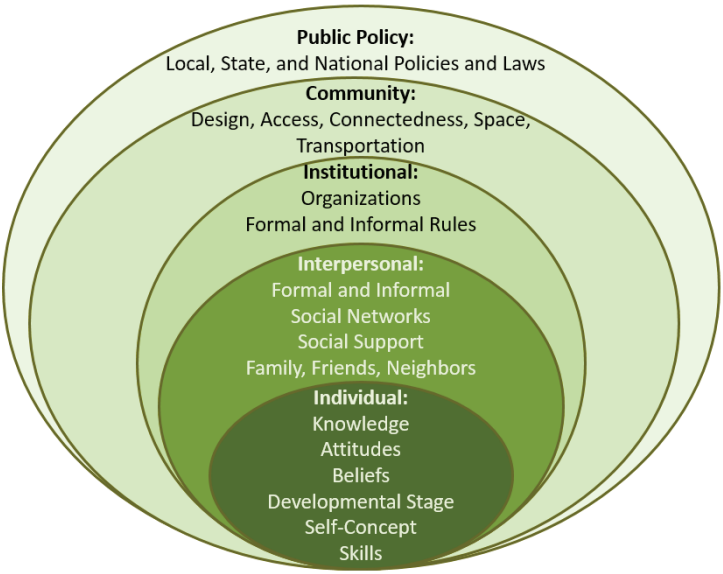

FIGURE 3-1 Ecological model.
SOURCES: Presented by Julie Locher on October 28, 2015 (McLeroy et al., 1988).

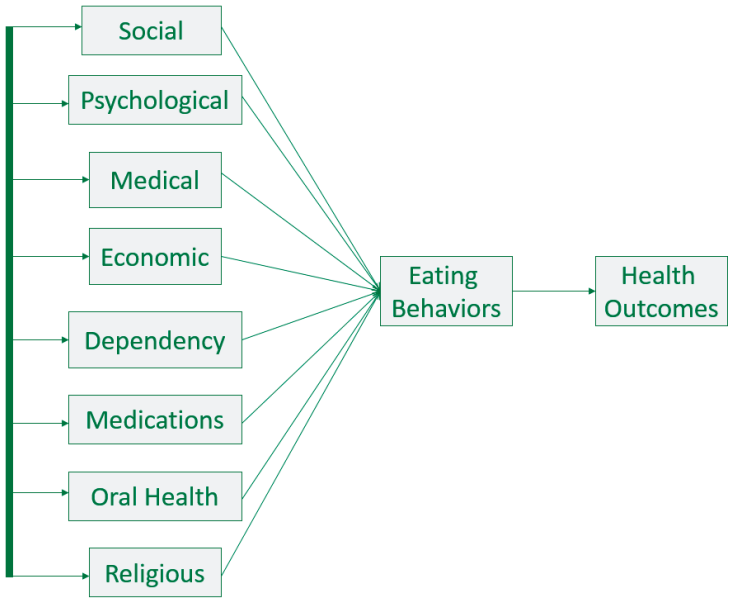

FIGURE 3-2 Multidimensional model of influences and constraints.
SOURCES: Presented by Julie Locher on October 28, 2015 (Locher et al., 2008, 2009).

The Concept of Food Choice

Locher continued by defining the concept of food choices, as actions that involve making a food-related decision when faced with two or more options. Food choices can be made at the global, societal, community, institutional, organizational, or individual level. Food choices made at the individual level are influenced by decisions that are made at all of the other levels. In addition, food behaviors happen as a sequence (Sobal and Bisogni, 2009) (see Figure 3-3).

Locher noted that her research often involves lengthy data collection instruments and, as an ice breaker, she often asks people what their favorite foods are. The foods that people prefer to eat are those that are based on people's early experiences and are specific to what they ate in their household and specific to their region (Yang et al., 2013). Locher described factors influencing food choices at various levels (see Box 3-1).

Locher then asked a fundamental question: Why does food choice even matter? She explained that the choices people make have consequences, such as over-consumption and obesity. Efforts designed to change some aspect of food choice must be cognizant of how individuals make those decisions. For example, research is starting to show that "choices" have less to do with individual "free will" and more to do with other factors, many of which are social, political, and environmental. Referring to work done by Brian Wansink and colleague, Locher stated that it is estimated that people make 221 decisions per day about eating (Wansink and Sobal,

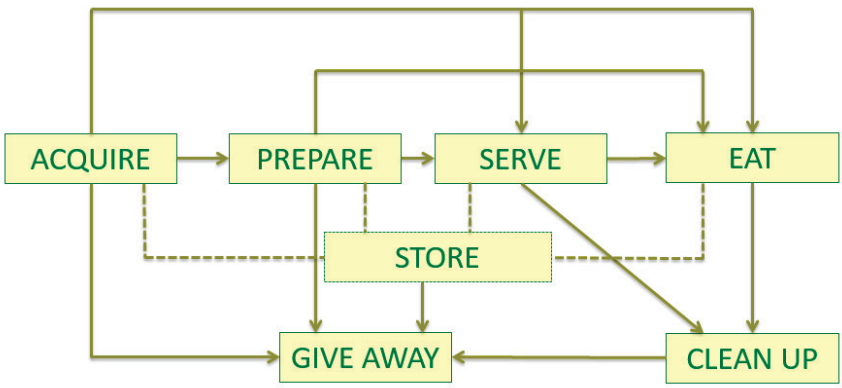

FIGURE 3-3 Type and sequence of food behaviors.
SOURCES: Presented by Julie Locher on October 28, 2015 (Sobal and Bisogni, 2009; reprinted with permission).

BOX 3-1
Factors Influencing Food Choices
Presented by Julie Locher

At the Individual Level

- Food choices are based primarily on sensory appeal, convenience, and price.
- Food preferences are based on habit, custom, and tradition.
- Food preferences and roles are gender-based.
- Health status, functional status, cognitive status, oral health status, sensory deficits, and medication usage influence individuals' ability to meet dietary needs.
- Key self-limitations to choice include health, being on a special diet, and being unable to shop for oneself.
- Knowledge about "healthiness" of food is variable.

At the Interpersonal Level

- People who are married or who eat with other people, especially with people who are family members or friends, generally eat more and eat better.
- People who have adequate social networks or social support are also less likely to be food insecure, especially if the person has a spouse or a caregiver.

At the Institutional Level

- Lifespace (i.e., a person's physical and psychological environment).
- Perceptions of safety.
- Available resources.
- Availability of transportation.
- Formal and informal support networks.

2007). More than 200 of these are made without conscious deliberation. Individuals' capacity to make rational decisions about food are constrained by the information available to them, any cognitive processing limitations they may have, and the time they have for decision making. Their choices are made based upon environmental cues, social expectations, distractions, and other people they are with. Locher concluded her presentation by noting that insights from behavioral economics may be very useful in designing intervention studies in nutrition and aging.

FOOD SECURITY AMONG OLDER ADULTS

Craig Gundersen, Soybean Industry Endowed Professor in Agricultural Strategy in the Department of Agricultural and Consumer Economics at the University of Illinois, opened his presentation with the official definition

of food insecurity used in the United States. He noted that a household is placed into food security categories based on responses to 18 items on the U.S. Department of Agriculture's (USDA's) Core Food Security Module (CFSM).[1] These items include "I worried whether our food would run out before we got money to buy more," "Did you or the other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food," "Were you ever hungry but did not eat because you couldn't afford enough food," "In the last 12 months did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?"

Since 2008, James Ziliak and Gundersen have issued an annual report on the extent of food insecurity among seniors in the United States (Ziliak and Gundersen, 2009, 2012, 2013, 2014, 2015; Ziliak et al., 2008). Based on trends uncovered in those reports, Gundersen reported that food insecurity rates have remained very high among seniors, rising from about 5 million older adults in 2001 up to almost 10 million in 2013. However, these overall numbers hide considerable variation across the United States. For example, North Dakota had the lowest rate, with about 2 to 3 percent of older adults being food insecure, whereas in Arkansas, more than 26 percent of older adults are food insecure.

Factors That Increase the Risk of Food Insecurity

Gundersen then went on to explain several factors that influence the probability of food insecurity. Although food insecurity occurs across the income spectrum, those who are at the lowest level of income have the highest rates of food insecurity. This is to be expected, but in fact, almost 30 percent of food insecure households have incomes above 20 percent of the poverty line. Gundersen stated that this needs to be considered when policies and interventions to address food insecurity are developed.

Gundersen also explained that in studies Ziliak and he have conducted, food insecurity is more likely among older adults living at or below the poverty line who do not have a high school degree, who are African American or Hispanic, who are divorced or separated, who are living in multigenerational households with a grandchild, and who are younger. Gundersen concluded that all of these factors should be recognized and considered in policy making.

[1] Based on the number of affirmative responses to the CFSM, households are categorized as marginally food insecure (threat of hunger) (1 or more affirmative responses); food insecure (at risk of hunger) (3 or more affirmative responses); or very low food secure (facing hunger) (8 or more affirmative responses in households with children or 6 or more affirmative responses in households without children).

Gundersen went on to present findings about the effects of food insecurity on nutrient intakes and health outcomes of adults age 60 and older. Being food insecure reduces nutrient intakes across the board. In addition, compared to food secure older adults, those who are food insecure have higher rates of depression, congestive heart failure, heart attack, chest pain, and asthma. Gundersen also noted that they also have more limitations in activities of daily living and a lower probability of being in excellent health.

Addressing Food Insecurity

Given these findings, Gundersen asked, "What can we do?" He stated that one successful program that addresses food insecurity is the Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program, and that data show that food insecurity rates are less among SNAP participants compared to eligible nonparticipants. Unlike other federal nutrition programs, SNAP is available across the entire age spectrum, and the eligibility criteria are lower for seniors. One reasonable action therefore, concluded Gundersen, is to encourage participation in SNAP among older adults. To do that, he noted that more knowledge is needed about why this group has lower participation rates than do other age groups. One factor may be that older adults living in multigenerational families may be caring for grandchildren for a large part of the month. However, they are not necessarily the primary caregiver and, therefore, cannot get SNAP benefits where levels are based on everyone in the household. If the benefits they do receive don't recognize the presence of others in the household, the amount may not be sufficient. One way to address this, suggested Gundersen, would be to ensure household size is correctly characterized in multigenerational households. More broadly, increasing benefit levels for seniors, especially those at the lower levels of SNAP benefits, would be worth considering.

Gundersen then commented on the discussions over whether SNAP participants should have restrictions on what they can and cannot purchase. He noted that this approach would have multiple negative ramifications, including that it would greatly stigmatize SNAP participants. He continued, saying that restrictions would be especially demeaning for older adults if they meant that they were not allowed to purchase items for their grandchildren. Restrictions on SNAP purchases, Gundersen stated, would patronize older Americans, and people should consider this when having discussions over restrictions.

Another approach, suggested Gundersen, is to reach out to the socially isolated. Many older adults have disabilities and challenges with mobility issues. How can we help them? They, too, may need higher SNAP benefit

levels. More needs to be done, said Gundersen, to understand the challenges older adults face so that efforts to address food insecurity can be effective.

A third approach, Gundersen proposed, is to recognize the importance of informal food assistance programs, such as Feeding America®, food banks, and Meals on Wheels™. These programs are important for those whose SNAP benefits run out before the end of the month as well as for those who are ineligible for SNAP.

Potential Priorities for Future Research

Gundersen concluded his talk by outlining several research directions that could help inform programs and policies to address food insecurity among older adults:

- Why is there a negative age gradient (why are younger older adults more likely to be food insecure than older older adults)?
- How do the dynamics of multigenerational households influence food insecurity?
- How do chronic health conditions influence food insecurity and vice versa?
- How might allowing home-delivered meals to be purchased with SNAP benefits influence food insecurity rates?

SPECIAL CONSIDERATIONS FOR MEETING THE DIETARY NEEDS OF VULNERABLE GROUPS

Joseph Sharkey is a Professor in the Department of Health Promotion and Community Health Sciences and Founding Director of the Program for Research and Outreach-Engagement on Nutrition and Health Disparities Solutions at the Texas A&M School of Public Health. He began his presentation by defining vulnerable populations as including underrepresented groups, underserved communities, racial and ethnic minorities, immigrant groups, and refugees. He went on to explain that the focus of his work has been with marginalized, impoverished *colonias* (i.e., neighborhoods) along the border of Texas and Mexico, as well as more recently those in southern New Mexico and Arizona. Sharkey explained that these *colonias* are important because the national epidemic of chronic diseases is more pronounced along the border than in other areas of the country, that they have persistent food insecurity and hunger, and that they are geographically isolated with limited access to food and social services (Ogden et al., 2010; Sharkey et al., 2011, 2012). This population is hard to reach, underrepresented, and mistrustful of researchers. He emphasized that meeting

their dietary needs is challenging given this complex physical, social, and demographic environment.

Considering the Meaning of "Resources"

Sharkey then asked workshop participants to think about the concept of resources, with this backdrop in mind. A traditional approach to thinking about resources can include economic resources (e.g., employment, income sources, benefits), community resources (e.g., transportation systems, neighbors, access to and availability of different types of food stores and food places, access to and use of nutrition assistance programs), family and household resources (e.g., relatives, household composition, nature of food sharing within the family, adequacy of cooking and food storage facilities), and individual resources (e.g., knowledge, skills, individual capacity).

Sharkey suggested that this way of thinking about resources is not sufficient. Rather, resources should be understood as having an overlay of several contextual domains (Sharkey et al., 2013) (see Figure 3-4).

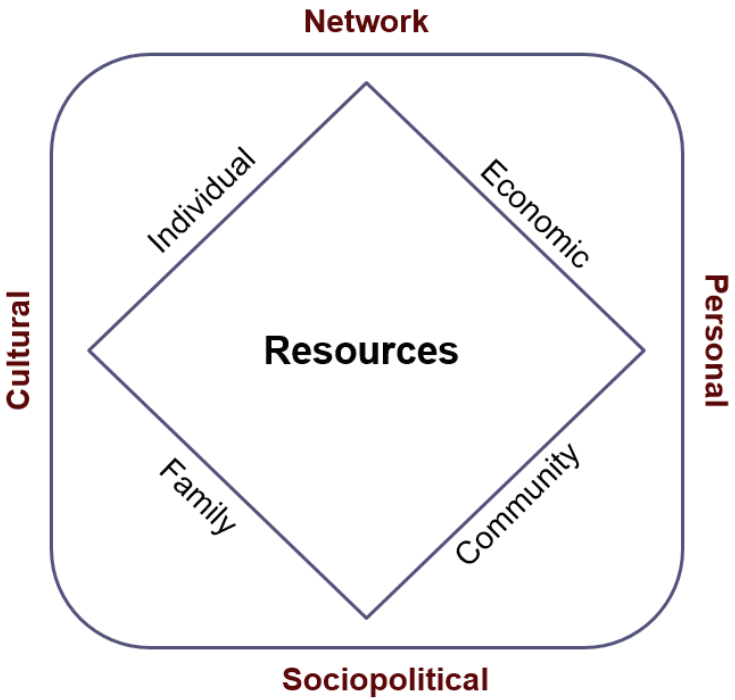

FIGURE 3-4 Resources within contextual domains.
SOURCES: Presented by Joseph Sharkey on October 28, 2015 (Ashing-Giwa, 2005; Sharkey et al., 2013).

One overlay is the sociopolitical domain, which could include the community's historical experience, mistrust, and fear. Another is the cultural context, which would include spirituality, language, means of communication, how people want to hear about information and how they share information, their attitudes, their resilience, the strategies people use to address issues in their lives, and whether concepts in one culture translate into another. A third overlay is the network context that includes family identity, especially extended family. Finally, the personal context overlay includes awareness, acceptance, and access. All of those contexts influence the use of available resources.

New Approaches for Addressing Food Insecurity

Sharkey then went on to explain that in the *colonias* in which he has worked, traditional approaches to meeting the dietary needs of vulnerable older adults have experienced only limited success. This could be due to using top-down and "one-size-fits-all" approaches to intervention planning, lack of consideration of community assets, strengths, or cultural wealth, lack of communication, or limited community collaboration.

Some groups and communities in South Texas and in other border areas have begun to change their approaches, stated Sharkey. These new ways of doing things have included engaging *promotoras*, who are community health workers. They are respected and trusted by the community, which allows them to help identify problems and solutions. They serve as cultural brokers and provide a link between program staff, academics, and the community. They serve as a sounding board and as a participant in determining whether the materials used and information provided is culturally responsive. They are able to mentor other *promotoras*. Sharkey concluded by saying that they provide invaluable observational insights and environmental knowledge and have been key to the work he has done in South Texas and Arizona.

Some of the projects Sharkey and his colleagues have conducted over the past several years include a survey of 140 seniors in two communities in South Texas to get the resident perspective, a household and resource survey of 548 people, and 14 focus groups of older adults to understand food access, food availability, and where help is needed most. Sharkey's team followed these projects with a senior hunger survey of 578 respondents. That survey included a household food inventory and questions about household refrigeration and storage so that the researchers could learn not only whether the respondents had access to food but the resources to store it safely. About 77 percent of the seniors participating in the surveys had less than a seventh grade education. Ninety percent were born in Mexico, more than 92 percent spoke Spanish only, and 95 percent were below the

poverty level. Sharkey noted that an important factor is not the percentage of people living below the poverty level but the extent below the poverty line. More than 50 percent of the participants in these surveys had incomes less than 50 percent of the poverty level. In addition, Sharkey continued, food insecurity begins in childhood and continues through the lifespan but only about 54 percent and 12 percent participated in SNAP and in senior meal programs, respectively.

Sharkey explained that these findings helped identify a need to develop sustainable training and education activities to reduce the risk and presence of hunger using community collaborations that integrate place, services, and population health. The driving force was to improve not only knowledge, but skills in the context of where people live.

With the help of the AARP Foundation, Sharkey and his colleagues developed and pilot tested a program called *No Más Hambre* (No More Hunger). It targeted the context of the home in which older residents lived. In the short term, the program changed the knowledge, skills, and food sourcing for the community. It created greater awareness of food insecurity among older adults and increased the knowledge and skills of *promotoras*. Midterm outcomes included increased community linkages, increased capacity for both *promotoras* and community partners, and empowered older adults at risk of food insecurity.

Sharkey presented some conclusions:

- Older adults are key to identifying issues about food acquisition and food preparation knowledge and skills needed to reduce food insecurity and prevent hunger.
- Focus group discussions provide the venue for exploring individual experiences, sharing information, and determining potential community and individual-based strategies.
- Understanding contextual opportunities and barriers are key to increasing the knowledge and skills of older adults. Individuals and communities have assets, not just needs.
- Community prevention requires the engagement of traditional and nontraditional partners and empowerment of *promotoras de salud* is important.

He also suggested some priority topics for future research:

- Life span perspective
- Noncharity approaches
- Solutions that engage community residents
- Co-existing programs
- Community engagement

BUILT ENVIRONMENT: WHAT IS IT AND HOW IT INFLUENCES DIETS OF OLDER ADULTS

Irene Yen, an Associate Professor in the Departments of Medicine and Epidemiology and Biostatistics at the University of California, San Francisco, opened her presentation by noting that the built environment field has been expanding rapidly in the past 60 years and much of the recent research has focused on obesity. She explained that in this field, when people think about built environment, they mean the man-made, physical attributes of the surroundings, including structural conditions that affect walkability and recreation. The availability of health-promoting resources (food stores and playgrounds) and undesirable amenities (fast-food restaurants, liquor stores) also are considered (Gomez et al., 2015).

One aspect of the built environment relevant to nutrition and older adults is accessibility to food stores. The USDA has introduced the term "food desert," which refers to a low-income census tract in which a large number of residents are more than a mile from a grocery store. The USDA has an Internet-based mapping tool that pinpoints the location of food deserts around the United States. Yen also noted that another key aspect of access to food sources is the ability to get to an existing store. Many parts of the United States do not have sidewalks. Even if the store is close by, accessibility will be diminished without the sidewalk (or pedestrian-friendly streets and crosswalks).

Built and Social Environments

Yen then noted that the social environment has become an active area of neighborhood-health research, complementing the work in the built environment. This work encompasses (1) the socioeconomic composition of the resident population, (2) social aspects of neighborhoods (e.g., crime, community support), (3) social capital (i.e., the collective value gained from social networks), and (4) social disorder (e.g., presence of trash, graffiti).

She then illustrated the relationship of built and social environments by describing a study conducted in early 2000 in which the authors found that respondents living in walkable neighborhoods were more likely to know and trust their neighbors and be socially engaged than those in non-walkable communities (Leyden, 2003). Yen explained that if the neighborhood is conducive to walking, residents might be more likely to be out and about and talking to their neighbors. She then described a study specific to older adults that was conducted in Miami's Little Havana district (Brown et al., 2008). The investigators found that people who sat on their porches not only socialized with people walking by, but they also kept their eye out for neighborhood safety and crime.

Another way that social environment can be measured, continued Yen, is by looking at segregation measures through indices of similarity or ethnic enclave. Yen showed a map of the United States from the 2010 census showing the proportion of Black non-Hispanics all across the country (http://www.remappingdebate.org/mediapopup?content=node/547 [accessed May 6, 2016]). The map shows clearly how areas of the country differ by race composition.

Segregation, Neighborhood Poverty, and Diet

Yen then presented the results of research on racial and ethnic residential segregation, neighborhood poverty, and diet biomarkers to make the point that built and social environments have effects on food intakes and that improving social environments can have positive effects on the built environments and therefore on older adults' access to healthy food (Yi et al., 2014). She also presented results of work showing the numbers of people living in affluent and low-income neighborhoods are both increasing over time, and this trend corresponds to a steady decline in the proportion of families living in middle-income neighborhoods, suggesting a widening inequality in income across neighborhoods (Bischoff and Reardon, 2013).

Yen ended her talk by reiterating the point made by other presenters that food insecurity and hunger are substantial problems among older adults, and that hunger, obesity, and related conditions are not mutually exclusive. She provided data showing that the prevalence of multiple chronic conditions increases dramatically as people age, with almost half of all people ages 45 to 64 having multiple chronic conditions, and more than 80 percent of those older than 65 having them (Gerteis et al., 2014). Yen concluded that it is difficult for older adults who are at risk of hunger, who live in difficult built and social environments, and who have limited income to achieve the healthy diet recommended for them.

ASSOCIATIONS BETWEEN MOBILITY AND NUTRITION

Richard Allman, Chief Consultant, Geriatrics and Extended Care, U.S. Department of Veterans Affairs (VA), began his presentation with studies he conducted while at the UAB. This research was supported by the National Institute on Aging (NIA) and the VA. He explained that he would describe the prevalence of low body mass index (BMI), high BMI, and nutritional risk factors among community-dwelling older adults, examine the cross-sectional associations between BMI and nutritional risk (unintentional weight loss and a nutritional risk index) with community mobility and provide prospective data on significant and independent associations between these measures with life-space mobility changes up to a 4-year

period of follow-up. Community life-space mobility is defined by the Life-Space Assessment, and was conceptualized as the distance, frequency, and independence of movement or travel that persons had in the 4 weeks before they were evaluated.

Allman stated that he and his colleagues conducted an observational study of aging in five Alabama counties between 1989 and 2009 (Allman et al., 2006). These counties have substantial proportions of African Americans. Participants were selected using a random sampling of Medicare beneficiaries living in these counties. The research team did extensive baseline in-home assessments between 1999 and 2001. The assessment included measures of health, life-space mobility, nutritional risk, and BMI. They also conducted telephone follow-ups every 6 months for up to 8 years to ascertain life-space mobility and mortality outcomes and a number of other measures.

Measuring Life Space Mobility

The primary outcome measure for the study was life-space mobility, as measured by the UAB Life Space Assessment (Baker et al., 2003). Allman's team asked people about the extent to which they had moved about in their environment in the previous 4 weeks and whether or not they used any kind of assistive device or got help from another person when they moved or traveled. Using these data, the research team developed a scoring algorithm that correlated with observed physical performance measures. Subsequently, they found that this measure also predicted mortality and use of health care.

Allman showed a figure illustrating the average scores at different independent life-space levels[2] (see Figure 3-5).

Mobility and Nutritional Risk

Allman's team also was interested in seeing the associations of different levels of mobility and nutritional risk. Using the Nutrition Screening Initiative's DETERMINE checklist, the nutritional risk assessment included questions about their appetite, the regularity of meals, frequency of alcoholic drinks, problems with teeth, mouth, or swallowing, difficulty paying for basics needs, the number of medications used, living alone, unexplained weight loss of 10 pounds or more, and difficulty eating, preparing meals, or shopping. The participants had a wide spectrum of social and economic

[2] Independent life-space levels are levels that a person could achieve without help from another person or use of assistive equipment.

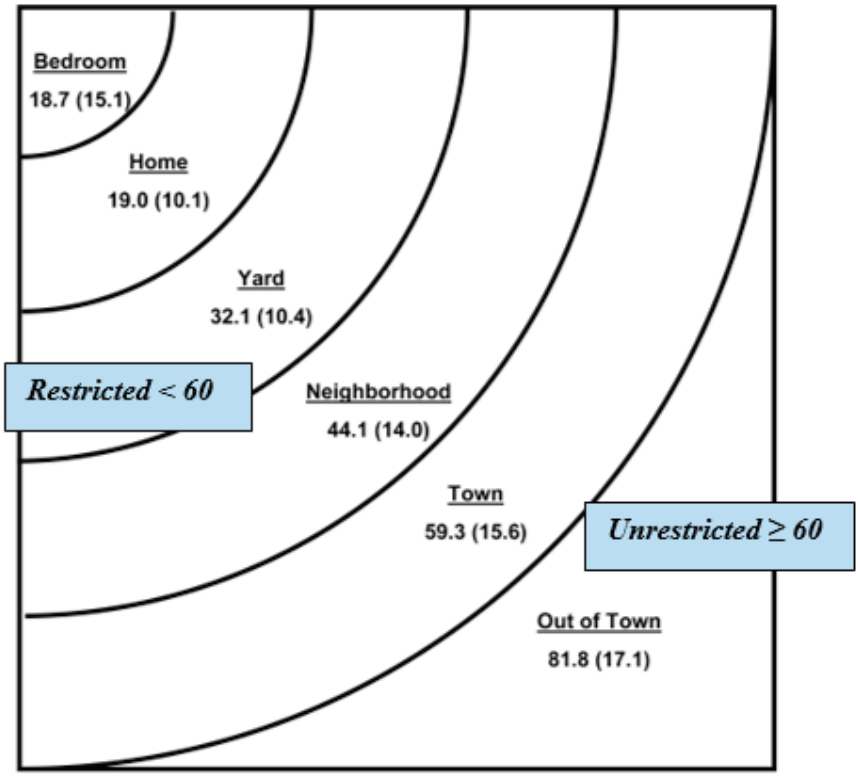

FIGURE 3-5 Mean composite life-space scores by life-space level achieved independently. Individuals with scores of less than 60 (they generally stayed in their bedroom, home, yard, or neighborhood without help from a person or use of an assistive device) were considered restricted in their mobility, whereas those with scores greater than 60 (those who were generally able to get out into their town or even beyond without any assistance) were considered to have unrestricted mobility.
SOURCES: Presented by Richard Allman on October 28, 2015 (adapted from Bowling et al., 2014).

diversity within racial and ethnic groups and a high prevalence of chronic diseases (see Box 3-2).

In addition, 30 percent of the sample scored less than 24 on the Mini-Mental State Examination (MMSE), 16 percent had a score of 5 or greater on the Geriatric Depression Scale (indicating declines in cognitive abilities and increased depressive symptoms), and 20 percent had no physical activity.

BOX 3-2
UAB Study Sample

Demographic Characteristics of UAB Study Sample	
Age (Mean ± SD)	75.3 ± 6.7
African American	50%
Female	50%
Rural Residence	51%
Married	51%
Education <12th Grade	20%
Education >12th Grade	50%
Income <$8,000/year	23%
Income >$40,000/year	12%

Prevalence of Common Conditions Among UAB Study Sample	
Hypertension	71%
Arthritis/Gout	49%
Gastrointestinal Disease	26%
Diabetes	25%
Cancer History (not including skin)	18%
Cardiac Arrhythmia	14%
COPD/Asthma	14%
Heart Failure	13%

NOTE: COPD = chronic obstructive pulmonary disease; SD = standard deviation.
SOURCE: Presented by Richard Allman on October 28, 2015.

Allman then showed the distribution of life-space scores.[3] More than 40 percent had restricted community mobility generally limited to the neighborhood or less unless they had help from another person or used an assistive device. About 42 percent of those with BMI greater than or equal to 30 (Obese I) reported that they had gotten out of the room where they slept without help from another person or use of an assistive device in the prior month. In contrast, about 75 percent of persons with a BMI <30 had gotten out of town without any help.

His study found a correlation between BMI and Life-Space Mobility and a significant cross-sectional association between the composite Nutrition Risk Index (NRI) score and independent life-space mobility.

An additional analysis of composite life-space score change by BMI

[3] The higher the score, the more likely it was that the person was driving his or her own vehicle, or independently using public transportation.

BOX 3-3
Conclusions from UAB Research on Mobility and Nutrition in Older Adults

- Body mass index (BMI) ≥30 was more common than BMI <20 or an elevated score on the Nutrition Risk Index (NRI).
- Higher BMI was associated with lower independent life-space mobility. However, this association was not significant after adjusting for other factors, and BMI was not associated with more rapid declines in life-space mobility.
- Nutrition risk factors (poor appetite, poor oral health, income inadequacy, weight change, isolation, difficulty with activities of daily living, and polypharmacy) were associated with lower life-space mobility, and an elevated NRI score was significantly and independently associated with lower independent life-space mobility.
- In a prospective analysis, unintentional weight loss was significantly and independently associated with accelerated declines in life-space mobility.
- After 8.5 years of follow-up, BMI <20 predicted life-space declines in both African Americans and whites; BMI >30 predicted life-space declines only in African Americans.

SOURCE: Presented by Richard Allman on October 28, 2015.

over 4 years showed that BMI levels were not associated with accelerated declines over time in the composite life-space score. However, those with BMI of less than 18.5 did have the lowest life-space scores at baseline, and those with more normal BMI (between 18.5 and 30) had higher baseline life-space scores. Additionally, unintentional weight loss was associated with lower baseline life-space and an accelerated decline in community mobility, independent of other factors. The overall conclusions from his work are in Box 3-3.

QUESTION AND ANSWER SESSION

The session discussion opened with a question for Sharkey about the low level of SNAP participation. He responded by saying that an important issue to understand is the length of time the benefits last. For about 40 percent of the SNAP participants in this population, the benefits last 1 week or less. To illustrate the realities of the lives of community members with whom he works, Sharkey then described one of the food insecure households in one of his studies. The mother in this household had two sons, ages 16 and 9. This woman was afraid that her older son could wind up in a gang and be a bad influence on her younger son. To solve this issue,

the mother told her son that he needed to come home after school right away every day and he agreed. However, the boy wanted to bring friends over with him. Sharkey followed up by saying, "Well, what do 16-year-old boys do? They eat." This story brought to light the dilemma this woman faced: keeping her son safe and away from gangs but also having limited food resources within her home to make coming home more appealing to her son and his friends. Sharkey concluded this story by stating, "Those are the kinds of insights that we've got with a lot of the observations and all that we've done; you would not have ever even thought about asking on a survey."

A follow-up question asked Sharkey to provide some ideas on how researchers and policy makers can work with the idea of "assets." The participant asking this question noted that researchers often approach research with the idea that it is easier to find associations when looking for bad things. Sharkey responded that his team is much more "on the ground" and are thinking about how to adapt and tailor things to individuals and situations. The *promotoras*, Sharkey noted, are engaging people in conversation and are identifying strengths and barriers. For example, one strength is that people love to share information. As an example, Sharkey shared a current USDA project he and his colleagues are working on. He described this project as discussions with children ages 7 to 11, while the mothers participate in a type of board game that Sharkey and his assistants created. The board game simulates going through a grocery store, having to make decisions about what to buy. Sharkey explained that not only do the mothers like this board game, they also take copies of it and share them with their families and neighbors. The mothers are excited to find healthier ways to make recipes and report back to the researchers their successes in finding healthier alternatives to classic recipes.

Sharkey concluded by suggesting that the biggest assets are community, neighborhoods, and families and that researchers and policy makers have a responsibility to help the community have a better situation by building on their strengths.

To a question about how behavioral economics might affect food choices if preferences are established at such an early age, Locher replied that she was referring to multiple spaces, ranging from the home environment to the larger community environment as well as things that policymakers and industry do. For example, some of the work that Yen is doing in regard to the built environment shows how people can make very simple changes within their own home environment by having food located in certain places within their refrigerators or on their countertops. Locher stated that she thought that one of the most exciting things about the workshop was the inclusion of industry and things that industry can do in partnership with government. One option for making healthier decisions easier for peo-

ple might be to shift the focus from opting in to the program to opting out. "What if we made SNAP available to everyone who was eligible instead of having the burdensome process of having to apply?" Locher concluded.

A participant asked Gundersen for his thoughts on restrictions that SNAP imposes on certain types of foods and whether taxes on items such as sugar-sweetened beverages are a good idea. Gundersen replied that the restrictions are an example of how poor people are treated in ways that other people are never treated. People at other income levels are never told what groceries they can and cannot buy. He asked, "Why do we think it is appropriate to tell poor people what they can and cannot do when we try to give them a helping hand. It is patronizing and condescending. Let them make their own choices. Spending in low-income households is not very different from spending in higher-income households." Gundersen pointed out that the main challenge low-income people face is they do not have enough money. With respect to taxes on certain food or beverage items, Gundersen emphasized that great care needs to be taken. He stated that evidence on soda taxes shows that they do not seem to have any impact on anything, but taxes have the greatest impact on poor people. Gundersen believes that these policies are another way to contribute to the debasement and marginalization of poor people. As a sociologist, Gundersen recognizes that people consume food for many reasons other than just physical nourishment, such as nourishment for the soul or as a way to express their cultural identity. Therefore, he said, this aspect also should be considered in setting policies and program requirements.

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4

National Programs Addressing Dietary Needs of the Older Population

OUTLOOK ON LEGISLATION ON NUTRITION AND AGING

Bob Blancato, Executive Director of the National Association of Nutrition and Aging Services Programs (NANASP), explained that NANASP represents 1,100 service providers around the country who support healthy nutrition for older adults. For the concerns of older adults and nutrition, Blancato opined that the 2-year budget agreement passed by the House of Representatives in October 2015 was beneficial because it meant no return to sequestration or across-the-board cuts through at least September 30, 2017. In addition, it included a $40 billion increase over 2 years in nondefense discretionary spending. Following the direction of President Obama's budget, two examples of what might occur as a result of the agreement are

- $60 million in funding for programs covered by the Older Americans Act (OAA), and
- $83.7 billion for the Supplemental Nutrition Assistance Program (SNAP), an increase of almost $2 billion, including $9 million for senior SNAP outreach.

Legislation and Programs

Blancato described the outlook for several pieces of legislation and programs important to nutrition and older adults.

OAA. This program has been one of the Great Society programs, and celebrated its 50th anniversary in 2015. Its three largest programs are the congregate meals program, home-delivered meals, and the Nutrition Services Incentive Programs. The OAA provides meals, nutrition education, and socialization for its participants, and current funding levels allow for provision of 224 million meals to older adults every year. At the 2015 White House Conference on Aging, President Obama called for its reauthorization, which prompted the Senate to pass S.192, a modest 3-year reauthorization of the Act. However, as of October 2015, the House of Representatives had not yet acted on the legislation. Funding continues during this time, yet Blancato stressed the need to complete legislative action so as to be prepared for the future nutrition needs of older adults.

Blancato continued by stating that given the current situation, aging services providers can and do look for alternate funding sources beyond the OAA. For many, Medicaid is a new and deeper source of funding. Total funding for home- and community-based services (HCBSs), including nutrition, has risen from 13 percent of the Medicaid budget in 1990 to 43 percent today, and Medicaid expansion under the Affordable Care Act (ACA) is bringing more older adults into the program. Blancato stated that funding for Medicaid will grow from $299 billion in 2014 to $576 billion in 2024, and that managed care alone will grow to $193 billion per year in 2024. At least 46 states administered Medicaid waiver programs which include nutrition.

ACA. Blancato stated that the outlook for the core law appears to be good, now that it has been upheld by the Supreme Court, although smaller changes to the law may occur. With respect to older adults, the law allows for an annual wellness visit with a health care provider, and 23 states now require some form of nutritional counseling and therapy (mostly for obesity and/or diabetes) to be covered as an essential health benefit.

Community-Based Care Transitions Program. This program, which is created by Section 3026 of the ACA, tests models for improving care transitions from the hospital to other settings and reducing readmissions for high-risk Medicare beneficiaries. Many of these models are run by aging networks, including nutrition providers. However, Blancato noted that not enough emphasis is placed on nutrition in the first rounds of testing of these models. Efforts are now under way to extend these programs to allow full benefits to be reached.

Social Services Block Grants. This program has multiple constituents, including older adults, explained Blancato. Estimates are that $30 million for elderly nutrition is provided through the program ($25 million for home-delivered meals and $5 million for congregate meals). Blancato stated that the program is always in danger of being defunded, and advocates

spend considerable energy ensuring that funding for the program is not cut or eliminated.

Agricultural Act of 2014. Better known as the "Farm Bill," the Agricultural Act of 2014 is an omnibus, multiyear piece of legislation that governs agricultural and food programs. The Bill, which was renewed for 5 years, includes several domestic nutrition programs for older adults. These include SNAP, which reaches 4 million older adults, the Senior Farmers' Market Nutrition Program (SFMNP), which reaches 835,000 older adults in 52 states and tribal areas, and the Commodity Supplemental Food Program (CSFP), which has transitioned to a program serving only older adults. It serves 573,000 older adults per month in 49 states and tribal areas.

Medical nutrition therapy. Medical nutrition therapy has been covered under Medicare Part B since 2002. It provides services to people who meet one of three conditions—diabetes, kidney disease, or have had a kidney transplant in the past 36 months. There is a bill in Congress to expand coverage under Medicare to people with prediabetes and risk factors for type 2 diabetes.

2015 White House Conference on Aging.[1] This conference, which was held on July 13, 2015, was the sixth ever held and the second in the 21st century. It was held in a year that marked important anniversaries for Social Security (80 years); Medicare, Medicaid, OAA, Voting Rights Act (50 years), the Americans with Disabilities Act (25 years) and the ACA (5 years). It focused on four topics, two of which have a direct bearing on nutrition and older adults: Healthy aging, and long-term services and supports. As defined by the White House conference, healthy aging is living a long, productive, and meaningful life and enjoying a high quality of life. The conference issued a policy background paper, which had one paragraph on nutrition that cited existing programs and resources and referred to the importance of healthy diet to disease prevention. In the long-term services and support section, the conference defined these services as health and social services that may be needed to maximize the independence and well-being of an individual. Other relevant announcements from the conference included

- A new proposed rule from the U.S. Department of Agriculture (USDA) to increase accessibility to critical nutrition for homebound, older Americans and people with disabilities by allowing government and nonprofit food purchasing and food delivery services to become authorized SNAP retailers which enables these

[1] More information on the White House Conference on Aging can be found at http://archive.whitehouseconferenceonaging.gov (accessed May 23, 2016).

services to accept SNAP benefits as payment for home-delivered meals.
- Peapod has adopted "best in class" web accessibility standards to ensure that all individuals, including those with disabilities and those who are unable to shop at traditional stores, can use its website and mobile applications.
- The National Prevention Council announced that in the spring of 2016, it will release a Healthy Aging Action Plan to advance the National Prevention Strategy and will identify federal action steps to promote prevention and well-being among older Americans.

Blancato noted that next steps following from the White House conference depend on the release of the final report and its ability to provide a roadmap for action. He went on to say that the responsibility for advocacy now is to see that the items laid out in the report are acted on and that any rules, regulations, and policies are adopted. Some had timetables attached and that is a good thing, Blancato added. New legislation may also follow.

Opportunities for Promoting Healthy Aging

Blancato concluded his talk by saying that actions to promote healthy aging must focus on the triple threat to older adults: hunger, food insecurity, and malnutrition. Many of the potential solutions to these problems are the same (e.g., increasing SNAP enrollment and participation in OAA programs), but some differ. Malnutrition is an area of new focus, and Blancato cited a recent study that estimated the annual burden of disease-related malnutrition in the community across eight diseases was $156.7 billion (Snider et al., 2014). Patients who are malnourished are more likely to experience complications, such as pneumonia, pressure ulcers, infections, and death. Malnourished older adults also are at greater risk of fall, longer hospital stays, worse outcomes after surgery or trauma, and self-neglect. Blancato proposed several potential solutions:

- Make malnutrition a key indicator of older adult health.
- Re-examine older adult goals of Healthy People 2020 and build in a stronger emphasis on malnutrition identification, prevention, and intervention.
- Address protein-related malnutrition in national and state obesity plans.
- Re-examine the protein requirements of older adults and consider the need for an increased protein DRI for older adults.
- Expand electronic medical records to include a standardized section on malnutrition.

- Include malnutrition screening and intervention in the essential benefits covered in the Medicare annual exam.
- Include coverage for oral nutrition supplements for malnourished and at-risk dual-eligible populations.
- Collect and analyze Medicare and Medicaid data to improve outcomes with malnutrition screening and intervention.
- Expand medical nutrition therapy coverage to include malnutrition.

Blancato noted that a new coalition—Defeat Malnutrition Today—has been formed to position malnutrition as a key indicator and vital sign of older adult health and to advocate for legislative and regulatory change.

Blancato then addressed questions about the competing priorities of nutrition and older adults versus nutrition and children. He stated that the real need is to improve the federal commitment to all people of all ages and for policies to promote good nutrition and nutrition education throughout the lifespan. Blancato stated that policy directions should focus on the intergenerational bases where better outreach and access to programs can be emphasized. Advocates for older adults can learn a lot about doing better advocacy by working with colleagues in the children's world.

Blancato ended his talk by suggesting the need to create a greater political imperative for nutrition. More outreach and enrollment in SNAP and increased funding levels for the other programs may be necessary. He also proposed that efforts be undertaken to discover how much OAA programs have saved for the programs like Medicaid and Medicare.

USDA NUTRITION PROGRAMS FOR THE OLDER POPULATION

This presentation featured two speakers: Lura Barber, Director of Hunger Initiatives at the National Council on Aging (NCOA), and Kathryn Law of the USDA Food and Nutrition Service. Both spoke about the USDA's nutrition programs for older adults.

SNAP for Older Adults: Opportunities for Improvement

Barber began her talk by explaining that NCOA is an advocacy organization based in Washington, DC, whose mission is to improve the lives of older adults, especially those who are struggling. The NCOA works with low-income adults in the community ages 60 and older on programs such as chronic disease self-management, falls prevention, and economic security. It does its work in partnership with a national network of organizations, intentionally including those working in aging and in other fields as well. Barber noted that she would focus her remarks on results from the first 2 years of a SNAP enrollment initiative for older adults that grew out of

BOX 4-1
Older Adults, Food Insecurity, and SNAP Participation
Presented by Lura Barber

Older Adults and Food Insecurity

- 5.4 million people ages 60 and older experience food insecurity (Coleman-Jensen et al., 2015).
- $16,020 is the average annual Social Security retirement benefit.
- 22 percent of married couples and 47 percent of unmarried persons rely on Social Security for 90 percent or more of their income (https://www.ssa.gov/news/press/basicfact.html [accessed May 9, 2016]).
- $3,312 is the median out-of-pocket spending on health care by Medicare beneficiaries (Cubanski et al., 2014).
- $40,900 is the median debt for the 61 percent of ages 60 and older households with any debt (NCOA, 2015).

SNAP Participation by Older Adults

- $134: The median SNAP benefit for households with an older adult in 2013 ($113 for a person living alone).
- 42 percent: SNAP participation rate among eligible seniors ages 60 and older.
- 83 percent: Total SNAP participation among all eligible households.
- 15.3 percent: Percentage of elderly SNAP households receiving the minimum benefit in 2013 ($16 per month in 2013, now $15).
- 1.3: Average size of a SNAP household with at least one person ages 60 or older in 2013.

earlier work on benefits access. The work has been supported by grants from the U.S. Department of Health and Human Services' Administration for Community Living and, currently, from the Walmart Foundation. Barber provided some statistics about older adults, food insecurity, and SNAP participation (see Box 4-1).

Barber noted that it is important to look at the big picture and create a balanced approach to the food security question, where SNAP is one key public benefit working synergistically with other benefit programs (see Figure 4-1).

Building on this base, Barber shared some of the best practices that her program saw in the first year of their Senior SNAP enrollment initiative. These best practices cluster around three areas: community-based assistance, social media outreach, and policy work.

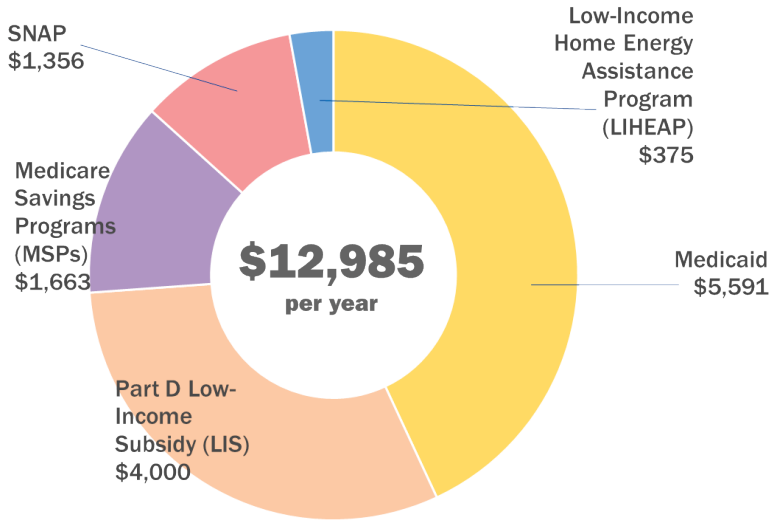

FIGURE 4-1 SNAP: A key public benefit for older adults.
NOTE: SNAP = Supplemental Nutrition Assistance Program.
SOURCE: Presented by Lura Barber on October 28, 2015 (NCOA).

Community-Based Assistance

NCOA has been working on the Senior SNAP enrollment initiative in the field since March 2014. Since the start of the initiative, NCOA has helped almost 200,000 older adults be screened for SNAP and other benefits. Its partners have submitted almost 47,000 SNAP applications on behalf of older adults all over the country. An estimated value of those applications based on general acceptance rates and the value benefits is about $64 million. NCOA anticipates submitting another 15,000 SNAP applications before the grant ends.

Barber noted that NCOA has learned that many different kinds of organizations can be successful in helping older adults in the community. Each type of organization has strengths and challenges, and learning about them and accommodating them helps NCOA work with them successfully (see Figure 4-2).

She then described the six steps NCOA has learned are best practices in helping older adults enroll in SNAP:

- **Step 1:** Assess your organization's strengths and challenges.
- **Step 2:** Understand your target population and your community.
- **Step 3:** Conduct outreach and education about SNAP and older

adults. One NCOA partner is Elder Law of Michigan, which uses voter registration data to target eligible people in low-income areas.

- **Step 4:** Screen clients for benefit eligibility. NCOA has developed a tool called Benefits Checkup, which indicated whether a person is eligible for SNAP and for what other benefits the person might be eligible.
- **Step 5:** Assist in completing and submitting applications.
- **Step 6:** Follow up to troubleshoot and ensure proper use of the SNAP Electronic Benefits Transfer (EBT) card. Making recertifications easy, which some states succeed at, also is important. Many older adults are on fixed income so, Barber said, there is no rationale for them having to complete this paperwork.

Barber noted that a common theme that all of NCOA's partners must deal with is overcoming the stigma of SNAP participation. The partners have developed a number of powerful approaches to talking about SNAP that reduce stigma. For example, they explain that participating in those programs is just "claiming what you earn" because older adults have paid taxes that fund programs like Social Security and SNAP. Another is to frame SNAP as a health care benefit. In rural areas, emphasizing that SNAP is a USDA program that helps local farmers and business has been particularly effective.

Barber also explained that building relationships and developing partnerships with state agencies, other community-based organizations, CSFP distributors, community organizing groups, domestic care workers, hospi-

Model	Strengths	Challenges
Aging network	Strong relationships with seniors	May lack expertise in SNAP
Ethnic-focused	Highly trusted; multilingual	May not have broad reach
Anti-hunger network	Already doing outreach for SNAP	Often child focused, not holistic
Food banks	Direct access to most in need	Outreach often difficult
Faith-based	Highly trusted	May not have broad reach
Senior centers	One-stop shop for seniors	Funding and outreach
Call centers	Very high volume	Highly complex, expensive model

FIGURE 4-2 Diverse partner organizations.
NOTE: SNAP = Supplemental Nutrition Assistance Program.
SOURCE: Presented by Lura Barber on October 28, 2015 (NCOA).

tals and other medical providers, and local businesses makes it much easier to improve outreach efforts.

Social Media Outreach

Barber stated that the conventional wisdom is that older adults are not on the Internet but that is not true. In fact, three in five older adults ages 65 and older are online, 71 percent of older adult Internet users go online every day or almost every day, and 46 percent of older adult Internet users are on social networking sites, such as Facebook (Pew Research Center, 2014).

Social media can be a powerful way to reach older adults who are isolated or who have issues with mobility. For example, NCOA has had significant success with Facebook. Social media outreach gets results quickly.

Public Policy Initiatives

Because SNAP is administered at the state level, much of NCOA's policy work focuses on the state. Barber noted that one of its most effective efforts is to expand implementation of the Elderly Simplified Application Project, a USDA demonstration project that seeks to increase SNAP participation among the elderly low-income population by streamlining the application and certification process. Another is implementing a standard medical deduction from their income if they can demonstrate at least $35 per month in unreimbursed out-of-pocket medical expenses. This deduction relieves older adults and state agency caseworkers of the time-consuming task of itemizing their medical expenses, and can help seniors qualify for a larger benefit amount (Jones, 2014).

NCOA also has pursued other policy options to streamline SNAP eligibility, such as partnering with aging organizations in state SNAP Outreach Plans, instituting broad-based categorical eligibility, setting up state call centers for application assistance, extending recertification periods, simplifying and combining applications for multiple benefits, instituting an online application, and creating a data bridge that allows counselors to track and flag their clients' applications.

USDA Nutrition Programs for Older Adults

Kathryn Law briefly described a few of the USDA nutrition programs that support the nutritional needs of older adults.

CSFP. This program provides low-income older adults with food packages containing a variety of foods that are good sources of nutrients that are often low in older adults' diets. CSFP operates in 46 states, the District

of Columbia, and 2 Indian reservations. About 573,000 individuals participated in the CSFP in each month in fiscal year (FY) 2014.

SFMNP. This program provides low-income older adults with coupons for eligible foods at farmers' markets, roadside stands, and community supported agriculture baskets. The SFMNP operates in 43 states, the District of Columbia, and 7 Indian reservations, and served about 790,000 individuals in FY2014.

Child and Adult Care Food Program (CACFP). This program reimburses centers that provide day services to older adults to help them serve nutritious meals. CACFP operates in all states and the District of Columbia, and about 120,000 adults participated each day in FY2014.

Food Distribution Program on Indian Reservations (FDPIR). This program provides food to low-income households, including older adults, living on Indian reservations, and to Native American families residing in designated areas near reservations and in Oklahoma. The FDPIR is operated by tribes and states and served about 85,000 individuals each month in FY2014.

SNAP

Law then provided a more detailed discussion of SNAP, the USDA's largest nutrition assistance program. This $70 billion program is the first line of defense against hunger for low-income people. As a mandatory entitlement, SNAP can grow as the demand or need for the program grows. The program serves about 4.6 million older adults; that is slightly less than 10 percent of SNAP participants but receive 7.5 percent of the benefits. Slightly more than 17 percent of households that receive SNAP contain a member age 60 or older.

For the past 30 years, the USDA has used census data to estimate how many people are eligible for the program and has used its own SNAP program data to determine how many are actually receiving benefits. These data show that, over the past 20 years, SNAP participation among older adults has been about half of the overall participation rate (see Figure 4-3).

Data also show that SNAP participation among eligible older adults varies widely by state (see Figure 4-4).

In regard to their characteristics, 73 percent of older adult participants live alone and 64 percent are female. Average gross income is 86 percent of the poverty line compared to 59 percent of the poverty line for all SNAP households.

Law then asked, "And what about the 60 percent of eligible older adults who are not participating in SNAP? What do we know about them?" She noted that they are generally similar to older adults who receive SNAP, but there are some differences. For example, nonparticipating older adults

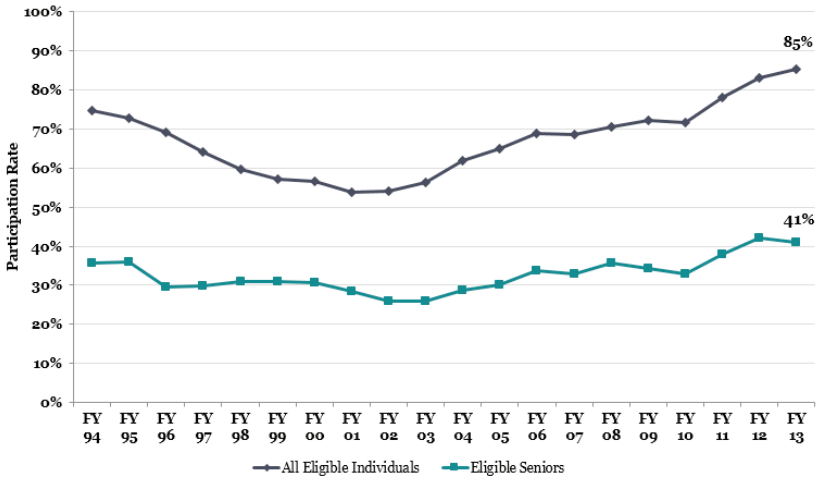

FIGURE 4-3 SNAP participation rates among eligible older adults. SNAP participation rate among eligible seniors is about half of the overall participation rate during past 20 years.
NOTE: FY = fiscal year.
SOURCE: Presented by Kathryn Law on October 28, 2015 (USDA, Food and Nutrition Service).

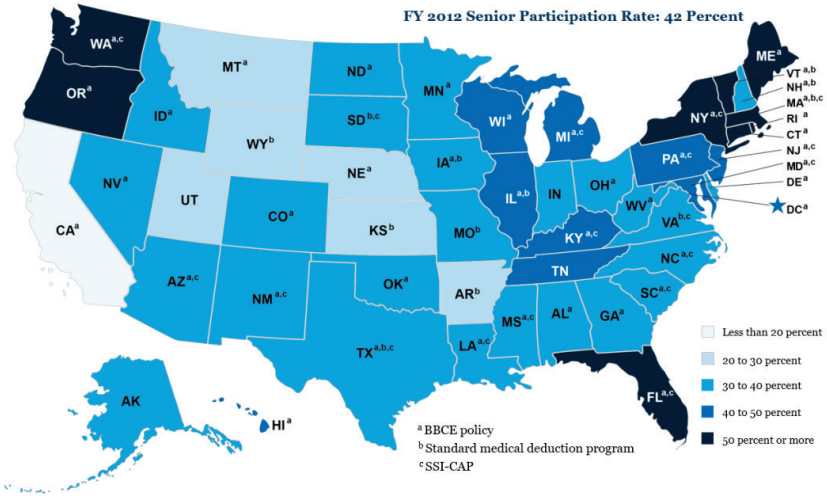

FIGURE 4-4 SNAP participation among eligible older adults, by state.
NOTE: BBCE = broad-based categorical eligibility; SSI-CAP = Supplemental Security Income Cap.
SOURCE: Presented by Kathryn Law on October 28, 2015 (USDA, Food and Nutrition Service).

are eligible for a lower benefit. Also, some older adults are eligible for a large SNAP benefit, but they are still not benefiting from the program. Law noted that research on the reasons for nonparticipation by eligible older adults suggests multiple causes, such as lack of knowledge about their eligibility, unfamiliarity with the application process, a desire for personal independence, the perceived cost of applying and participating, the low benefit expected, and the stigma associated with program participation.

BOX 4-2
USDA Pilot Tests to Increase SNAP Participation Among Older Adults
Presented by Kathryn Law

- **2002-2004:** Elderly nutrition pilots in six states that tested three approaches:
  - Florida: Simpler eligibility determination rules, which required less documentation of income and expenses, and waiver of the eligibility interview. Participation increased by more than 20 percent and it was the lowest cost pilot because it involved only changing program rules.
  - Arizona, Maine, Michigan: One-on-one application assistance. In the most successful site, participation increased by more than 30 percent, but the program was more costly to operate.
  - Connecticut and North Carolina: A food package worth $60 to $70 was provided instead of the SNAP benefit. In one site, participation increased by more than 35 percent but the program was costly and difficult to implement.
- **2009:** Reaching underserved elderly and the working poor in SNAP:
  - Michigan and Pennsylvania: Provided application assistance and simplified application waiving income verification requirements. The interview could be conducted by demonstration staff. These pilots had a statistically significant impact on older adults' participation.
  - Ohio: Provided only application assistance. No impact on participation.

The effects of the pilot tests in these three states were strongest for the oldest older adult households, suggesting that eliminating SNAP office visit may have played an important role.

- **2010:** Testing approaches to facilitate SNAP access for recipients of Medicare's Extra Help or Medicare Savings Programs (i.e., programs that help cover Part D premiums):
  - New Mexico: Tried a combined application that used income provided for Medicare application for the SNAP application (i.e., "deemed income"); benefits were standardized.
  - Pennsylvania: Used a shortened application and provided one-on-one application assistance; used deemed income.
  - Washington: Used a shortened application and targeted outreach.

BOX 4-3
Additional USDA Efforts to Encourage SNAP Participation Among Older Adults
Presented by Kathryn Law

- **Combined Application Projects:** These projects allow elderly and disabled Supplemental Security Income (SSI) recipients to receive SNAP by using automation, simplified or standardized benefits, and eliminating the office visit (18 states).
- **Standard Medical Deductions:** These initiatives allow households with elderly or disabled members to receive a standard medical deduction from gross income if medical expenses exceed $35 per month (18 states).
- **Elderly Simplified Application Project:** These projects allow simplified application, use of data matching, and 36-month certification period for households with only elderly or disabled members (7 states).

Law also reported on a series of pilot tests that the USDA has conducted to increase SNAP participation among older adults (see Box 4-2). These tests had positive but small effects. She also described several other efforts to encourage SNAP participation that are currently ongoing in a variety of states (see Box 4-3).

Law then mentioned several initiatives included in the 2014 Farm Bill. For example, it allows home delivery services to accept SNAP benefits if the services are intended for older adult and disabled participants. In its FY2016 budget request, the USDA also has asked to expand its Elderly Simplified Application Projects. This authority would reduce the requirements that states must meet in order to implement Elderly Simplified Applications.

In concluding, Law stated that some actions show promise in getting more older adults to participate in SNAP, including one-on-one application assistance, using a simplified site application that reduces verification requirements, and waiving the face-to-face interview in SNAP offices. Ways to overcome other barriers to participation are still unknown, however. It may be that some eligible older adults may never choose to participate, and therefore it is unlikely that the USDA can ever completely close the participation rate gap, Law concluded.

NUTRITION DURING CARE TRANSITION

In her opening remarks, Rose Ann DiMaria-Ghalili, Associate Professor of Doctoral Nursing and Nutrition Science at Drexel University's College of Nursing and Health Professions, stated that her research has focused on malnutrition in older adults, particularly in older adults who are undergo-

ing surgery. She has been interested in looking at risk factors before people come into the hospital, what happens while they are in the hospital, and most importantly, what happens when they are sent home to recover.

DiMaria-Ghalili framed her presentation by highlighting the lack of a systematic approach to managing care transitions and the inconsistent involvements of registered dietitians during care transitions. She illustrated the need for better care transition by showing a news story of an older man recently discharged from the hospital who called 911 because he could not obtain food. Describing the lesson learned from this episode, DiMaria-Ghalili stated that translating nutrition guidance into patient care practice is critical in moving nutrition from a "support service" to a critical health intervention. She cited a recent statement from the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.): "It is the position of A.S.P.E.N. that addressing disease-related malnutrition in hospitalized patients should be a national goal in the United States and thereby help to improve patient outcomes by reducing morbidity, mortality, and costs. A malnutrition-focused national goal would better overtly address the issue of disease-related malnutrition to alert healthcare organizations on the need to provide optimum nutrition care" (Guenter et al., 2015).

Facts About Hospital Malnutrition

As a backdrop to her discussion of care transitions, DiMaria-Ghalili provided several facts related to hospital malnutrition derived from large data sets collected during health care utilization projects (Allaudeen et al, 2011; Corkins et al, 2014; DiMaria et al., 2014; Kassin et al., 2012; Krumholz, 2013):

- Patients coded for malnutrition tend to be age 65 and older, have higher infection rates, longer lengths of stay, higher costs, and higher rates of death.
- Older adults with a malnutrition diagnosis are more likely to be admitted to the hospital from a skilled nursing facility, and more likely to be discharged to a skilled nursing facility.
- Weight loss increased risk of 30-day readmission in medical patients.
- Failure to thrive and malnutrition are frequent reason for readmission in surgical patients.
- Malnutrition and Posthospital Syndrome is "an acquired, transient period of vulnerability" (Krumholz, 2013).

Currently, The Joint Commission, an independent nonprofit that accredits and certifies health care organizations and programs in the United

States, requires that older patients be screened for malnutrition within 24 hours of admission to the hospital, but a second malnutrition screen is not required before discharge, DiMaria-Ghalili stated, which is important in care transition. Her logic for this contention is that older adults are at risk of malnutrition, that malnutrition affects readmission, and that transitional care can influence hospital readmission rates.

Evidence to Support Nutrition During Care Transitions

The ACA gave the Centers for Medicare & Medicaid Services (CMS) the authority to create several Health Care Innovation Awards programs. The first round of awards, worth up to $1 billion, went to 107 projects throughout the United States. DiMaria-Ghalili noted that among the 21 projects targeted at reducing hospital admission rates, nutrition during care transition was not a primary focus (https://innovation.cms.gov/initiatives/Health-Care-Innovation-Awards [accessed May 9, 2016]).

She pointed out the following strengths and weaknesses of the nutrition components:

- **Strengths:** Nurses played a primary role in transitional care. Most of the programs had an interdisciplinary team, and included predictive analytics to identify eligibility for services and levels of intervention intensity. These hospital-based models had the potential to be sustainable upon completion and transitions to skilled nursing facilities were examined.
- **Weaknesses:** The roles of various people on the transitional care teams were not clearly delineated. Nutrition was not fully integrated into the programs. Dietitians were missing from the teams. Most of the sites reported problems with integrating the electronic health records or data across sites and across different settings as well as issues with data use agreements.

A search for other federal and local programs that have focused on nutrition during care transition revealed one ongoing randomized clinical trial funded by the NIA. The study is examining the safety and efficacy of the Dietary Approaches to Stop Hypertension (DASH) diet given for 4 weeks to 50 older adults who had been discharged after a diagnosis of acute decompensated heart failure. DiMaria-Ghalili stated that the findings of this trial will make a significant difference in transitions of care, especially when targeting certain disease states. She also found a variety of other hospital-based programs with widely different components, from sending patients home with food packs to home-delivered meals.

Possible Research and Policy Priorities

DiMaria-Ghalili concluded her talk by suggesting several research and policy priorities:

Potential research priorities

- Integrate nutritional risk assessment into predictive models to determine levels of intensity of nutritional care after discharge:
  - High-risk: intervention delivered by dietitian
  - Medium-risk: intervention delivered by nurses
  - Low-risk: intervention delivered by social worker or lay health worker
- Conduct a secondary analysis of nutrition risk data from Health Care Innovation Awards recipients to develop nutrition risk predictive models based on readmissions, transitional care needs, and chronic care needs.
- Identify and review programs instituted by hospitals to address nutrition needs after discharge. Determine common elements, program costs, cost savings, sustainability, and patient outcomes.

Potential health policy priorities

- Expand reimbursement for registered dietitians beyond diabetes and chronic kidney disease to also include heart failure as these patients are at risk of malnutrition and dietary modifications may play an important role in symptom management of heart failure.
- Incorporate nutrition risk screen and assessment upon hospital discharge and identify ways to incorporate nutrition into transitional care programs.

CHALLENGES AND INITIATIVES IN AMERICAN INDIAN RESERVATIONS

Kibbe Conti, Supervisory Dietitian at the Rapid City Indian Hospital, focused her talk on challenges and initiatives in American Indian reservations of the Lakota tribe, which is part of the great Sioux Nation in South Dakota.

As background, Conti noted that geography often defines foodways. Looking at a map of North America, she explained that the nations she works with are located in the middle of the Great Plains, called the grasslands. Even though the Lakota are different than Crow, which are different than Cheyenne, all the Northern Plains tribes have a similar foodway.

Conti works primarily with the groups who belong to the Cheyenne River Sioux tribe. Their reservation, which covers the two counties of

Ziebach and Dewey, is quite large—3 million acres—but the population density is quite sparse—one to two people per square mile. The poverty rate is 33 percent to 40 percent, depending on the county, median household income is about $32,000, the typical household size is 3.5 persons per house, and 6 percent to 10 percent of the population is age 65 and older. More than 70 percent of the population in the two counties is Native American.

One of the greatest assets in Indian Country is the elders, stated Conti. They carry on the traditions, maintain the language, and are the keepers of wisdom. They are truly valued. However, elders face a number of health challenges, including lower life expectancy (e.g., age 54 for males), higher rates of illness at younger ages, lack of long-term care services, lack of transportation (e.g., a round trip to the grocery store can easily be 60 miles), and lack of built environmental features (e.g., sidewalks, community centers).

Health disparities also are a significant concern, with Native American people experiencing an epidemic of diabetes, as well as high rates of obesity, cancer, cardiovascular disease, chronic kidney disease, and alcoholism. Food insecurity also is very high at 23 percent. Nearly 25 percent of Native households participated in SNAP and 20 percent of older adults receive Supplemental Security Income (SSI) payments.

Conti noted that she works in an urban clinic, which has fewer resources than are available on the reservations. To compensate, people living in the urban areas can access food pantries and the Indian Health Service (IHS) allows doctors to prescribe food supplements to older malnourished adults. "Diets of poverty" are also common. Conti explained that this term describes high-fat, high-carbohydrate, low nutrient diets.

Food Distribution Programs Used by the Cheyenne River Sioux

In the Cheyenne River Sioux communities where Conti works, the FDPIR, until recently, had higher participation rates than SNAP, but that is no longer true. She noted, however, that the FDPIR has greatly improved in recent years and now features updated warehouses, walk-in refrigeration units, and freezers. Good quantities of fresh produce and frozen meat are available and the program provides a large food package. She noted that many of the families that do choose commodities through FDPIR do so because they feel they get a greater amount of food from that program. In addition to SNAP and FDPIR, the CSFP also is popular among the urban Indian population. Furthermore, the Title VI meal programs, and to a lesser extent the Title III meal program also are vital to the Cheyenne River Sioux communities; both programs are under the OAA. The tribe has increased the supplemental funding it provides to the Title VI program to ensure its continued stability.

Conti then described a variety of partnerships that have emerged to care for tribal elders. The Pine Ridge area has a senior living center on the reservation funded through Title VI. Tribal members serve as community health representatives. These health paraprofessionals act as cultural liaisons between the IHS doctors and their patients. Public health nurses and public health nutritionists also play a critical role, said Conti. Another initiative is the Elder Care Initiative, which the IHS began in 2008. This program provides funding to help tribes launch their own long-term care initiatives. Other valuable partners, stated Conti, are the various diabetes programs, some of which have fitness programs and facilities.

The Native Food Sovereignty Movement

Conti closed her presentation by describing the exciting Native food sovereignty movement, which is gaining strength among the Indian tribes. This movement aims to eliminate food insecurity in Indian Country by strengthening food production and reclaiming and restoring former Native food systems. The idea behind the movement is that control over the Native food system helps promote the tribal Nations' economies and people. Conti showed how the movement has adapted traditional food paradigms to the contemporary food system (see Figures 4-5 and 4-6).

In the traditional version, the West direction is associated with water. Rain comes out of the Western direction and provides things to drink, such as water and tea (i.e., tea is simply water with an herb). The North direction holds the symbol of the buffalo. Buffalo provide quality protein and fatty acids. The East direction holds the symbol of Springtime. That is the time when everything begins to emerge from the earth and the gathering season begins. The South is associated with summertime efforts to cultivate crops such as corn, beans, squash, and potato, which reflect traditional Native agriculture. Creating the new paradigm is a way to honor the four things that Native peoples did so well, and to apply it to a contemporary context that allows people to choose a healthy drink, good sources of protein, a fruit or a vegetable, and a starchy vegetable or grain. This new paradigm is similar to the My Native Plate that was developed in 2002. Conti noted that the Native Food Sovereignty Movement provides an important opportunity for youth to partner with elders. The elders have the knowledge about traditional foods and the youth can adapt this knowledge to the foods commonly available today.

Conti closed her talk by stating the need to expand wellness initiatives in Native communities, provide more nutrition screening of elders and more assessments in meals centers. These types of initiatives could help to identify those at greatest risk and direct them to available resources. She also suggested that nutrition education and counseling should be more available.

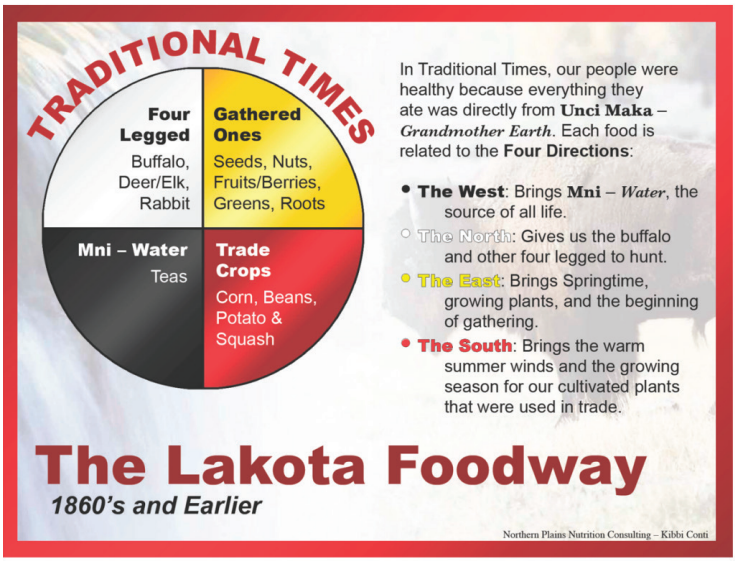

FIGURE 4-5 The Lakota Foodway Dietary Components.
SOURCE: Presented by Kibbe Conti on October 28, 2015 (Northern Plains Nutrition Counseling).

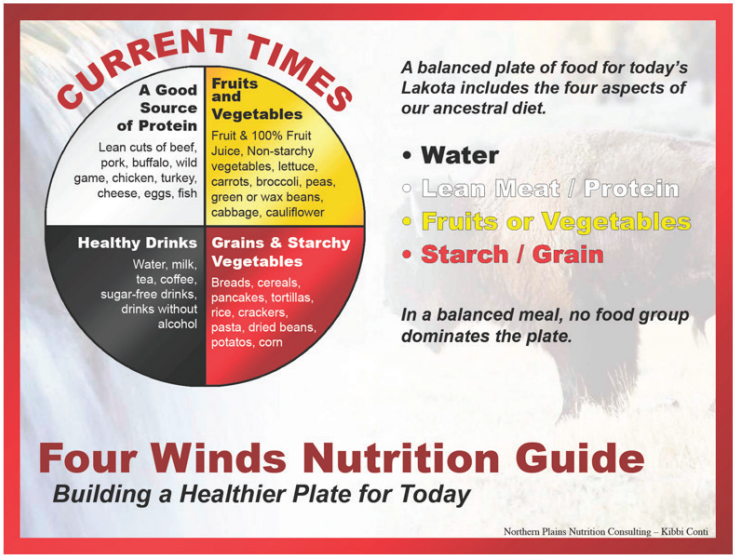

FIGURE 4-6 Four Winds nutrition guide.
SOURCE: Presented by Kibbe Conti on October 28, 2015 (Northern Plains Nutrition Counseling).

Moreover, Conti urged efforts to fill knowledge gaps, as very little research is conducted among Native Americans and elders. Her concluding thought was that attention to improving access to healthy foods is increasing, and this is leading to expansion of local food harvesting and production in some communities. The benefits of traditional foods as a means to restore health is now widely accepted by Native people as the way to restore health to Native Nations.

QUESTION AND ANSWER SESSION

Following the Session 4 presentations, the floor was opened for questions and general discussion. Joining the panel for this session was Jean Lloyd, formerly a national nutritionist with the U.S. Administration on Aging (AoA).

The first question dealt with whether panelists were aware of CMS's Center for Medicare & Medicaid Innovation program on chronic diseases in which seven states are conducting pilot programs to determine how Medicare can improve chronic care management. The questioner was interested in whether the panelists thought that nutrition should be one of the issues covered in the program. Panelists strongly agreed that nutrition should be a vibrant element of these pilot tests. Lloyd noted that an element often missing is the critical connection between nutrition and health in transition care. Most of the transition care grants did not include nutrition because nutrition was not a part of the evidence-based models on which the program was based and in addition, DiMaria-Ghalili said, the grant reviewers did not have a strong nutrition background. Advocating for inclusion of this area of expertise on grant review panels may be necessary.

A second participant noted that the funding for the OAA relative to the number of older Americans in the United States is decreasing and asked Lloyd whether she was aware of any activities by states to use their own Medicare and Medicaid funds to increase the number of meals per week that older adults receive through meals programs. Lloyd pointed that in 1990, funding was about $25 per capita and now it is $12. The programs always have accessed other sources of funds. Under Medicaid waiver programs,[2] 46 states include some meal services but those services vary. Some states say that older adults first must be served by programs under the OAA and if that is not possible, then they will be served under the Medicaid waiver program. Another issue is trying to get funding from other private sources. Under some grants, healthy aging services networks

[2] Medicaid waiver programs are designed to provide services to keep people who are at a nursing home level of care out of nursing homes and in their homes. Under those programs, meals are an optional, not a required, service.

are trying to have managed care insurance companies pay for services such as meals and nutrition education.

Conti responded to a question about lessons from the food sovereignty movement by describing the White Earth program, in which tribes put lands that they recover legally back into food production and have paid for people who harvest using traditional methods to harvest crops such as maple syrup and corn. She continued by saying that, in fact, all the tribes are engaged at some level in food sovereignty efforts using the food ways and key foods of their specific regions, such as buffalo for South Dakota.

Lloyd added that the 2014 Farm Bill included a requirement to allow traditional foods to be used in senior programs, assisted living, nursing homes, and schools on tribal reservations and in Alaskan villages. In addition, the Alaska Native Tribal Health Consortium is developing a model program in which public health is working with traditional hunters and others to serve those foods in nursing homes. A traditional foods conference was held in Albuquerque in October 2015 and participants discussed these issues for Indian country across the nation.

Another participant noted that some presenters asked for clarification in regard to malnutrition and food insecurity outcomes in their screening measures and tools. She also endorsed an increase in funding and asked whether any cuts in Social Security or Medicare would require a greater need for funding from other programs that had been mentioned. Blancato responded that the increase for home-delivered and congregate meals was in a prior appropriation bill. If the current budget is passed, $40 billion in additional funding for nondefense discretionary programs will be available for the next 2 years. After passage, the budget goes to the Appropriations Committees, where attempts can be made to try to get the funding levels raised. The president has put forward a budget for nutrition programs that would increase the funding by $60 million. Organizations will advocate for the highest funding level possible, but that would not be possible without the budget caps being lifted first. On the Social Security side, he continued, the only major change in the budget so far has to do with the disability insurance program to protect it from going into a negative financial situation. He stated that the issue most seniors are concerned about is that about 30 percent of older adults were going to face a 52 percent increase in their Medicare Part B premium on January 1. This group includes dual eligibles, very wealthy Medicare beneficiaries, and those who are on Medicare but not on Social Security. Beneficiaries will pay more for their Part B premium but not as much as was projected.

DiMaria-Ghalili responded to the question about screening tools, noting that it depends on what is being measured. She suggested that a new tool might be needed to screen for risk of malnutrition—not a new tool for use on admission but one what would cover the social and economic issues

that need to be considered when hospitals are ready to send people home. She further stated that existing tools need to be revamped to make sure that hospitals incorporate a holistic approach to screening upon discharge.

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5

Role of Community and the Food Sector

RETAILERS' INITIATIVES FOR MEETING THE DIETARY NEEDS OF OLDER ADULTS

Government programs play a vital role in meeting the nutrition needs of older adults. For-profit and nonprofit organizations also are critically important players. In the first of several presentations on the role of the for-profit sector, Annette Maggi spoke about the retail landscape. Maggi is President of Annette Maggi & Associates, Inc., a strategic nutrition marketing and communications consulting firm that specializes in the interface between food manufacturers and retail grocers.

Maggi outlined four objectives for her talk: (1) explain why retail is ideal for health promotion, (2) provide a landscape scan, (3) describe how health professionals are working at the retail level, and (4) show how retail presents a "total store message."

Retail is ideal for health promotion, Maggi contended, because it is uniquely positioned to easily integrate a health and wellness program with its large consumer base. Consumers visit food or food/drug stores an average of 1.9 times per week. In addition, 92 percent of consumers live within 5 miles of a pharmacy (the average is 1.86 miles) (Nazaruk, 2009). Retail has a significant number of touchpoints with the health conscious consumer. In fact, Maggi asserted, this number is much higher than doctor visits.

In addition, the retailer typically carries 40,000 items and national, regional, and private label brands. Because of their brand neutrality, they are perceived differently than manufacturers and perhaps trusted in a different

way, said Maggi. Retailers are in a position to provide messages across the entire store to help consumers evaluate the differences between products.

Maggi emphasized that retailers are committed to health and wellness for a variety of reasons, including competitive advantage, opportunities to establish profit centers within the store, corporate responsibility, employee engagement, and reduced employee health insurance premiums. Maggi noted that Wegmans has what they call the "amplifier effect"—they believe they can increase the health and wellness education and knowledge of all of their employees and that, in turn, translates to the shoppers in their store.

Approaches to Leverage Health and Wellness

Maggi explained that retailers have used a variety of methods to sell products to shoppers to leverage health and wellness: store design, in-store displays, such as endcaps,[1] in-store signage, couponing, advertising of "better-for-you" products, promotions, publications, and owned brands. Retailers are driving health and wellness through their own brands, which are popular with retailers, Maggi explained, because they provide a much better profit margin than national brands.

Maggi then noted that for health and wellness strategies to be effective in the retail space, senior leadership commitment is essential, as is the commitment of multiple corporate functions, including merchandising, marketing, communications, public relations, and operations. Retailers also are aware that consumers today have easy access to a variety of sources of health information, so providing a credentialed health professional to meet the shopper's unique needs is a way for retailers to distinguish themselves from other stores. For example, although many retail chains have pharmacies in every store, nutrition education is outside the pharmacist's scope of practice. Still, the pharmacist does play a potentially important role in disease management, medication adherence, guidance on supplements, and vaccinations, and retailers see that these are all elements of a total store health and wellness program, even though the "wellness shopper" may never visit the pharmacy nor look to the pharmacist for health and wellness guidance.

Store Dietitians Are a Key Resource

Maggi went on to explain that because of their background and training, dietitians play a key role in retail healthy living programs. Perhaps 600 to 700 dietitians are directly employed by retailers and many others are employed as consultants. Dietitians are versed in nutrition, but also

[1] An endcap is a display of products placed at the end of an aisle in a grocery store.

healthy cooking techniques, behavior change education, food composition and science, food safety, and a host of other food and health topics. Maggi suggested that they are ideally suited to drive consumer education, partner throughout the store on "better-for-you" promotions, and build corporate policies on topics such as genetically modified organisms. The roles of retail dietitians tend to fall into three buckets: a corporate dietitian is at the corporate level, the regional dietitian tends to be focused on stores in a key market, and in-store dietitians tend to have the most direct contact with the shopper as they provide one-on-one education through store tours and cooking classes.

Maggi explained further that the industry is split on the reporting structure of retail dietitians. Those reporting through pharmacy may spend more time on disease management, including medical nutrition therapy and one-on-one consults. Those reporting through operations, merchandising, marketing, or communications tend to focus more on wellness and a total store approach to healthy living. Dietitians report, recounted Maggi, that they spend about 50 percent of their time on health and wellness and 50 percent on disease management, with much of the work being related to disease conditions and targeted at older adults. Immunization clinics, store tours, and cooking classes, Maggi said, are other opportunities for retail dietitians to engage older consumers in dialogue around health and wellness.

A Total Message on Health, Wellness, and Food

Maggi then moved on to the topic of the total store message. This emerging area of retail focuses on how to bring health, wellness, and food together to provide a comprehensive message to consumers. Partnerships between nutrition and pharmacy are potentially valuable and some stores, for example, have begun to promote and market the work of the dietitian combined with the pharmacist. Another example of this partnership is cross-promotion signage to promote vegetables and fruits displayed in the pharmacy and adding healthy nutrition messages to the prescription. For example, if a shopper is picking up a cholesterol medication, a dietitian can put tips about healthy eating to control cholesterol into the package.

Another link is with in-store clinics. Some retailers have medical clinics in their retail stores. The primary usage of these clinics is cold, cough, flu, and similar acute conditions, that occur more frequently in the winter months. To broaden their healthy living messages and to increase their return on investment, weight management and smoking cessation programs as well as school and sport physicals are being included as additional services in the clinics.

In conclusion, Maggi noted that although retail health and wellness programs are not specifically designated as programs for older adults,

they have considerable appeal for these audiences. Partnering with retail on health and wellness could have great impact because most food buying decisions are made at the point of purchase. It may be essential for interested partners to create win-win opportunities and understand the retail environment.

INSIGHTS FROM THE RETAIL SECTOR: THE LITTLE CLINIC AT KROGER

Eileen Myers is Vice President of Affiliations and Patient Centered Strategies for The Little Clinic at The Kroger Co. Kroger was founded in 1883 and headquartered in Cincinnati, Ohio. It is the nation's largest traditional grocery retailer and also has 1,965 pharmacies throughout 32 states.

Characteristics of The Little Clinic

The Little Clinic is the health clinic inside of Kroger. Kroger now has 181 clinics in 9 states. The clinics are accredited by The Joint Commission and affiliated with local health systems, including Ohio State University, University of Colorado, University of Cincinnati, Virginia Commonwealth University, Vanderbilt Affiliated Network, Via Christi Health, and Covenant Medical Group. Kroger meets with these health systems and looks at gaps in care to determine how the clinics can help fill those gaps, such as through providing after-hours and same-day service, providing post-discharge follow-up, and serving as a portal for chronic disease management. Myers noted that this capability is especially useful for patients who are unwilling or unable to see a provider because of time or resource constraints. About half of its affiliations have an interface with electronic medical records, so health information from a Little Clinic visit can be shared with a primary care physician.

The clinics are operated by nurse practitioners and physician assistants, who focus on acute, episodic care and screenings for people ages 18 months and older. The clinics have seen growth in the number of visits by adults ages 50 and older; about 25 percent of the patients seen at The Little Clinic are older than age 50.

Myers noted that The Little Clinics have a number of strengths. They provide convenient and cost-effective access to a health care provider who can identify, diagnose, and treat. They are connected to well-established health systems and participate in Population Health Management[2] and in

[2] Population Health Management is the aggregation of patient data across multiple health information technology resources, the analysis of that data into one actionable patient record, and the actions through which care providers can improve both clinical and financial

clinical trials. They provide an avenue to build motivation for health behaviors and links to additional health and wellness, including healthy food in the store, pharmacists, and in-store dietitians.

At the same time, Myers admitted that The Little Clinics do face some barriers. These include legal challenges that prohibit the clinics from offering some services, depending on the state. Another barrier is that some payers will not reimburse for The Little Clinic services. Also, Myers mentioned, some health care practitioners, especially pediatricians, have difficulties accepting this new form of health care delivery.

In closing, Myers reiterated that the goal of The Little Clinic is to provide personal, relevant health care solutions that are easy and affordable. Kroger is now doing that in a small way, but Myers expressed confidence that this opportunity will grow in the years ahead.

PERSPECTIVES FROM A "HOME SERVICE" RETAILER

Beth Burrough, a Partner of Healthcare Alliances and Chief Marketing Officer for PurFoods LLC, turned the workshop participants' attention to the practical realities of getting healthy and nutritious food to the aging and vulnerable. They market their product under the brand name of Mom's Meals NourishCare. The company was founded in 1999 and is headquartered in Des Moines, Iowa. The company delivers more than 14 million meals per year through partnerships with state and local government agencies and health providers.

Mom's Meals expertise is in rapid, direct-to-customer nationwide delivery of fresh prepared meals designed around the Dietary Reference Intakes (DRIs) and also nutritionals tailored for specific health conditions. Its mission is to be the leading expert on, and provider of, nutrition solutions that preserve health, help combat chronic disease, support recuperation, and nourish independence for higher- quality living at home.

Burrough described how Mom's Meals provides a unique solution created to address nutritional needs of older and disabled adults and patients (see Figure 5-1).

Burrough noted that providing a custom solution that is created and controlled by the customer is a critical point. The meals are designed to meet the needs of people with acute as well as chronic needs, including malnutrition and food insecurity. Burrough explained that the Mom's Meals concept is an emerging health care area with considerable opportunity. The program appeals to Medicaid because it meets the goals of the Medicaid

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outcomes. [NOTE: This definition is from http://www.wellcentive.com/what-is-population-health-management (accessed May 9, 2016).]

FIGURE 5-1 Addressing the nutrition needs of older adults with acute and/or chronic conditions by Mom's Meals.
SOURCE: Presented by Beth Burrough on October 29, 2015 (Mom's Meals).

Waiver program[3] by responding to the nutrition needs of a large number of individuals who qualify for, or would otherwise be going into, nursing homes. The program also has advantages for Medicare because it improves care transitions and chronic care management. The majority of states with which Mom's Meals has contracts provide one or two meals per day, but many customers could use all three. Many customers are on a fixed income and are having to make decisions about whether to use that money to feed themselves, pay their rent, or buy their medications.

[3] Medicaid's home- and community-based service (HCBS) waiver program allows states to provide an array of home and community services, including home-delivered meals, nutrition counseling, and nutrition risk reduction to older adults. For more information, visit https://www.cms.gov/Outreach-and-Education/American-Indian-Alaska-Native/AIAN/LTSS-Roadmap/Resources/State-Federal-Relationships/National-Overview-of-1915c-HCBS-Waivers.html (accessed May 9, 2016).

Characteristics of Mom's Meals

Each Mom's Meals provides one-third of the DRIs for a male ages 70 and older. Calories vary according to state requirements, though the default is the *Dietary Guidelines for Americans* recommendations. Vitamin levels also vary by state. Burrough noted that the company manages 17 different nutritional profiles conforming to the requirements for 31 states. Another challenge is that the DRIs were designed for healthy adults, yet 90 percent of the Mom's Meals population is believed to have one or more chronic conditions based on CMS data. To address this reality and also meet the needs of the patients they serve, Mom's Meals has developed health condition menus that meet scientific and health association guidelines for nine clinical conditions (i.e., heart friendly, diabetic friendly, renal friendly, cancer, pureed, lower sodium, general wellness, gluten free, vegetarian). The meals also must meet rigorous food quality and food safety requirements while being comfort foods. Mom's Meals continually surveys its customers and their preferences always come back to these foods.

The Meal Delivery Process

The logistics of preparing and delivering meals is complex, involving six hundred staff people to carry out the approval, enrollment, order taking, and home delivery. This process, stated Burroughs, is taken very seriously because failure to deliver may mean someone does not eat. Mom's Meals uses a combination of its own delivery trucks, UPS, and FedEx. The company is able to get to any area, including rural areas, within 1 to 3 days.

Mom's Meals conducted a satisfaction survey with 152 customers, and the results demonstrated the impact the service has. Among respondents, 91 percent felt that their quality of life had improved, more than 75 percent felt they were actually eating better, and more than 40 percent reported that the meals help them remain in their own homes. Respondents also said that the service allows them to be self-sufficient and independent, and that is a significant quality-of-life issue.

Burrough closed her talk with some reflections on the need for scientific research. She stated that a fair amount of research on malnutrition and its prevalence and impact has been conducted, but very little research has been done on effective community-based interventions to address the impact of long-term nutritional interventions on quality of life, prevention of long-term institutionalization, rate and length of hospitalization, and overall medical costs. Mom's Meals is collaborating with the University of Michigan and Columbia Presbyterian on an NIH-funded trial in post-discharge acute decompensated congestive heart failure patients. Mom's Meals also

partners with Kaiser and hopes to gain more insight on how the meals affect their members' health and quality of life.

Services like Mom's Meals also provide an opportunity, noted Burrough, to rethink nutrition as more than a support service (which is how it has been characterized in the Medicaid Waiver Program), but as a critical health intervention for preventing nursing home care, aiding in post-discharge recovery, supporting chronic care management, and providing additional support to the Supplemental Nutrition Assistance Program (SNAP) participants. It also can be an avenue for refining DRI meal guidelines or adding therapeutic guidelines that are aligned with evidence-based nutrition specifications for health conditions.

FOOD PRODUCT DEVELOPMENT FOR OLDER ADULTS

John Ruff, former head of research and development for International and North American businesses at Kraft Foods and a past president of the Institute of Food Technology, opened his talk by explaining that he would consider the question of what the food industry is doing to address the needs and preferences of older adults. With a few exceptions, few successful food products have been specifically designed for older adults. On the other hand, the nutrient supplement business is incredibly successful, although recent research, said Ruff, places some doubt on whether some supplements, for instance calcium, have benefits for older adults (Tai et al., 2015).

Ruff set the stage by describing how the age 50 and older population segment is large and diverse. The key to making products for older adults, concluded Ruff, is not to make products specifically for them. Stereotyping this group will lead to products sitting on the shelves. Older American consumers are trying to eat more healthfully and the adoption of healthy food behaviors increases with age. For example, Ruff observed that 35 percent of younger Baby Boomers (those ages 50 to 68) eat whole grains on most days compared to 44 percent of seniors, and 21 percent of young Boomers consume omega-3 foods or supplements on a daily basis compared to 30 percent of older adults. That shift, Ruff pointed out, will make a difference and provide opportunities for overt development of products for the older population.

Impacts of the Baby Boomer Generation

Ruff then described the impact of the Baby Boomer generation. In 2014, Baby Boomers accounted for 23.6 percent of the total U.S. population. According to Ruff, they are by far the single largest and most influential demographic group in history, and they have the spending power to disrupt the entire food market. Citing a recent trend report (FONA Inter-

national, 2014), Ruff noted that in 3 years, nearly half of the U.S. population will be age 50 or older and they will control 70 percent of disposable income in the country. Boomers' median household incomes and median expenditures exceed the average. They outspend other generations by $400 billion per year on consumer goods and services. Boomers' annual spending has been estimated by some to be responsible for half of all consumer expenditures in the United States, to the tune of $2.3 trillion, annually (FONA International, 2014). They want an active lifestyle so that they can keep up with grandchildren and will spend what they need to in order to extend their ability to do those things. As a result, it is expected that the global market for functional foods, or super foods, is expected to reach $130 billion in 2015. In addition, they are taking a variety of actions to stay healthy, including consuming more protein and fruits and vegetables.

Up to the age of about 65, older adults are trying to lose weight, and after that they focus on maintaining weight. They are socially active and involved in the community. They travel more, Ruff stated. They pay attention to packaging designs and they own smartphones, but do not use them to their full potential. They are concerned about privacy, and advertising on social media is viewed as an invasion of privacy.

Those ages 50 and older believe that foods and beverages are important to improve health and help them stay young. Interestingly, continued Ruff, this generation is more concerned about nutritional value than the source of the ingredients. They have a tendency to accept fortification more in beverages than in food. They also tend to shop on the perimeter of the stores. Like many people, they look for value for money. One major challenge they face is declines in the senses of taste and smell, as well as increasing difficulties with chewing and swallowing, which affects the palatability of foods and the ability to eat and may increase the risk of malnutrition.

Product Development to Meet the Needs of Older Adults

Product development is complex, and especially so when dealing with the older population. A few examples of the complexities are the need for different portion sizes due to lowered appetite, the need for higher nutrient density and flavor enhancement, and better texture, compensatory strategies (to cope with reduced motor skills) and appropriate packaging (single portion or smaller pack sizes with readable fonts and easy-to-open packages).

Ruff mentioned food labeling and regulatory challenges that limit food product development. He also noted that, in contrast to the United States, Japan has developed the Food for Special Health Uses (FoSHU) concept with the backing of the government. This concept has led to innovation in foods using functional ingredients, with many of the products focusing on

health issues of an aging population. Foods that meet specific requirements for FoSHU are marketed under the FoSHU label and have an exclusive market protection, unlike similar products in the United States.

He ended with two additional points. The first was that the opportunities for the food industry to focus on older adults is going to get significantly greater as Baby Boomers age. The second one was that the best way to improve the health of the elderly is to improve the nutrition of younger adults.

THE ROLE OF COMMUNITY PROGRAMS: P.E.E.R., INC.

Sally Allocca, Senior Pastor of East Lake United Methodist Church in Birmingham, Alabama, explained that she would describe how a church kitchen can partner with a nonprofit organization to form a viable food system to support low-income community residents. To set the stage, she showed a video[4] about the church and the nonprofit that was produced by two students from the University of Alabama for one of their classes.

South East Lake has undergone a dramatic demographic shift in the past 15 years. About 10 percent of the population is older than 65, and the community is predominately African American. About 28 percent of the population lives alone and the median income is $23,000. About one-third of the population receives SNAP benefits.

The East Lake United Methodist Church was founded more than 125 years ago with a commitment to be "in the neighborhood for good." The mission of the church is radical hospitality, welcoming all as Jesus would welcome them, and this mission is lived out in diverse ministries. One such ministry is the "Downstairs Diner," a commercially equipped kitchen onsite. This Health Department–licensed and –approved facility provides healthy and hearty meals to community members.

Reaching the Community Through P.E.E.R., Inc.

P.E.E.R. stands for Promoting Empowerment Enrichment Resources and it was started in 2005 to more effectively reach the community. Its flagship program is the East Lake farmers' market, from May to October. Allocca noted that one of the market's most popular programs is the Senior Market Basket Program. P.E.E.R. purchases foods in bulk from the farmers and delivers 150 boxes each week to low-income older adults in two neighboring communities. This program has been described in a paper published in the *Journal of Hunger & Environmental Nutrition* (Dover et al., 2013).

Other P.E.E.R. programs extend the purchasing power of money that

[4] This video can be viewed at https://vimeo.com/94114446 (accessed May 9, 2016).

people spend at the market for vegetables and fruits. These efforts piggyback on programs that are already established so there are no additional application or eligibility process.

P.E.E.R. also has a mobile market bus that takes food to older adults. It was the mobile library for a nonprofit in town and they gave it to P.E.E.R. This bus goes to senior centers, facilities, and schools. P.E.E.R. also has a chef apprentice program where it trains unemployed or underemployed individuals in the neighborhood in culinary skills. This program gives people skills so that they can prepare the fresh food they get at the farmers' market and it provides great training and opportunities for jobs in the food system. It also generates good cooks who can work in the Downstairs Diner.

The Importance of Community Partners

Allocca went on to discuss the importance of having good community partners and stable sources of support. The church was already known as a resource center, so many community groups were already associated with it. The church relies on the health department, the food bank, and many other nonprofits and they conduct many of their programs in cooperation with them. Funding comes from donations as well as from private and public funders. The church is being used by other groups for their own programs. For example, the University of Alabama acute care for elders unit partnered with the church to develop a home-delivered meals program to people who had just been released from the hospital or rehab to see if improved nutrition would reduce the risk of readmission. It worked well for both groups because the church did not have to do any of the research or program development and the university was able to use the church's existing contacts with local farmers to obtain the food. Allocca encouraged researchers among the workshop participants to follow this example and look for local institutions to help them with their programs. East Lake also is preparing meals for other churches in the area, which are using them for their own older adult programs. This arrangement helps East Lake through the purchases of the meals, and helps the other churches by providing healthy meals for their older adults.

Allocca concluded by saying that the church works hard to raise money for its programs through as many avenues as possible, including fundraisers, selling value-added products made from fruits and vegetables purchased from farmers, and grant writing. It also depends heavily on its leadership and staff, and relies on the community to let them know that the church is meeting the needs that they have. The church works closely with area colleges, which supply volunteers and interns, and depends on its board to help with marketing and fundraising. It takes everyone working together to get the job done.

THE ROLE OF COMMUNITY PROGRAMS: CITY HARVEST

Leslie Gordon is the Senior Director of Program Strategy and Operations for City Harvest. City Harvest was founded in 1982 and it has been in the marketplace in New York City for more than 30 years. For 6 years, City Harvest has received a four-star rating from Charity Navigator, America's largest independent charity evaluator. The organization has a staff of 160 people and more than 20,000 individuals volunteer throughout the year.

City Harvest is the world's first, and New York City's only, food rescue organization. It is dedicated to feeding New York's hungry by collecting excess food that would otherwise go to waste and distributing it to those in need. The food comes from food manufacturers, wholesalers, corporate cafeterias, farms, and other sources. City Harvest, a member of Feeding America®, delivered its 500 millionth pound of food in 2014. In its first year, it delivered slightly more than 1 million pounds of food. Its 45,000 square foot warehouse facility opened in 2011 and it has given City Harvest the capability to move more food than ever before. It is on pace to deliver to hungry New Yorkers nearly 60 million pounds of good nutritious food in 2015. Even City Harvest's food waste does not go to waste, as it has it worked with an organization called Build it Green. This organization gets any waste from City Harvest and produces compost from it that is used in city community gardens. City Harvest's fleet of 22 refrigerated trucks, including two tractor-trailers, travel about 275,000 miles per year criss-crossing New York City, the equivalent of about eight times around the equator. City Harvest does all this for free, being the beneficiary of a highly diversified funding stream, with individuals as the largest base of donors.

Hunger in New York City

Hunger remains a serious problem in New York City and the problem has become increasingly complicated in recent years. About 1.4 million New Yorkers are food insecure and face hunger. Last year, the soup kitchens and pantries that City Harvest serves helped provide food to many of the 2.5 million city residents ages 50 and older. About 1.4 million New Yorkers are currently ages 60 and older; by 2030, that number will rise to about 1.8 million, making older adults roughly 20 percent of the New York City population. One out of every 10 older immigrants in the United States lives in New York City. Immigrants make up about 46 percent of the city's older adult population (Gonzalez-Rivera, 2013). Older adult immigrants have lower incomes than their native counterparts, and typically much less in retirement savings. Gordon illustrated with a map of New York showing the convergence of hunger and diet-related disease in low-income neighborhoods (see Figure 5-2).

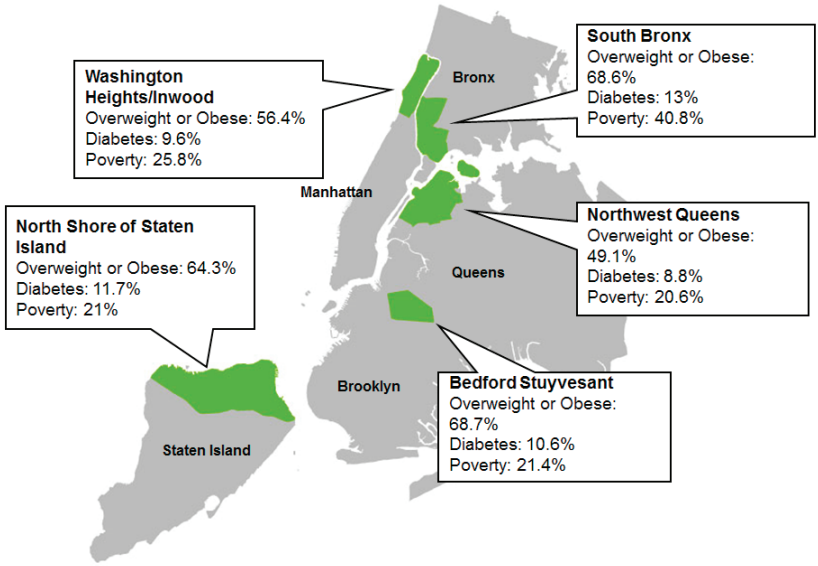

FIGURE 5-2 Hunger and diet-related disease converge in low-income communities in New York City.
SOURCE: Presented by Leslie Gordon on October 29, 2015.

Across the country, Gordon stated, it is generally known that emergency food, originally intended to be used only in times of emergencies, is now needed on a regular basis. Older adults in New York, as in other places, struggle with hardships, such as low fixed income. They also must contend with extremely high housing costs. Higher rates of serious health conditions and low participation in SNAP contribute to long-term reliance on emergency foods. One in five older adults in New York lives below the federal poverty line. A similar number receive food from soup kitchens and food pantries, of which there are about 1,200 total across the five New York boroughs.

Communities where poverty is high also have high disease rates, noted Gordon. In addition, New York City Department of Health findings suggest that affordable healthy foods are hard to find, and farmers' markets, supermarkets, and sources of fresh healthy foods are typically scarce. Sources of healthy food are vastly outnumbered by fast food restaurants and poorly stocked corner stores. New York has an abundance of heavily processed, cheap, convenient food that is highly caloric and low in nutritional value, stated Gordon, who added that this is the new normal in New York City.

FIGURE 5-3 City Harvest's integrated approach in the Building Healthy Neighborhoods program.
SOURCE: Presented by Leslie Gordon on October 29, 2015 (City Harvest).

The Healthy Neighborhoods Program

This reality, stated Gordon, has required City Harvest to evolve how it conducts its program. Its new Healthy Neighborhoods Program has a vision in which healthy food is available, affordable, and in high demand. The program has several key goals, including relieving food insecurity, improving access to healthy and affordable food, increasing awareness of healthy habits and inspiring positive changes to dietary behaviors, and strengthening community capacity.

The program is built as an expansion of the work City Harvest started in the early 1980s: rescuing and delivering food. The program operates in low-income communities that have high rates of diet-related disease and challenges in finding healthy affordable food outlets. The program has four main elements that work together (see Figure 5-3):

- The program serves very low-income, low resource communities. The first step therefore is to ensure that the program **brings emergency food into the neighborhood, focusing on fresh produce.** This is done through City Harvest's Mobile Markets and deliveries. City Harvest delivers food free of charge to soup kitchens and food pantries throughout New York City, including 74 of them in the

program's Healthy Neighborhoods. City Harvest also has mobile markets, which are a free, fresh air, open distribution farmers' markets that are done in conjunction with the New York City Housing Authority. These mobile markets are done 18 times per month and each event lasts about 3 hours. City Harvest brings up to 20,000 pounds of fresh produce in different varieties. The produce is distributed primarily to older adults. The markets provide an opportunity to talk with people about how to eat well, so the events also have cooking demonstrations and an "ask the doctor" table. City Harvest partners with hospitals that are often present at the mobile market. The markets provide a casual, comfortable way for health professionals to have conversation about disease management, asthma, diabetes, heart disease, and similar topics.

- City Harvest develops **partnerships with food retailers** because people do not need free food all of the time. When they are able, they want to purchase healthy food for themselves and their family, but they need a place to buy it. City Harvest is partnering with smaller independent supermarkets, corner stores, and bodegas to increase the variety of fresh produce they carry. It launched a program in 2012 to work with 64 retailers in the area by the end of 2017 to ensure their produce offerings are fresh and affordable and that their stores are in places where residents could and would like to spend their food budget. City Harvest works through local supermarkets to train store managers on how to successfully manage a produce section to increase sales of quality, affordable produce. City Harvest also works with area corner stores that are situated in areas that allow them to reach residents with fresh produce.
- City Harvest connects **nutrition education** with its emergency food and at food retail sites, including its mobile market, supermarkets, and corner stores. City Harvest believes that integrating nutrition education right where people are makes a big difference. Since 2000, City Harvest has been engaging residents in low-income communities—older adults included—in nutrition education programs that increase individual appreciation for and consumption of healthy, low-cost foods. Through hands-on cooking and nutrition courses, grocery store tours, and cooking demonstrations, community residents learn to shop for and prepare healthy, delicious dishes for themselves and their families while staying within their budget. City Harvest reaches older adults at senior centers, churches, and community centers. Its Well Seasoned course, developed by an in-house registered dietitian, addresses the specific needs of older adults. Over 8 weeks the course takes them through

food safety, budgeting, physical activity, nutrition, how to purchase healthy food on a limited budget, and reading food labels.

- City Harvest ties its work into the **community.** The success of the Healthy Neighborhoods Initiative depends on people and organizations that reside in communities where it works. Before entering a neighborhood with programming, City Harvest conducts a Community Food Assessment that helps it understand what a community wants, create a vision for how to go about doing it, and identify some barriers to success. It convenes Community Action Networks to provide a space for community organizations and residents to drive change in their neighborhoods. City Harvest plays a convening role.

Evaluation also is an important foundation for the program. City Harvest wants to know whether its programs are working, both at the individual and program level. At the individual level, it wants to know: Are people changing eating behaviors after participating in the nutrition programs? Are people shopping differently because of the program's work in supermarkets? At the initiative level, it wants to know: Do residents feel they have improved access to healthy food in their neighborhoods? Do all programs result in people eating more produce?

Lessons Learned from the Healthy Neighborhoods Program

Gordon summarized some of the key lessons learned in the Healthy Neighborhoods program:

- Partnership-based programming requires time and patience.
- Each neighborhood is unique and dynamic.
- Community engagement is critical.
- Programming and messaging must be culturally sensitive.
- Anchor partners are key.
- Cross-sector collaborations are fruitful.
- A consistent presence builds credibility.

City Harvest is thinking about opportunities for additional programming in the future, including a potential retail program, pilot programs around using SNAP dollars to incentivize purchases for nutritious foods, ways to reach out to older adults with nutrition information and disease management information, and ways to use text messages to educate consumers. City Harvest also is thinking about how to engage consumers as change agents on the policy side and opportunities to change the built

environment in ways that can encourage healthy lifestyles and increased levels of fitness.

COMMUNITY PROGRAMS FOR CHRONIC DISEASE AND SENIORS

The final speaker for Session 5 was Hilary Seligman, the Senior Medical Advisor and Lead Scientist at Feeding America®. Seligman also is Associate Professor of Medicine and of Epidemiology and Biostatistics at the University of California, San Francisco.

To help workshop participants understand the connections between food insecurity and chronic disease and why these community programs are so important, Seligman reminded them that 5.4 million seniors are food insecure and there is a very important difference between the concepts of hunger and the concepts of food insecurity (Ziliak and Gundersen, 2014). The official definition of hunger is that it is a physical sensation that everyone experiences no matter their financial access to food. In contrast, food insecurity is officially defined as an economic and social condition of limited or uncertain access to food. Seligman explained that she considers the differences between being hungry and being food insecure important because people who are food insecure engage in a never-ending sequence of coping strategies in order to avoid the physical sensation of hunger. These strategies occur in the context of preventing and managing chronic disease.

Food Insecurity and Coping Strategies

Coping strategies that food insecure adults use include shifting food choices toward low-cost foods. This tends to be fewer fruits and vegetables and more fats and carbohydrates because fruits and vegetables are more expensive calorie for calorie than are carbohydrates and fats. Seligman noted that food insecure adults also eat highly filling foods in the hope that they will be full for the rest of the day if they do not have access to a second or a third meal of the day. Other strategies include concentrating on a small variety of foods that are either comfort foods or that people are very confident will keep them full. A big effort to avoid any food waste and binging when adequate food is available to keep them healthier during anticipated times of food inadequacy of the future also occurs. Although people use many other coping strategies as well, Seligman said that she highlighted these because they are highly relevant to increased risk of obesity and other chronic diseases.

Seligman then elaborated, stating that these strategies start a cycle that is challenging for the food insecure adult to deal with. She provided a conceptual model to illustrate this cycle (see Figure 5-4).

Using this framework, Seligman explained that food insecure older

adults adopt a number of coping strategies that change the way they eat. These changes are accompanied by extreme stress that individuals live with when they do not have adequate money to afford food. The adoption of these coping strategies places individuals at higher risk of chronic disease. When chronic disease burden increases, health care expenditures go up and, particularly for older adults, functional status goes down. For younger older adults, employability also may decrease. As household income decreases, pressure on the household budget increases and spending trade-offs occur, leading to food insecurity. Seligman emphasized that because of the high costs associated with health care in the United States, once individuals enter this cycle of food insecurity and chronic disease, it is very challenging to get out of it. Stress and competing demands make it difficult to both manage food insecurity and a chronic disease. To illustrate, Seligman posed the example of an older adult with diabetes who has to make the choice of paying for test strips or having another meal to eat. She noted that for many food insecure people, the focus on finding the next meal crowds out other things. People have cognitive bandwidth for only a certain number of things, no matter what their age is. She showed several quotes from a study by Wolfe and colleagues (2003) that illustrate their experiences with food insecurity (see Box 5-1).

Because food insecure older adults are not always able to obtain the nutrient-rich food they need to enable their medications to work effectively

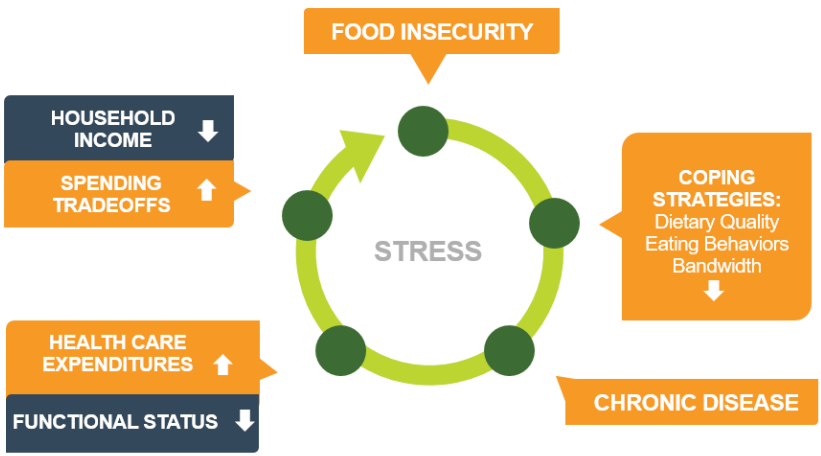

FIGURE 5-4 A conceptual framework for the cycle of food insecurity and chronic disease.
SOURCE: Presented by Hilary Seligman on October 29, 2015 (University of California, San Francisco).

BOX 5-1
Illustrating Older Adults' Experience with Food Insecurity

- **Reduced food intake:** "With all of my expenses . . . sometimes I have to go to bed without eating, [but] I am used to it."
- **Episodic food availability:** "There were times that if we found [food] for lunch we didn't have [food] for dinner. Sometimes [our daughters] would help us. They would give us a loaf of bread and they would help us with a little bit of food. . . . It is sad and painful. Sometimes we run out of things towards the end of the month."
- **Dietary quality, competing demands:** "I buy the medication first. I cook macaroni and put some sauce on it…. No protein, you know, not enough protein."
- **Stress:** "I worry a lot because of nutrition and health. I don't have the money to buy what I need."
- **Coping strategies:** "Sometimes I don't have anything here and I don't want to tell my children that I am in that situation. I'll go to some of the Sisters' apartments from church and they offer me food and that's how I can get something to eat."

SOURCES: Presented by Hilary Seligman on October 29, 2015 (from Wolfe, 2003).

and help keep themselves healthy, they face significant health challenges. Compared to their food-secure peers, food-insecure older adults are 60 percent more likely to experience depression, 53 percent more likely to report a heart attack, 52 percent more likely to report asthma, and 40 percent more likely to report congestive heart failure (Feeding America and NFESH, 2014). They also are more likely to have diabetes and a host of other diseases.

Key Intervention Points

Going back to the conceptual framework, Seligman pointed out two key intervention points—the point at which people experience food insecurity and the point at which they have developed chronic disease. To the extent that food insecurity can be resolved, said Seligman, clients and patients and older adults in our community can avoid the need for coping strategies that challenge the prevention and management of chronic disease. The goal, Seligman said, is to move interventions upstream, to the earliest point possible that is, moving interventions into the community. Food insecurity can be a very socially isolating experience, so community interventions that can

reduce food insecurity also have the bonus of reducing social isolation. The second is that food insecurity among older adults declines as people age.

Seligman then noted that older adults have a continuum of needs based on their mobility and ability to prepare meals, and this continuum influences the approach taken by Feeding America®. Different interventions are required to reach each of these groups. The three broad categories include older adults who are not homebound and can cook or access meals. Food pantries and meal sites are good interventions for this group. Because people are now using food pantries as a regular source of food not just for emergency food support, these sites provide an opportunity for other types of interventions, such as chronic disease management. Feeding America® currently has a project that provides diabetes self-management support in the food pantry. A person who comes to the food pantry every month can have his or her hemoglobin A-1c checked. The pantry can then not only make sure he gets the healthy food he needs but may even be able to connect him to appropriate disease management care.

The second group is older adults who are homebound and can cook. Community-based programs, such as home-delivered groceries, are interventions that work well for this group. The third group is older adults who are homebound and cannot cook. Home-delivered meals are a valuable approach for this group.

Seligman explained that Feeding America®'s primary focus is on increasing access to food for older adults who are not homebound. It has chosen to primarily focus its strategy on this segment because of the alignment of serving this population with the core competencies of its nationwide network of 60,000 food pantries and meal programs. To meet the needs of other older adults across the spectrum, Feeding America® and its network take a supportive or a partnership role with other organizations. These two premises are the foundation on which Feeding America®'s senior hunger strategy is grounded.

QUESTION AND ANSWER SESSION

Following the Session 5 presentations the floor was opened for questions and general discussion. Presenters and workshop participants commented on a range of themes emerging from the presentations. These ideas included the growing awareness of food waste and how partnerships and programs can be formed to make more productive use of that food. Another theme was the need to intervene earlier to identify food insecurity. Determining food insecurity when a person has developed health conditions may be too late. A third idea was the power of community and that bringing their strengths to partnerships may be a key factor in their success. Some communities have strong efforts to help older adults, but in other commu-

nities, that help does not exist, and time and energy is needed to support those communities. Another theme was the importance of complete and wholesome nutrition for older adults and how it can be a challenge to get that wholesome food to many older adults and to provide the information they need for eating healthy and managing or preventing disease.

A participant asked each of the presenters about their thoughts about health and wellness in their area and, if there is a partnership that would help with that, what might that be? Maggi stated that it would be transformative in the supermarket to make it easier for people to buy, assemble, and obtain healthy food. Myers stated that a beneficial partnership in her mind would be efforts by store clinics to hire more dietitians in order to make healthy choices the easy choices. Burrough stated that it would be how nutrition will come into the medical equation at either care transitions or chronic care management. She feels that vulnerable older adults who are going home from the hospital are the next big priority group. They are not mobile and they do not have consistent caregiving. The Centers for Medicare & Medicaid Services (CMS), groups like AARP, and health plans will all need to be involved in addressing the needs of this group, Burrough suggested. Medical institutions and health plans also are becoming more involved in health and wellness initiatives.

Some presenters and workshop participants also noted the potential in emerging partnerships between food banks and food pantries and the health care system. The system of food pantries in the United States is extraordinary in scope. They are located in the neighborhoods of highest need. This creates an opportunity to reach people in their communities in a place that they are, in many cases, very comfortable going. They know the volunteers. Many pantries are open at a time that is worked into their schedule. Chronic disease management is very challenging from a health care perspective because it requires interaction frequently. Some presenters observed that it is hard to go to a doctor in an academic center once a month, and pay for parking or walk-in a full block from the bus stop. The food pantries are often right there and people are primed when they walk in to talk about health because food is understood so much in the context of health. Churches also can play a vital role in these partnerships because they are an established and trust part of the community.

A final comment from Leslie Gordon elaborated on the partnership idea. She noted that City Harvest is laying out the foundation for its healthy neighborhood programming over the next few years. One of the things it is acknowledging is that City Harvest is good at some things, but that others can provide necessary resources to address the needs of the whole person not just their food needs. One thing they will be thinking about, for example, is how to connect mental health providers and clinicians with the work they do and the emergency food network of food pantries and soup

kitchens. Currently, a smattering of the 1,200 emergency food programs in New York City distribute food and also address the care of the whole person, including conducting some mental health screening but, Gordon observed, it is not nearly enough.

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6

Potential Research Priorities and Gaps

DOCUMENTING OUTCOMES FROM OLDER ADULT NUTRITION PROGRAMS

Kali Thomas, Assistant Professor at the Brown University School of Public Health and a Research Health Scientist at the U.S. Department of Veterans Affairs (VA), opened her presentation by noting that she has a longstanding interest in assessing the impact of programs to enable older adults to remain at home. Previous work has included studies on spending on home-delivered meals and low-care nursing home residents and a follow-up analysis of state savings related to increasing home-delivered meals capacity. This analysis showed that by spending more and expanding home delivery of meals, states could have saved $109 million in 2009 (Thomas and Mor, 2013). In addition, 26 states would have immediately realized savings based on these results and 22 others were projected to have savings in the future. She noted that she also completed a project with Meals on Wheels America with funding from an AARP Foundation grant to profile older adults on waiting lists for home-delivered meals, and to study the effectiveness of different meal delivery modalities on clients' outcomes. Currently, she noted that she is leading a study to evaluate the role of home-delivered meals and use of health care.

A Logic Model to Assess Program Impact

Thomas then shared a logic model that provides a way to assess the impact of the programs' performance. The model is a feedback loop in

which each component (inputs, process, outputs, and outcomes) informs the other. Because of current reporting requirements, Thomas noted that programs do well on tracking information in the first three elements of the model. They can explain their funding and resources that they use, as well as their missions and the legislation that enables them to provide services. They can describe the cost and their infrastructure, their staffing, and the vendors and food preparation facilities they contract with. They can report on the number of volunteers they are able to recruit and retain and the numbers of people receiving meals. They can report on the number of unduplicated meals that older adults receive and provide some information on client satisfaction.

However, when it comes to outcomes, Thomas emphasized that information is lacking. Several avenues to find current measures of these programs exist. The National Survey of Older Americans Act (OAA) Participants is a telephone survey with approximately 6,000 clients of OAA programs. About 1,000 of these older adults receive home-delivered meals and 900 receive congregate meals. Participants are asked about how often they receive a given service, how they feel the service affected their lives, and whether it met their physical, social, and emotional needs. The Performance Outcome Measurement Project was developed by the U.S. Administration on Aging (AoA) in collaboration with State Units on Aging[1] and Area Agencies on Aging[2] and a number of universities. This project developed a publicly available toolkit, which is a combination of the grantee development efforts and provides step-by-step instructions on how programs can go about measuring outcomes. A third source of information about outcomes is scholarly research and the grey literature. A wide spectrum of published papers and reports about program outcomes has been published.

Even with all this information, Thomas stated that some limitations to current evidence exist. The National Survey of OAA Participants is cross-sectional so it measures participants' feelings at only one point in time. It is self-reported data and includes no adequate comparison and control groups

[1] State Units on Aging are agencies of state and territorial governments established under the OAA in 1965 and designated by governors and state legislatures to administer, manage, design, and advocate for benefits, programs, and services for older adults and their families and, in many states, for adults with physical disabilities. The term "state unit on aging" is a general term, and the specific title and organization of the governmental unit will vary from state to state. For more information, visit http://www.eldercare.gov/Eldercare.NET/Public/About/Aging_Network/SUA.aspx (accessed May 9, 2016).

[2] Area Agencies on Aging (AAAs) were established under the OAA in 1973 to respond to the needs of Americans ages 60 and older in every local community. AAAs provide a range of options that allow older adults to choose the home and community-based services and living arrangements that suit them best, making it possible for older adults to "age in place" in their homes and communities. For more information, visit http://www.n4a.org/files/LocalLeadersAAA.pdf (accessed May 9, 2016).

to shed light on the reported improvements. The Performance Outcomes Measurement Project data are not collected in every state. The scholarly literature is primarily descriptive, contains mostly self-reported nutrition status information, and lacks scientific rigor to produce generalizable findings.

Assessing the Importance of Outcomes Measurement

Stepping back, Thomas asked the question, "Why is outcomes measurement, in fact, important?" Having information about outcomes informs improvements in the rest of the service delivery system. It also provides the evidence base needed to guide decision making at all levels. Policy makers at all levels of government, from Congress to state and local governments, rely on outcomes information to make budget decisions. Increasingly, funding for health and social programs is based on outcomes. Third, Thomas pointed out that outcomes research is needed to ensure the sustainability of nutrition programs for older adults because it can make the case that these programs matter.

As important as it is to measure outcomes, it is a difficult endeavor. This is because it can be challenging to determine who is ultimately responsible for documenting outcomes—the programs? The contracting Area Agency on Aging? The State Unit on Aging? Researchers and academia? Resources—financial, time, work load—also make documenting outcomes a particular challenge. Another challenge is the issue of uniformity across programs. Programs vary dramatically from site to site with respect to the information they collect and the software they use.

As a result, Thomas said that a big question remains, "What outcomes should we measure?" Ideally, Thomas stated, researchers should be measuring what OAA programs were designed to achieve and seek to answer the questions: Are they reducing hunger and food insecurity among older adults? Are they promoting socialization and the health and well-being of older adults? Are they delaying adverse health conditions?

It is critical, noted Thomas, to consider not only what the programs were designed to achieve, but also the outcomes of importance to different stakeholders, including policy makers and payers, caregivers, and clients (see Box 6-1).

Thomas then described a variety of ways in which these data could be collected. Many validated survey instruments are available, so she stressed the importance of not reinventing the wheel. Ideas for potential surveys that were offered include surveys of all recipients as well as surveys of families or family caregivers. It also is possible to capture program data at regular intervals. One example she highlighted was North Carolina's Aging and Disability Transit Service, which interviews clients on a regular basis: upon requesting service, beginning service, and annually thereafter. Clients are

BOX 6-1
Key Measures to Consider When Assessing the Impact of Older Adult Nutrition Programs
Presented by Kali Thomas

Measures of Potential Importance to Payers and Policy Makers
- Health status
- Injuries or secondary health outcomes
- Maintenance of community living
- Health care utilization
- Mortality
- Cost-effectiveness

Measures of Potential Importance to Caregivers
- Emotional stresses
- Financial stress
- Health

Measures of Potential Importance to Clients
- Quality of life
- Socializations
- Individuality
- Relationships
- Dignity
- Safety
- Independence
- Security

asked a variety of questions related to health, quality of life, depression, social isolation, and food insecurity. Another possibility is to link client data to medical records. Thomas noted that she and her colleagues are about to embark on a project to do that retrospectively. Finally, another possible option is to conduct a large programmatic trial. The pilot that Thomas conducted with Meals on Wheels America and funded by AARP Foundation showed that such a trial is possible.

In conclusion, Thomas reiterated that outcomes measurement is important. Measuring and documenting outcomes will shed light on the unmet needs of older adults who receive these services and improve understanding of the people who are not receiving these services but perhaps could be. Thomas noted that outcomes measurement also provides a better understanding of what types of models work better and for whom. Outcomes measurement also can assist in subgroup analyses to identify older adults who may benefit most from these services as well as prioritize those on waiting lists. Finally, outcomes measurement can be valuable for cost-

effectiveness and cost-benefit analyses. When all is said and done, however, Thomas emphasized that all of this work is dependent on robust, diverse funding and resources at all levels, from the local level to the federal level.

HIGHLIGHTS OF THE WORKSHOP: IDENTIFICATION OF UNMET NEEDS

The final session of the workshop covered findings, questions, and unmet needs[3] emerging from the presentations as summarized by Elaine Waxman. Waxman is a Senior Fellow in the Income and Benefits Policy Center at The Urban Institute (see Box 6-2).

QUESTION AND ANSWER SESSION

Following the Session 6 presentations, the floor was opened for questions and general discussion. The first question dealt with whether it is possible to retrospectively analyze National Health and Nutrition Examination Survey (NHANES) data on participation in meals programs. Thomas responded that her understanding was the sample sizes for participation in home-delivered meals programs was small and she did not know about data on other programs. She emphasized, though, that the questions on NHANES are good, validated questions and noted that one of the benefits of the senior nutrition programs is socialization and that NHANES does not have data on this. A workshop participant added that NHANES is useful for examining data on the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) but is very limited for home-delivered meals program data.

A participant congratulated Waxman on her summary of the workshop and suggested two additional items for consideration: (1) multigenerational households and the challenges for older adults who have grandchildren in the home, and (2) mobility issues and the difficulties they pose for older adults in accessing food even if food sources are nearby.

[3] A demographic group that was briefly addressed in the workshop, but that may be sometimes overlooked is older people living in rural areas. Nearly 23 percent of the U.S. population ages 60 and older lives in rural areas (U.S. Census 2010; http://www.agid.acl.gov/StateProfiles/Profile/Pre/?id=109&topic=1&years=2011 [accessed May 9, 2016]). Some states such as Mississippi, North Dakota, and West Virginia have a significantly higher portion of their older population living in rural areas than is true for other states. Compared to urban and suburban areas, residents of rural areas face unique challenges and concerns. Rural residents often do not have access to public transportation (cabs, buses, trains) or Internet connection in the home. Without Internet connections, residents also do not have the ability to access transportation services such as Uber, or to order online meals or other services.

BOX 6-2
Workshop Highlights of Some Knowledge Gaps and Unmet Needs Presented by Elaine Waxman

Gaps in Our Understanding: What Is Healthy Aging?

- Some disconnect between how researchers and seniors define healthy aging.
- Insufficient engagement with older adults to understand influences on their nutritional behaviors and outcomes, and how interventions could be more effective.
- Value of cross-disciplinary collaboration.

Emerging Dietary Science: Areas for Continued Exploration

- What is the role of body mass index (BMI) in senior health outcomes?
- Are Dietary Reference Intakes (DRIs) adequate for seniors (e.g., protein, vitamin D, B vitamins) and is there appropriate guidance for compromised adults?
- What are the effects of interactions between nutrients and between nutrients and medications?
- What is the role of the microbiome?

Food Insecurity Among Older Adults

- Importance of acknowledging and understanding the link between food insecurity and health outcomes and ultimately health care costs (e.g., chronic disease management).
- Need for more insights into how food insecurity is experienced over the life course (what happens before the older adult years matters).

National Programs: Supplemental Nutrition Assistance Program (SNAP)

- We have some understanding of how to reach eligible older adults (e.g., simplified administrative processes), but some older adults that could be eligible for higher-level benefits but are not enrolled. How do we address this issue?
- Would a higher minimum benefit make a difference in older adults' participation?
- How can incentives be leveraged to enhance opportunities for healthier eating (e.g., SNAP incentives)?
- Although SNAP can be a central strategy for many older adults, it takes a combination of approaches across the older adult population (public and private).
- Evolution of payer involvement (e.g., Medicaid waivers) provides opportunities.

Another participant noted the importance of better defining a population under consideration. Older adults from age 50 to 110 vary considerably, so precision in description is needed. In addition, care needs to be taken with the language used to describe older adults. This participant suggested that "older adults" should be used in place of "elders" and "seniors." Nancy Wellman, moderator of this workshop session, agreed with

The Role of Nutrition in Care Transitions
- Lack of systematic approach in managing care transitions after hospitalization.
- Inconsistent involvement of registered dietitians during care transition.
- More to learn about which patients and diseases to target.

Challenges for the Health Professions Understanding of the Issues
- How to translate nutrition guidance, which continues to evolve, into patient care practice.
- How to screen (e.g., food insecurity, nutritional risk) and create effective responses.
- Moving nutrition from a "support service" to a critical health intervention.

Need for Methodological Improvements
- Limitations with self-reported food frequency.
- Need for better nutrition risk assessment that incorporate food insecurity, malnutrition risks, and assessment at both admission and discharge.
- Value of innovative, validated assessments that shed light on complex influences (e.g., Life-Space Assessment and mobility).

Opportunities for Better Engagement with Older Adults
- Learning from Native Food Sovereignty Movement.
- Use of *promotoras* and other community-based outreach (e.g., food pantries).
- Meeting older adults where they are—culturally, in place, and in response to their particular challenges.

Behavioral Economics and Seniors
- Opportunity to learn more from behavioral economics to improve healthier eating.
- Reduce the burden of decision making for the older adult population.

Food Sector Evolution
- How to leverage opportunities in retail and food industry? Much is happening but may not be marketed as older adult specific.
- What will global (product/regulatory) and technological innovations offer?
- How will integration of health and food in settings/roles offer opportunities to promote nutrition in senior communities?

this latter observation. She added that her research shows that older adults are among the most likely group to change their eating habits if they are given good reasons for it and have the knowledge to do so. Older adults are very receptive to new information about healthy eating because they want to retain their independence and do not want to leave their homes.

Lloyd, formerly a national nutritionist with the AoA, commented on

sources of available data and studies that participants might be interested in. She noted that a national evaluation is under way of OAA nutrition programs, including process and cost evaluations. These evaluations will be posted on the AoA website[4] sometime in November 2015. She also reminded participants about the AoA's September 2015 Research Brief on OAA Nutrition Programs. Another part of the national evaluation is currently in the field. It is looking longitudinally at individual outcomes, including food insecurity, social connectedness, chronic conditions, medications, health care utilization, and is matching these data with Medicare data on hospital and emergency room admissions. These data will be available in 2017. Both components of the national evaluation are being conducted by Mathematica Policy Research.

A representative of Mom's Meals commented that their organization now serves many populations in addition to older adults, including the physically disabled. Including all the populations they serve can strengthen efforts to bring attention to the issue of ensuring adequate nutrition for vulnerable populations. He stated that funding is often an issue and that there are long waiting lists for individuals who could greatly benefit from meals programs, especially those who are physically disabled.

Wellman responded that, similar to school populations that participate in free, reduced price, and full price programs, there are adult populations who are willing and able to pay full price for nutritious delivered meals. Delivering meals to them is a way to broaden the population of older adults who can retain their independence and stay at home.

A participant who works with minority and migrant populations in California noted that accessibility to programs is often limited for these populations because of language and cultural issues. This issue should be considered when developing information for older adults.

A participant asked Thomas to comment about available data on people who are on waiting lists for programs. Thomas responded that she did not know about any national data. However, she has done a study that surveyed eight programs around the country that had waiting lists of more than 3 months. The study found significant needs, such as many respondents who did not have money to buy food and 12 percent who reported having no one they could call on for help. Great needs exist but nothing was available to meet those needs. Wellman added that some information is available about people on waiting lists who are readmitted to the hospital or who die before services become available. So, prioritization and targeting are important issues, she noted.

The final comment concerned the role of the built environment and

[4] See http://www.aoa.acl.gov/Program_Results/Program_Evaluation.aspx (accessed May 9, 2016).

how it plays a critical role in whether older adults have mobility and access to food. Departments of Transportation and of Building should be integrated into efforts to ensure improved mobility for older adults. Wellman agreed, noting that transportation is one of the most highly demanded services and that many people do not go to their local community or senior centers because they cannot get there.

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Thomas, K. S., and V. Mor. 2013. Providing more home-delivered meals is one way to keep older adults with low care needs out of nursing homes. *Health Affairs (Millwood)* 32(10):1796-1802.

Appendix A

Workshop Agenda

Meeting the Dietary Needs of Older Adults: A Workshop

October 28-29, 2015
National Academy of Sciences
2101 Constitution Avenue NW
Washington, DC

WEDNESDAY, OCTOBER 28, 8:00AM-5:40PM

8:00 am **Registration**

Session 1: Introduction and Background

8:30 **Welcome and Introductory Remarks**
Gordon Jensen, Pennsylvania State University

8:40 **Perspectives from the AARP Foundation**
Lisa Marsh Ryerson, President

8:50 **Consumer Behavior**
Dave Donnan, A.T. Kearney

9:10 **What Is Healthy Aging?**
Simin Meydani, Jean Mayer U.S. Department of Agriculture (USDA), Nutrition Research Center on Aging, Tufts University

9:30 **Break**

Session 2: Emerging Insights (Physiological)
Moderator: Katherine Tucker

9:50	**Dietary Needs of the 50+** *Katherine Tucker, University of Massachusetts Lowell*
10:10	**Aging, BMI, and Mortality Outcomes** *Gordon Jensen, Committee Chair*
10:30	**Muscle Health: Protein** *Wayne Campbell, Purdue University*
10:50	**Aging, Vitamin D, and Physical Function** *Denise Houston, Wake Forest University School of Medicine*
11:10	**Brain Health: B Vitamins and Omega-3 Fatty Acids** *Irv Rosenberg, Tufts University*
11:30	**Gut Health: Dietary Fiber, Microbiome** *Lita Proctor, National Human Genome Research Institute, NIH*
11:50	**Panel Discussion with Session 2**
12:10 pm	**Lunch**

Session 3: Emerging Insights (Ecological)
Moderator: Uche Akobundu

1:10	**Factors Influencing the 50+** *Julie Locher, University of Alabama at Birmingham*
1:30	**Food Security Among Older Adults** *Craig Gundersen, University of Illinois at Urbana-Champaign*
1:50	**Special Considerations for Meeting the Dietary Needs of Vulnerable Groups** *Joseph Sharkey, Texas A&M School of Public Health*

2:30 **Built Environment: What Is It and How It Influences Diets of Older Adults**
Irene Yen, University of California, San Francisco

2:50 **Relationship Between Mobility and Nutrition**
Richard Allman, Geriatrics and Extended Care, U.S. Department of Veterans Affairs

3:10 **Panel Discussion with Session 3**

3:30 **Break**

Session 4: National Programs Addressing Dietary Needs of the Older Population
Moderator: Robert Post

3:50 **Outlook on Legislation on Nutrition and Aging**
Bob Blancato, National Association of Nutrition and Aging Services Program

4:10 **USDA Nutrition Programs for the Older Population (Including Participation in SNAP and Outreach Initiatives)**
Lura Barber, Director, Hunger Initiatives, National Council on Aging, and Kathryn Law, USDA Food and Nutrition Service

4:40 **Nutrition During Care Transition**
Rose Ann DiMaria-Ghalili, Drexel University

5:00 **Challenge and Initiatives in American Indian Reservations**
Kibbe Conti, Lakota, Indian Health Service (IHS) Rapid City Indian Hospital, South Dakota

5:20 **Panel Discussion with:**
Lura Barber
Bob Blancato
Kibbe Conti
Rose Ann DiMaria-Ghalili
Kathryn Law
Jean Lloyd

5:40 Adjourn

THURSDAY, OCTOBER 29, 8:00AM-12:30PM

8:00 am	**Registration**
8:15	**Welcome and Recap of Day 1** *Gordon Jensen, Committee Chair*
	Session 5: Role of Community and Food Sector **Moderator: Susan Crockett**
8:40	**Retailers' Initiatives for Meeting the Dietary Needs of Older Adults** *Annette Maggi, Annette Maggi & Associates, Inc.*
9:00	**Insights from the Retail Sector—The Little Clinic at Kroger** *Eileen Myers, The Little Clinic*
9:20	**Perspectives from a "Home Service" Retailer** *Beth Burrough, Mom's Meals Nourishcare*
9:40	**Food Product Development for Older Adults** *John Ruff, retired Kraft Foods, past President of Institute of Food Technologists (IFT)*
10:00	**The Role of Community Programs: P.E.E.R., Inc.** *Sally Allocca, P.E.E.R., Inc.*
10:20	**The Role of Community Programs: City Harvest** *Leslie Gordon, City Harvest*
10:40	**Community Programs for Chronic Disease and Seniors** *Hilary Seligman, University of California, San Francisco*
11:00	**Break**
11:10	**Panel Discussion with Session 5**
	Session 6: Research Priorities and Gaps **Moderator: Nancy Wellman**
11:30	**Documenting Outcomes from Older Adult Nutrition Programs** *Kali Thomas, Brown University*

11:50 **Highlights of the Workshop: Identification of Unmet Needs**
Elaine Waxman, The Urban Institute

12:10 pm **Reflections and Open Discussion**

12:30 **Adjourn**

Appendix B

Acronyms

AAA	Area Agency on Aging
AARP	American Association of Retired Professionals
ACA	Affordable Care Act
AoA	U.S. Administration on Aging
A.S.P.E.N.	American Society for Parenteral and Enteral Nutrition
BMI	body mass index
CACFP	Child and Adult Care Food Program
CFSM	Core Food Security Module
CMS	Centers for Medicare & Medicaid Services
CSFP	Commodity Supplemental Food Program
DASH	Dietary Approaches to Stop Hypertension
DNA	deoxyribonucleic acid
DRI	Dietary Reference Intake
EAR	Estimated Average Requirement
EBT	Electronic Benefits Transfer
FDPIR	Food Distribution Program on Indian Reservations
FoSHU	Food for Special Health Uses
FY	fiscal year

HCBS	home- and community-based service
IHS	Indian Health Service
IOM	Institute of Medicine
MMSE	Mini-Mental State Examination
NAME	Nutrition, Aging, and Memory in the Elderly
NANASP	National Association of Nutrition and Aging Services Programs
NCOA	National Council on Aging
NHANES	National Health and Nutrition Examination Survey
NIA	National Institute on Aging
NIH	National Institutes of Health
NRI	Nutrition Risk Index
OAA	Older Americans Act
P.E.E.R.	Promoting Empowerment Enrichment Resources
RDA	Recommended Dietary Allowance
SFMNP	Senior Farmers' Market Nutrition Program
SNAP	Supplemental Nutrition Assistance Program
SSI	Supplemental Security Income
UAB	University of Alabama at Birmingham
UL	Tolerable Upper Intake Level
USDA	U.S. Department of Agriculture
USPS	U.S. Postal Service
VA	U.S. Department of Veterans Affairs
WHO	World Health Organization
WIC	Special Supplemental Nutrition Program for Women, Infants, and Children

Appendix C

Speaker Biosketches

Richard M. Allman, M.D., is the Chief Consultant for Geriatrics and Extended Care for the Veterans Health Administration in Washington, DC. He serves as a member of the National Institute on Aging (NIA) Advisory Council and of the Advisory Committee for the Alzheimer's National Plan. Before becoming Chief Consultant in January 2014, he was the founding director of the Birmingham/Atlanta Veteran Affairs Geriatric Research, Education, and Clinical Center. Dr. Allman was a faculty member at the University of Alabama at Birmingham (UAB) School of Medicine between 1986 and 2014. He was the Parrish Endowed Professor of Medicine and Director of the Division of Gerontology, Geriatrics, and Palliative Care, and the Comprehensive Center for Healthy Aging at UAB. He served as the principal investigator for the NIA-funded UAB Study of Aging, the Deep South Resource Center for Minority Aging Research, and the UAB component of the Hartford Foundation–funded Southeast Center of Excellence in Geriatric Medicine. He provided leadership for statewide quality improvement initiatives as the Principal Clinical Coordinator for the Alabama Medicare Quality Improvement Organization between 1995 and 2005. He directed the Pilot Grant and Nascent Project Programs of the UAB Center for Clinical and Translational Science between 2010 and 2014. His research has focused on mobility, cardiovascular disease, and health disparities among older adults, including studies of the associations between nutritional risk and adverse outcomes. Dr. Allman received his M.D. as an Alpha Omega Alpha honor graduate from West Virginia University School of Medicine, where he also completed a residency in internal medicine. After completing a fellowship in internal medicine and training in clinical

epidemiology at Johns Hopkins University, Dr. Allman joined the faculty at UAB. Dr. Allman is a board-certified geriatrician, and he was listed annually in *Best Doctors in America* between 1991 and 2014. He received the 2013 Donald P. Kent Award for leadership and service from the Gerontological Society of America (GSA) and the 2013 Joseph T. Freeman Award from the Health Science Section of GSA in recognition of his research.

Sally M. Allocca, M.Div., is the Senior Pastor of East Lake United Methodist Church in Birmingham, Alabama, where she has served for 22 years, as well as Founder and Executive Director of P.E.E.R., Inc., a nonprofit community health and economic development organization serving a diverse neighborhood. Rev. Allocca is a leader in local efforts to build a healthy, just, and sustainable local food system in the East Lake neighborhood, and in greater Birmingham. As part of her efforts, she founded the East Lake Farmers Market, a successful growers-only market serving her low-income community. As an outgrowth of the market, P.E.E.R., Inc., sponsors weekly boxes of produce that are delivered free of charge to older adult residents of low-income housing facilities in the neighborhood during market season. Rev. Allocca was awarded a Champion of Change award by the White House in 2013. She received her B.A. in Religion and Philosophy from Birmingham-Southern College, and her Master of Divinity degree from the University of Chicago Divinity School.

Lura Barber, M.P.P., is the Director of Hunger Initiatives at the National Council on Aging (NCOA). In this role, she provides direction and oversight for NCOA's initiatives to end hunger among older adults and increase access to the Supplemental Nutrition Assistance Program (SNAP). Under her leadership, NCOA's SNAP and hunger-related initiatives have grown from a small pilot project in two states, to senior SNAP enrollment initiatives in 26 states and online. She also leads initiatives focused on creating sustainable policy and systemic changes to improve benefits access for seniors at the state and national level. Her efforts inform NCOA's policy agenda to increase the participation of older adults in SNAP. Before joining NCOA, Barber served as a Long-Term Care Ombudsman and Pension Rights Advocate at the Legal Assistance Foundation of Metropolitan Chicago (LAF), where she advocated for the rights of older adults to self-determination, freedom from abuse, and economic security. While at LAF, she also served terms as Vice President, Treasurer, and Lead Bargainer for United Legal Workers Local 2320. Barber earned a B.A. in English and Gender and Women's Studies from Grinnell College and a Master's in Public Policy, focusing on Women and Public Policy, from the Hubert H. Humphrey School of Public Affairs at the University of Minnesota. She is

a member of the faculty of Washington Improv Theater, and teaches and performs improv comedy in the DC area and across the country.

Bob Blancato, M.P.A., is President of Matz Blancato and Associates, located in Washington, DC. He is the National Coordinator of the bipartisan 3,000-member Elder Justice Coalition. He serves as Executive Director of the National Association of Nutrition and Aging Services Programs. Blancato has more than 20 years of federal government service in the Congress and Executive branches. He has participated in four White House Conferences on Aging, including the most recent in July 2015, and was appointed by President Clinton to be Executive Director of the 1995 Conference. In March 2016, he became Chair of the Board of the American Society on Aging. Blancato serves as AARP Volunteer State President in Virginia, and on the Board of the National Council on Aging. He has won numerous awards for advocacy. In 2011 he was knighted by the Italian Republic. He is a contributing blogger on Huffington Post and Next Avenue, writing on aging issues. In September 2015, he was appointed to the Advisory Panel on Outreach and Education of the Centers for Medicare & Medicaid Services. He holds a B.A. from Georgetown University and an M.P.A. from American University.

Beth Burrough, M.B.A., is a Partner of Healthcare Alliances and Chief Marketing Officer for PurFoods, LLC, a provider of fresh-made meals delivered directly to the doorsteps of older adults nationwide under the brand name Mom's Meals NourishCare®. Mom's Meals NourishCare has partnered with Area Agencies on Aging, Managed Care Organizations, and Health Plans and Service Providers to provide nutrition solutions for Medicaid Waiver, Medicaid Managed Long Term Services and Supports, Care Transitions post-acute discharge and chronic care patients. From 1991-2006, Ms. Burrough worked for Johnson & Johnson in Consumer and Pharmaceutical strategic marketing, including as Vice President for the Worldwide Oral Health Division and Executive Director of Strategic Marketing for Johnson & Johnson/Centcor's Global Biologic Drugs. She earned her B.A. from Princeton University and her M.B.A. from Harvard Business School. Ms. Burrough has presented on "The Importance of Nutrition in Care Transitions" and "Nutritional Intervention in Treating Chronic Conditions" at the American Society on Aging, National Area Agencies on Aging, Case Management Society of America, and other organizations.

Wayne W. Campbell, Ph.D., is currently a Professor in the Department of Nutrition Science at Purdue University. Dr. Campbell's research includes determining the dietary protein requirements of older adults and evaluating the effects of protein, carbohydrate, and energy intakes and exercise train-

ing on macronutrient metabolism, body composition, and muscle strength and function. In addition, his research includes studying the effects of macronutrient intakes and dietary patterning on human appetite, body composition, and cardio-metabolic health. He was a member of the 2015 Dietary Guidelines Advisory Committee. Dr. Campbell received B.S. and M.S. degrees in Nutritional Sciences from the University of Delaware and University of Maryland, respectively, with emphases in exercise physiology, and completed post-doctoral training in nutrition, exercise physiology, and geriatrics at the Noll Physiological Research Center, The Pennsylvania State University. Dr. Campbell received his Ph.D. in Nutritional Sciences at Tufts University while conducting research at the Human Physiology Laboratory, U.S. Department of Agriculture (USDA) Human Nutrition Research Center on Aging, specializing in the dietary protein needs of older adults.

LCDR Kibbe Conti, M.S., R.D., serves the U.S. Public Health Service as Supervisory Dietitian at Rapid City Indian Hospital. She is a member of the Oglala Lakota Tribe in Pine Ridge, South Dakota. She is a recipient of the Annie Dodge Wauneka award for her work with tribes creating education materials that promote health by building on historic food ways. LCDR Conti received her M.S. degree in Nutrition at South Dakota State University, and completed undergraduate studies at the University of Minnesota.

Rose Ann DiMaria-Ghalili, Ph.D., R.N., C.N.S.C., F.A.S.P.E.N., serves as an Associate Professor in the Doctoral Nursing Department and Nutrition Sciences at the College of Nursing and Health Professions, Drexel University. During her John A. Hartford Foundation post-doctoral fellowship, she collaborated with interdisciplinary experts at the University of Pennsylvania School of Nursing to incorporate biomarkers of nutrition and inflammation into her research model. Dr. DiMaria-Ghalili maintains an active program of research with funding from the National Institutes of Health (NIH), American Nurses Foundation, the American Society for Parenteral and Enteral Nutrition's Rhoades Research Foundation, Drexel-Coulter Research Partnership Program, and several Drexel University internal grants. Her research focuses on the role of nutrition on improving health outcomes in older adults across the care continuum. Additional interests include nutrition assessment, malnutrition, inflammation, sarcopenia, frailty, gerontechnology, and interprofessional nutrition competencies. Dr. DiMaria-Ghalili is a certified nutrition support clinician and serves on national committees for the American Society for Parenteral and Enteral Nutrition (including the Malnutrition Committee), and was recently appointed as a board member to the Rhoades Research Foundation board. She was recently appointed by the U.S. Department of Veterans Affairs (VA) for a 4-year term to the Rehabilitation Research and Development Service Scientific Merit Review

Board. Dr. DiMaria-Ghalili received her Ph.D. in research and theory development in nursing science from New York University, where she explored the changes in nutritional status in older adults undergoing coronary artery bypass grafting surgery. She received her B.S. in nursing and M.S.N. as a medical-surgical clinical nurse specialist from Hunter-Bellevue School of Nursing at Hunter College of the City University of New York.

David Donnan, M.B.A., is a Partner with A.T. Kearney, a management consulting firm based in Chicago. He leads A.T. Kearney's Global Food & Beverage Consulting team. He is an experienced business leader and consultant with significant global experience in consumer products and retail industries. During his career, Mr. Donnan has managed operating companies, run food plants and consulted to leading global retail and consumer product companies in technology and supply chain strategies, brand growth and positioning. In his consulting career, Mr. Donnan has provided strategic advice on major transformation initiatives and growth opportunities to executives from the top 100 global consumer and retail companies. Mr. Donnan is a frequent speaker and author and has presented at a variety of industry conferences for the Grocery Manufacturers Association, Food Marketing Institute, National Retail Federation, Global Market Development Center, Independent Grocers Allowance and Healthcare Distribution Management Association. He also has appeared on Bloomberg TV and has been quoted in various business journals, including *Business Week*, *Wall Street Journal*, and *Forbes*. Mr. Donnan earned his M.B.A. at the University of Toronto Rotman School of Business and his Bachelor of Applied Science in Industrial Engineering from the University of Toronto.

Leslie Gordon is Senior Director, Program Strategy & Operations at City Harvest. Ms. Gordon joined City Harvest in 2007, where she leads and sets the vision and growth strategy for four business units—Agency Relations, Mobile Markets, Volunteer Services, and Healthy Neighborhoods—responsible for the organization's relationship with nearly 600 community food programs, allocation of nearly 60 million pounds of food annually, development and engagement of more than 13,000 volunteers annually, and delivery of City Harvest's bold citywide plan to improve food access and nutritional behaviors for nearly 500,000 low-income residents. Ms. Gordon previously served as a consultant to the Fortune 500 under the direction of General Colin L. Powell at America's Promise Alliance, where she helped corporations achieve their goals by designing large-scale corporate social responsibility programs that serve youth. After spending time at America's Promise, Ms. Gordon directed the launch of "Made in Hudson Valley," an innovative business designed to promote products manufactured in the Hudson Valley region of New York State (with a special focus on food)

through website, direct mail, and retail distribution. Earlier in her career, Ms. Gordon served as the Executive Director of Best Buddies International in Pennsylvania, and Director of Youth Markets for the American Heart Association in New York.

Craig Gundersen, Ph.D., is the Soybean Industry Endowed Professor in Agricultural Strategy in the Department of Agricultural and Consumer Economics at the University of Illinois and Executive Director of the National Soybean Research Laboratory. He also is a member of the Technical Advisory Group of Feeding America® and is the lead researcher on the Map the Meal Gap project and is a Non-Resident Senior Fellow at The Chicago Council on Global Affairs. Previously, he was at the Economic Research Service of the USDA and at Iowa State University. Dr. Gundersen's research is primarily focused on the causes and consequences of food insecurity and on evaluations of food assistance programs. His work has been supported from various government and nongovernment sources including, the USDA's National Institute of Food and Agriculture, National Foundation to End Senior Hunger, ConAgra Foods Foundation, Canadian Institutes for Health Research, the AARP Foundation, American Beverage Association, Agency for International Development, Walmart Foundation, the USDA's Economic Research Service, Merck Foundation, The Urban Institute, and the USDA's Food and Nutrition Service.

Denise K. Houston, Ph.D., R.D., is an Associate Professor in the Department of Internal Medicine, Section on Gerontology and Geriatric Medicine, with a joint appointment in the Department of Epidemiology and Prevention at Wake Forest University School of Medicine. Dr. Houston's research interests include the role of nutritional status, dietary patterns, and obesity and age-related changes in body composition on physical function in older adults. She is currently the Principal Investigator of the EVIDENCE vitamin D trial funded by the NIA to examine the effects of increasing 25-hydroxyvitamin D concentrations on neuromuscular deficits that are risk factors for falls in older adults. She is also a Co-Investigator on several NIH grants examining the effects of intentional weight loss on physical function in older adults with overweight and obesity. She is the author/co-author of more than 80 peer-reviewed publications, primarily in the areas of nutrition, obesity/weight loss, body composition, and physical function. Dr. Houston received her Ph.D. in Nutrition, with a minor in Epidemiology, from the University of North Carolina at Chapel Hill. She received an M.S. degree in Foods and Nutrition and a B.S. degree in Nutrition Science from the University of Georgia.

Kathryn Law, M.P.A., is the Director of the SNAP Research and Analysis Division at the USDA's Food and Nutrition Service. She leads a multidisciplinary team responsible for the development, design, and execution of policy research and analysis for SNAP. Before becoming Director, she was the Chief of the SNAP Analysis Branch, where she oversaw the preparation of legislative, regulatory, and cost analyses related to SNAP. Ms. Law received a B.A. in Economics from Rice University and a Master's in Public Affairs from Princeton University.

Annette Maggi, M.S., R.D.N., L.D., F.A.N.D., is the President of Annette Maggi & Associates, Inc., a strategic nutrition marketing and communications consulting firm specializing in the interface between food manufacturers and retail grocers, and nutrition and regulatory issues. Ms. Maggi has extensive experience in and knowledge of the retail industry as well as individual chains and the current health and wellness offerings in the current shopping environment. Ms. Maggi has experience at Fortune 500 companies, including Pillsbury and General Mills, and extensive experience within the retail industry, including work with Target, NuVal LLC, and Vestcom. She is the Past Chair of the Food & Culinary Professionals Dietetic Practice Group and the Executive Director of the Retail Dietitians Business Alliance.

Simin Nikbin Meydani, D.V.M., Ph.D., serves as the Director of the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University. She is professor of Nutrition and Immunology at the Friedman School of Nutrition Science and Policy and the Tufts Sackler Graduate Program in Immunology. Dr. Meydani's scientific interests include the impact of nutrition on the aging process and age-associated diseases, the role of nutrition on immune and inflammatory responses and predisposition to infectious diseases in developed and less-developed countries, on which she has published extensively. Her honors include the American Aging Association Denham Harman Lifetime Research Achievement Award, American Society of Nutrition (ASN) Herman Award in Clinical Nutrition, ASN Lederle Award in Human Nutrition Research, Fellow of Hedwig van Amerigen Executive Leadership in Academic Medicine, American College of Nutrition Grace Goldsmith Award, International HERMES Vitamin Research Award, International Nutritional Immunology Group Award, and Iowa State University Distinguished Alumni Lifetime Achievement Award. Meydani was the President of the American Society for Nutrition (June 2014-June 2015) and has served the academic, government, and corporate communities as President of the American Aging Association; member of NIH Geriatric Rehabilitation Study Section, Aging Systems and Geriatrics Study Section,

and Cellular Mechanism of Aging and Development Study Section; member of the USDA Human Nutrient Requirements for Optimal Health Program Grant Review Panel; member of United Nations Food and Agriculture Organization/World Health Organization Expert Panel on Nutritional Requirements of the Elderly; member of NIH-funded Consortium Lipid Maps Scientific Advisory Committee, NIA Primate Calorie Restriction Project Advisory Board; Gerontological Society Nutrition Steering Committee; International Life Sciences Institute (ILSI) North America Board of Trustees, Working Group of the Sackler Institute of Nutrition for Aging Populations, New York Academy of Sciences; editorial boards of several journals; chair of several Federation of American Societies for Experimental Biology summer conferences and other international meetings.

Eileen Myers, M.P.H., is currently the Vice President, Retail Dietetics & Nutrition Solutions for The Little Clinic, a retail health care company operating more than 180 clinics inside Kroger grocery stores. Ms. Myers is responsible for successful execution of nutrition services in the clinics and stores. She also works with leadership on overall prevention and wellness services in close proximity with Kroger health and wellness initiatives. Before her current role, Ms. Myers was Vice President, Affiliations and Patient Centered Strategies for The Little Clinic, responsible for creating and developing clinical partnerships across the health care industry. She is a board member of the Convenient Care Association and is a co-author of the chapter "Collaboration and Partnership in the Convenient Care Setting" in the 2013 book *Convenient Care Clinics: The Essential Guide for Clinicians, Managers, and Educators*, a Springer Publication. She also has published a book by Helm Publishing called *Winning the War Within: Nutrition Therapy for Clients with Eating Disorder,* a teaching manual for clinicians working in the field of eating disorders (in print from 1999-2016). She has received numerous excellence in practice awards within the nutrition and dietetics profession. Ms. Myers received her M.P.H. from the University of North Carolina and her B.S. in nutrition from Pennsylvania State University.

Lita Proctor, Ph.D., is Program Director and responsible for coordination of the Human Microbiome Project (HMP). The HMP is an 8-year, trans-NIH Common Fund Initiative to create a toolbox of resources for this emerging field. During the first phase of HMP (2008-2012), resources that were developed included bacterial, viral, and fungal strains and their genome sequences, and phylogenetic and metagenomic sequence data from the microbiomes of healthy adults and from a collection of cohort studies of patients with specific gut, skin, or urogenital diseases. Computational tools for phylogenetic and metagenomic data analysis, and single cell ge-

nomics and novel cultivation approaches as well as ethical, legal, and social implications studies in human microbiome research rounded out the resources for this phase. For the second phase of HMP (2014-2016), an integrated data set of biological properties, to include transcripts, proteins and metabolites, from both the microbiome and host are being developed as a community resource. These data sets are being developed from three different systems—inflammatory bowel disease, diabetes, and preterm birth—as exemplar models of microbiome-associated conditions or diseases. Computational tools to analyze these complex data sets also will be developed as a resource. Dr. Proctor joined the Division of Genomic Sciences in the Extramural Research Program in 2010. Before this, she served as Program Director at the National Science Foundation (NSF) in the Geosciences and the Biosciences Directorates, where she managed microbiological, bioinformatics, and research resources programs. She is formally trained in microbial ecology, was an NSF Postdoctoral Fellow in molecular microbial genetics at the University of California, Los Angeles, and has held appointments at Florida State University and at the University of California, Santa Cruz.

Irwin H. Rosenberg, M.D., is an internationally recognized leader in nutrition science. Dr. Rosenberg is a Senior Scientist at the Jean Mayer USDA Human Nutrition Research Center on Aging and Dean of the Friedman School of Nutrition Science and Policy at Tufts University. He served for 15 years as the director of the Human Nutrition Research Center, which studies the interaction of aging and nutritional/dietary factors, as well as the way in which diet, nutrition, and physical activity can modulate or prevent degenerative diseases of aging. The focus of his research has been on vitamin metabolism, especially folate and cardiovascular disease, as well as stroke and cognitive decline. Rosenberg receives research support from NIH, the USDA, and the Foundation for Nutritional Advancement. As Dean and Professor, Rosenberg has been involved in nutrition and food policy issues, ranging from dietary guidelines and reference intakes to international nutrition recommendations for the elderly. Before joining Tufts, Dr. Rosenberg held faculty positions at the Harvard Medical School and at the University of Chicago, where he served as the first director of the Clinical Nutrition Research Center and helped develop a nutritional focus within the field of gastroenterology. He has served on the Food and Drug Administration Food Advisory Committee's Subcommittee on Folic Acid and on the Institute of Medicine (IOM) Subcommittee on Upper Reference Levels of Nutrients. He is a past chair of the Food and Nutrition Board. Among his many honors are the Josiah Macy Faculty Award, the Robert H. Herman Memorial Award of the American Society for Clinical Nutrition, and the Bristol Myers Squibb/Mead Johnson Award for Distinguished Achieve-

ment in Nutrition Research. He was elected to the National Academy of Medicine in 1994 and became a university professor at Tufts in 2001. He was chair of a March 2003 World Health Organization Consultation on Guidelines for Food Fortification.

John Ruff, C.F.S., headed research and development (R&D) for International and North American businesses during his 36-year career with Kraft and the former General Foods, where he successfully integrated the technical operations of numerous acquisitions, established global centers of expertise, and led a worldwide advisory council consisting of external experts who helped guide Kraft's health and wellness initiatives. He is a past president of the Institute of Food Technologists (IFT), the ILSI and past chair of the former National Food Processors Association (NFPA). Mr. Ruff received his M.A. in Biochemistry and a B.A. in Natural Sciences from Cambridge University in the United Kingdom.

Hilary Seligman, M.D., M.A.S., serves as Senior Medical Advisor and Lead Scientist for Feeding America®. She is an Associate Professor in Residence at the University of California, San Francisco (UCSF) in the Departments of Medicine and of Epidemiology and Biostatistics, and directs the Food Policy, Health, and Hunger Research Program for UCSF's Center for Vulnerable Populations at San Francisco General Hospital. She also is the Director of the Centers for Disease Control and Prevention's Nutrition and Obesity Policy Research and Evaluation Network. Her research focuses on the health implications of food insecurity in the United States. She continues to practice Internal Medicine in San Francisco's safety net hospital and is a Fellow of the American College of Physicians. Seligman received her M.D. at Baylor College of Medicine, her Master of Advanced Studies in Clinical Research at UCSF, and her undergraduate training at Williams College.

Joseph R. Sharkey, Ph.D., M.P.H., R.D., serves as a Professor in the Department of Health Promotion and Community Health Sciences and Founding Director of the Program for Research and Outreach-Engagement on Nutrition and Health Disparities Solutions at the Texas A&M School of Public Health. Dr. Sharkey leads efforts to examine food insecurity—causes, consequences, and coping strategies—among children, adults, and older adults in rural and underserved areas. His current work focuses on the growing Mexican American and Mexican immigrant population along the United States border with Mexico. Dr. Sharkey is currently Principal Investigator on a USDA/National Institute of Food and Agriculture award to improve nutritional and physical health among families of Mexican heritage who reside in underserved areas along the Arizona, New Mexico, and Texas borders with Mexico. In addition to this work, Dr. Sharkey maintains extensive

community collaborations to improve population health. His mixed methods approach to research and outreach has been supported by the AARP Foundation, Centers for Disease Control and Prevention, the Robert Wood Johnson Foundation, NIH, and the USDA. He has published more than 120 peer-reviewed articles and book chapters. Dr. Sharkey received his Ph.D. and M.P.H. degrees from the Department of Nutrition at the University of North Carolina at Chapel Hill School of Public Health.

Kali S. Thomas, Ph.D., is an Assistant Professor (Research) of Health Services, Policy and Practice at Brown University's School of Public Health, and a Research Health Science Specialist in the Center of Innovation for Long-Term Services and Supports at the Providence Veteran Affairs Medical Center. Thomas' research focuses on identifying ways to improve the quality of life of older adults needing long-term services and supports. Funded by the VA, the Agency for Healthcare Research and Quality (AHRQ), the NIA, and AARP Foundation, she has led research projects related to the quality of care delivered in long-term care facilities and the role of home- and community-based services in preventing or postponing nursing home placement. She received her Ph.D. in Aging Studies from the University of South Florida and completed an AHRQ-funded Postdoctoral Research Fellowship at the Brown University Center for Gerontology and Healthcare Research.

Irene H. Yen, Ph.D., M.P.H., is an Associate Professor in the Departments of Medicine and Epidemiology & Biostatistics at UCSF. She also is the research director for the Department of Medicine at Alameda Health System/Highland Hospital, the county safety net provider. Dr. Yen's research focuses on the social determinants of health, in particular place, race, and socioeconomic status. She has conducted quantitative and qualitative studies to investigate how place influences health for older adults and adolescents, with a focus on diet and physical activity. Currently, she is a co-investigator of a study investigating organizational processes and patient engagement for people with multiple chronic conditions and high health care utilization in a safety net setting. Dr. Yen received her doctorate in epidemiology from the University of California, Berkeley (UCB). She received a M.P.H. in epidemiology and biostatistics from UCB. She has Bachelor degrees in Medical Microbiology and Political Science from Stanford University.

Appendix D

Planning Committee Biosketches

Gordon L. Jensen, Ph.D., M.D. (*Chair*), is Senior Associate Dean for Research and Professor of Medicine and Nutrition at the University of Vermont College of Medicine. Dr. Jensen's research interests have focused largely on geriatric nutrition concerns. A major limitation in the identification of elders at nutritional risk has been the lack of valid methodologies that have been tested in rigorous research studies with well-defined outcome measures. His team has therefore emphasized the development and testing of nutrition screening and assessment tools in relation to specific functional and health care resource outcomes for older persons. In particular, he has focused on the impact of obesity on these outcomes. Dr. Jensen is the current president of the American Society for Nutrition (ASN), past president of the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.), and a current member of A.S.P.E.N.'s Foundation Board. He also is a past chair of the Association of Nutrition Programs and Departments. He has served on advisory panels, study sections, or work groups for the National Institutes of Health (NIH), the American Dietetic Association, and the Food and Nutrition Board. Dr. Jensen received a Ph.D. in Nutritional Biochemistry from Cornell University and an M.D. from Cornell University Medical College.

Ucheoma O. Akobundu, Ph.D., R.D., is the Director of Project Management and Impact at the Meals on Wheels Association of America and currently serves on the Academy of Nutrition and Dietetics Healthy Aging Dietetics Practice Group. Dr. Akobundu has more than 10 years of experience working in community nutrition and aging services research,

in addition to program management and evaluation within academia and nonprofit organizations. She received her Ph.D. in Nutrition at the University of Maryland and completed her Dietetic Internship at Hunter College, New York. She earned an M.S. in Nutrition with a concentration in Public Health from the University of Massachusetts and a B.S. in Biology with a minor in French from the State University of New York.

Susan J. Crockett, Ph.D., R.D., is an Adjunct Professor of Food Science and Nutrition at the University of Minnesota. Until January 2013, she was Vice President and Senior Technology Officer for Health and Nutrition at General Mills, where she led the Bell Institute of Health and Nutrition. She was responsible for health and nutrition strategy for General Mills' businesses, health and nutrition regulatory affairs and issues management, nutrition science and health professional communication. Dr. Crocket has published research about nutrition education in schools, effectiveness of nutrition interventions in rural medical clinics and communities, and influence of environments on the eating behavior of children. She chaired the Board of Directors of the International Food Information Council from 2009 to 2013, was active in the International Life Sciences Institute, and was a member of the Food and Nutrition Board's Food Forum. Dr. Crockett is a Registered Dietitian and received a Ph.D. in Epidemiology and an M.S. and B.S. in Nutrition and Dietetics from the University of Minnesota.

Julie L. Locher, Ph.D., is a Professor in the Departments of Medicine and Health Care Organization and Policy at the University of Alabama at Birmingham (UAB). Her primary area of research focuses on social and environmental factors, including the role of formal and informal support on influencing health-related behaviors and outcomes related to nutrition. She is particularly interested in nutritional issues of vulnerable older adults. Her recent studies focus on interventions aimed at improving patient-centered outcomes by providing meals to frail older adults who are being discharged from the hospital, and implementing lifestyle changes in older adults with obesity. She serves as the Director of the UAB Translational Nutrition and Aging Program and as the Associate Director for Enrichment within the UAB Nutrition Obesity Research Center. Dr. Locher earned her Ph.D. in Medical Sociology from UAB.

Robert C. Post, Ph.D., M.Ed., M.Sc., is Senior Director for Nutrition and Regulatory Affairs at Chobani, LLC. Dr. Post's mission is to help drive nutrition strategies around the brand's current and future offerings and navigate critical nutrition issues, such as dietary guidance, marketing, and food labeling. He leads work to translate nutrition science into meaningful messages about the contributions of yogurt and dairy foods to diet, health,

and wellness. Dr. Post recently served as key nutrition advisor to the White House and First Lady Michelle Obama and collaborator on the White House Let's Move! initiative. He also served as Director of the USDA's Center for Nutrition Policy and Promotion (CNPP) and most recently as Chief Science Officer for FoodMinds, where he advised major food companies on changes in the nutritional affairs environment, including dietary guidance, marketing, and nutrition and food labeling. At CNPP, Dr. Post led the efforts for establishing national dietary guidance, leading the Dietary Guidelines for Americans, designing the USDA's Nutrition Evidence Library, and directing the MyPlate (ChooseMyPlate.gov) initiative. Dr. Post currently serves on American Society for Nutrition research advisory groups, including the Food and Nutrition Science Solutions Task Force, the Society for Nutrition Education and Behavior Foundation Board of Trustees, and the Board of Directors for the International Food Information Council. He is an active member of the Academy of Nutrition and Dietetics and the Institute of Food Technologists, where he is co-director of the Food Labeling for Foods Marketed in the United States, and Food Laws and Regulations short-courses. From 2004 until 2013, he was an adjunct professor in the Nutrition and Food Science Department at the University of Maryland. He holds Ph.D., M.Ed., M.Sc., and B.S. degrees from the University of Maryland.

Mary Pat Raimondi, M.S., R.D.N., is Vice President of Strategic Policy and Partnership at the Academy of Nutrition and Dietetics. She brings methodical and strategic expertise in public policy, marketing, and nutrition education to her position at the Academy of Nutrition and Dietetics. Her focuses are on federal government relations and lobbying, including federal regulatory relations, alliance and coalition building, public policy strategy development, and identification of the new policy and program opportunities. Before joining the Academy of Nutrition and Dietetics, Ms. Raimondi was the Program Director for Health and Nutrition at the University of Minnesota Extension, where she helped shape the university's federal and state legislative public policy key messages and managed multiple grants and innovative programming. Ms. Raimondi is a Registered Dietitian Nutritionist and received her M.S. in Nutrition from the Loyola University Chicago.

Katherine L. Tucker, Ph.D., is Professor of Nutritional Epidemiology in the Department of Clinical Laboratory and Nutritional Sciences at the University of Massachusetts Lowell. She also holds adjunct appointments at the Friedman School of Nutrition Science and Policy and the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, and the Department of Health Sciences at Northeastern University. Dr. Tucker has

contributed more than 250 articles in scientific journals. Her research focuses on dietary intake and risk of chronic disease, including osteoporosis, cognitive decline, obesity, metabolic syndrome, and heart disease. She is the Director of the National Heart, Lung, and Blood Institute (NHLBI)–funded center on Population Health and Health Disparities, studying the roles and interactions of stress, social support, diet, health behavior and genetic predisposition in relation to health disparities in Puerto Rican adults. She has collaborated for many years with the Framingham Studies, particularly the Framingham Osteoporosis Study, and she serves as a scientific adviser for, and leads a Vanguard data analysis center with, the Jackson Heart Study. She is the Editor-in Chief of *Advances in Nutrition*, the review journal of the ASN, and currently serves on the NIH study section for Kidney, Nutrition, Obesity and Diabetes. She is also an associate editor for *Public Health Nutrition*, and was a co-editor of the recently published 11th edition of the textbook *Modern Nutrition in Health and Disease*. She is a past-chair of ASN and past Associate Editor of the *Journal of Nutrition*. Dr. Tucker is a member of the Food and Nutrition Board and also served on the Institute of Medicine's Committee on the Implications of Dioxin in the Food Supply. Dr. Tucker received her Ph.D. in International Nutrition from Cornell University.

Elaine Waxman, Ph.D., is a Senior Fellow in the Income and Benefits Policy Center at The Urban Institute. Her expertise includes food insecurity, nutrition and the food assistance safety net, the social determinants of health disparities, as well as broader issues affecting low-income families and communities. Her current research includes a health care utilization study as part of a randomized controlled trial of a diabetes intervention and a planning project for longitudinal research on food insecurity and housing insecurity. Before joining the Institute, Dr. Waxman served as the Vice President of Research and Nutrition at Feeding America, where she oversaw research on food insecurity, the intersection of hunger and health, and the circumstances and experiences of individuals seeking food assistance. In that role, Dr. Waxman supervised *Hunger in America 2014*, the largest study ever conducted of charitable feeding in the United States, and collaborated on the development of *Map the Meal Gap* project, the first county-level estimates of food insecurity in the United States. She has co-authored numerous research and policy reports and articles in scholarly journals, including *Applied Economics Perspectives and Policy*, *Social Service Review*, *Journal of Hunger and Environmental Nutrition*, *Journal of Family and Economic Issues*, and *Journal of Food Law and Policy.* She received her Ph.D. from the School of Social Service Administration at the University of Chicago, where she is currently a Lecturer. She also holds a

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