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Report of a Meeting

Nutrition for Older Adults: Perspectives on Dietary Guidance for Healthy Aging

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A B S T R A C T

The world is rapidly aging. It is projected that the "young old" (i.e., 60+ y) population will double by 2050 and the "older old" (i.e., 80+ y) will nearly triple. Greater life expectancy has been accompanied by more chronic health conditions and disabilities, especially those that are related to diet and lifestyle. Although people are living longer, their healthy life expectancy has not kept pace, meaning that more years are spent in poorer health—thus, the need to identify targets to increase "health span." Nutrition plays a critical role in aging healthfully. However, the aging process is accompanied by unique physiological, social, and contextual factors that impact the nutritional needs of the aging population—requiring more specific and tailored dietary recommendations. To examine the complexity of diet within the aging population, the *Nutrition and Wellness Science Forum: Exploring the Journey to Healthy Aging* was held in Washington, D.C. to focus on scientific evidence and research gaps surrounding dietary intakes and nutrient adequacy among older adults, as well as the role of nutrition in musculoskeletal, cardiometabolic, and cognitive health. Discussions also addressed the need for culturally appropriate dietary assessment methods and interventions that reflect the heterogeneity and diversity of older adults, as well as the importance of the food system. This review summarizes the forum's key themes, discussions, and identified research gaps.

Keywords: older adults, aging, nutrition, diet, dietary patterns, dietary guidelines, healthy aging

Abbreviations: AD, Alzheimer's disease; BHB, betahydroxybutyrate; BPRHS, Boston Puerto Rican Health Study; CVD, cardiovascular disease; DASH, Dietary Approaches to Stop Hypertension; DGAs, Dietary Guidelines for Americans; Health ABC, Health, Aging, and Body Composition Study; HEI, Healthy Eating Index; MIND, Mediterranean-DASH Intervention for Neurodegenerative Delay; MPS, muscle protein synthesis; mTOR, mammalian/mechanistic target of rapamycin; PREDIMED, Prevención con Dieta Mediterránea; RCT, randomized controlled trial; RDA, recommended dietary allowance; T2D, type 2 diabetes; TNI, total nutrient index.

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Statement of significance

Although substantial scientific progress has been made in understanding the role of diet and nutrition in promoting healthy aging, important knowledge gaps remain. This is due, in part, to the interindividual variability in the aging process. This article summarizes the scientific presentations and discussions from a nutrition and healthy aging workshop and provides recommendations for future research aimed at addressing unanswered questions so that dietary guidance for older adults can be improved and refined.

The Consequences of Increased Life Expectancy

Population aging, the demographic shift toward an older population, is rapidly occurring worldwide. By 2050, it is estimated that the global population of people aged ≥60 y will double to 2.1 billion, and the number of persons aged ≥80 y will triple to 426 million [1]. Although this global shift towards an older population started in high-income countries, low- and middle-income countries are now experiencing accelerated transitions toward an older demographic. An estimated two-thirds of the global population >60 y will be living in low- and middle-income countries by 2050 [1]. As people age, they are more likely to develop coexisting chronic health conditions and utilize multiple medications. Globally, over the last 30 y, the total burden of disability increased by 52%, driven primarily by noncommunicable diseases, which accounted for 80% of disability in 2017 [2]. In this time frame, disability from metabolic diseases, such as type 2 diabetes (T2D) and fatty liver disease, increased globally and across all levels of economic development. In 2019, global life expectancy at birth was 73 y, yet healthy life expectancy was only 63 y [3], indicating that people spend nearly a decade living with illness and/or disability, which poses significant challenges to health care systems [4].

Despite the United States Government Accountability Office recommendation in 2019 that the Department of Health and Human Services develop a plan to focus on older adults' nutritional needs, gaps remains in nutrition guidance for older adults especially those living with chronic conditions [5]. Understanding how nutrition can influence the unique physiological and health challenges of older adults is important, given their increased risk for chronic disease and disability. In response to this need, the *Nutrition and Wellness Science Forum: Exploring the Journey to Healthy Aging* convened experts across industry, academia, and federal agencies (all of whom are coauthors on this review) to examine the core elements of dietary patterns to support healthy aging, with a focus on musculoskeletal, cardiometabolic, and cognitive health. The purpose of this narrative review is to describe the forum's central themes and scientific discussions and to highlight research gaps that need to be addressed to foster the development of effective dietary strategies, guidance, and interventions that support healthy aging across diverse populations.

What Is Healthy Aging?

"If in old age I can walk on the beach and discuss poetry with my friends, I will be happy."—Luigi Ferrucci, MD, PhD, Scientific Director, National Institute on Aging, NIH, poignantly began the discussion with this quote.

"Healthy aging" is a multidimensional concept that combines scientific perspectives and the lived experiences of older adults themselves [6]. It is commonly described through 3 domains. Medical health refers to the presence or absence of disease and is documented clinically. Functional health refers to the ability to perform daily activities independently. Self-rated health is how individuals describe their own physical and mental health [7]. Self-rated health predicts morbidity and mortality and has been recommended by international organizations, including the WHO, for international comparisons of health status. The WHO defines healthy aging as "the process of developing and maintaining the functional ability that enables wellbeing in older age" [8]. This definition accounts for physiological and environmental influences that impact biological aging that are shaped by the social determinants of health. With this current definition, research efforts can shift from a focus on lifespan to health span, to help ensure that older adults maintain independence as they age.

Dietary Intakes of Older Adults in the United States

Although aging has historically been associated with frailty and underweight, older adults are now more likely to be obese than underweight. The most recently published data from NHANES indicate that 39% of adults over age 60 are obese, whereas <2% of adults ≥60 y are underweight [9,10]. As we age, energy (i.e., kilocalorie) needs tend to decrease whereas nutrient requirements are unchanged or, in some instances, increase [11,12]. Thus, it is important to focus on guidance towards consuming more nutrient-dense foods to meet nutrient requirements without additional energy intake. However, adherence to the Dietary Guidelines for Americans (DGAs) among adults ≥60 y is suboptimal [as measured by a Healthy Eating Index (HEI)]. Those with low socioeconomic status and those who reported limited access to healthy foods were more likely to have a suboptimal diet, as measured by the HEI [13]. Older adults with obesity are at higher risk for micronutrient inadequacies compared with those who are of normal weight [14]. This is due, in part, to lower overall diet quality, combined with obesity-related physiological changes that alter nutrient metabolism that can result in higher nutrient requirements [15].

Although older adults in the United States fall short on micronutrient intakes from foods and beverages, dietary supplement use is high among this segment of the population. Nearly 70% of adults >60 y report taking ≥1 dietary

supplements daily [16]. Given the high prevalence of dietary supplement use, methods to assess nutrient intakes from both diet and supplements are important. Similar to the HEI, the total nutrient index (TNI) is a score that reflects overall nutrient adequacy. Unlike the HEI, which focuses on adherence to the DGAs and overall diet quality based on foods and beverages, the TNI evaluates micronutrient intakes from foods, beverages, and dietary supplements relative to the dietary reference intakes [16]. Both the HEI and TNI are used for research purposes, and the HEI is also used for monitoring diet quality at the population level. The inclusion of nutrient exposures from dietary supplements improved the correlation with nutritional biomarkers, indicating that older adults may have higher actual micronutrient status than what is captured by the HEI [17,18]. It is important to note that most dietary supplements used among older adults are not at the recommendation of a health care provider, but rather out of personal motivations to improve or maintain overall health [16]. Supplements can represent a key source of certain nutrients given lower energy demands throughout the aging process, including loss of skeletal mass. Although the DGAs and registered dietitians consistently recommend obtaining nutrients primarily from foods and beverages to the extent possible [19], it may not be possible for all Americans. For this reason, the NIH's Office of Dietary Supplements advises all supplement users to consult and alert their healthcare providers and report all products taken [20].

Special Dietary Considerations for Older Adults

As appetite and energy needs decline with age, nutrient density—the ratio of nutrient intake to energy intake—becomes particularly important. Higher nutrient-dense foods and dietary patterns are necessary to meet recommendations for nutrients that tend to be underconsumed. Conversely, for nutrients like sodium, which are typically consumed in excess, consumption should be reduced in proportion to energy intake. For example, when 2400 mg of sodium is consumed as part of a 1500 kcal/d diet, the sodium density is 1.6 mg/kcal. When 2400 mg of sodium is consumed as part of a 2000 kcal, the sodium density is 1.2 mg/kcal. This concept of sodium density has practical implications for tailoring dietary recommendations as energy needs change. The Dietary Approaches to Stop Hypertension (DASH) study was seminal in finding that a diet rich in fruits, vegetables, and low-fat dairy foods and with low saturated and total fat can substantially lower blood pressure [21]. During the original DASH trial, sodium and energy intakes were maintained constant. The subsequent DASH-sodium trial tested the effect of the DASH diet with different sodium intakes (1150, 2300, or 3450 mg/d) on blood pressure [22], and found that reduced sodium intake and the DASH diet lowered blood pressure independently, with even greater reductions when combined [22]. A secondary analysis of the trial data found the dose-response relationship between sodium and blood pressure was not linear [23], and importantly, blood pressure increased more steeply with higher sodium intake at lower energy intakes than higher energy intakes. This reinforces that sodium density (sodium relative to energy intake) is a critical factor in understanding blood pressure responses. There was also evidence that the diastolic blood pressure response varied with energy intake only among the African American participants [23]. These findings are an example of the importance of considering nutrient density in making dietary recommendations and individualizing dietary recommendations for certain populations.

Chemosensory changes in older age are important to consider because they affect food choices that can reduce diet quality [24,25]. These changes are only partly attributable to the aging process itself. Environmental insults, chronic disease, and the use of prescription medications and supplements are key contributors to chemosensory decline in older age [26]. Among the chemosensory changes, taste perception generally declines in older age, although the impact on eating habits is variable. For example, some studies suggest older adults may need a markedly higher salt concentration to achieve the same taste intensity as younger adults [27]. This shift could increase sodium density in the diet and potentially elevate blood pressure and contribute to poorer metabolic health in older adults. However, the literature on age-related differences in salt taste perception is mixed [28,29]. Additional research is needed to clarify how diminished chemosensory function affects eating behavior, nutritional and overall health status of older adults [30,31].

Nutritional needs of older adults for musculoskeletal, cardiometabolic, and cognitive health

Musculoskeletal health

After age 60 y, the mean skeletal muscle mass loss is ~1% per year, whereas strength decreases, ~3% per year [32]. Identifying strategies that mitigate loss of muscle, strength, and function is vital for maintaining independence and quality of life in older adulthood. Protein adequacy is emerging as a key player. In the Health, Aging and Body Composition Study (Health ABC), participants in the highest quintile of protein intake (1.1 g/kg/d) lost ~40% less lean mass and appendicular lean mass than those in the lowest quintile (0.7 g/kg/d) >3 y of follow-up [33]. Among those who lost weight over the 3-y study period, lower protein intake was associated with greater loss of lean mass [33]. These findings suggest that consumption of adequate dietary protein could mitigate loss of muscle mass in older adulthood. Moreover, a separate analysis of Health ABC found that the association of protein intake with physical function and mobility disability differed by race and sex [34], highlighting the importance of considering race and sex in studies of protein requirements in older age.

Current dietary protein recommendations in the United States are based predominantly on short-term nitrogen balance studies that were conducted in young adults [35]. Some studies have suggested that the current recommended dietary allowance (RDA) for protein, 0.8 g/kg/d, is suboptimal for maintaining muscle mass and function in older adults [36–39]. An international group that reviews dietary protein needs with aging, the PROT-AGE Study Group, and the European Society for Clinical Nutrition and Metabolism Expert Group recommend protein intakes of 1.0–1.2 g/kg/d to maintain muscle mass and function in older adults [38,39]. However, meeting an increased dietary need for protein in older age can be challenging due to the reduced energy needs and loss of appetite that accompany aging. Protein supplementation has been suggested as one way that older adults can consume sufficient protein to mitigate

age-related loss of muscle mass and function [40]. However, the available evidence regarding the efficacy of protein supplementation on muscle function in older adults remains mixed. A systematic review and meta-analysis of randomized controlled trials (RCTs) found that protein supplementation did not benefit lean mass, muscle strength or physical performance either alone or in combination with resistance exercise [41]. The populations included in the analysis were mostly nonfrail older adults who were already consuming protein above the RDA, which may explain why there was no additional effect of protein supplementation on muscle mass or function. Another systematic review and meta-analysis focused on the effect of protein supplementation on body composition and muscle function with respect to timing of protein intake and observed a positive effect of protein supplementation on lean mass, but not strength, regardless of timing [42]. A third meta-analysis evaluated how increasing daily protein intake combined with resistance exercise training contributed to lean body mass, muscle strength, and physical function in healthy adults and found that protein intake of 1.6 g/kg/d combined with resistance exercise training resulted in small, but significant, gains in lean body mass, muscle strength, and physical function [43].

The mammalian/mechanistic target of rapamycin (mTOR) pathway has emerged as a central player in muscle protein metabolism[44,45]. Clinical trials conducted in healthy adults demonstrated that muscle protein synthesis (MPS) via mTOR-dependent mechanisms was stimulated by resistance exercise training [46], and ingestion of essential amino acids, particularly the branched-chain amino acid leucine [47–49]. This observation fostered the design of several RCTs of leucine supplementation as a potential therapy to counteract anabolic resistance—the findings of which are inconsistent. Approximately 1.7 g of leucine (from 15 g of protein) was adequate to stimulate MPS in young adults, whereas older adults needed 2.8 g of leucine (from 30 g of protein) [48]. However, in a RCT of males and females aged ≥65 y with low muscle mass and/or strength at baseline, supplementation with 3 g leucine with 10 g protein twice daily for 6 mo did not affect appendicular lean mass, knee extensor strength, grip strength, physical performance, or MPS [50]. A trial specifically designed to determine the leucine requirements of healthy adults ≥60 y utilizing the indicator amino acid oxidation method found that the RDAs for dietary leucine for males and females were 81.0 and 82.0 mg/kg/d, which are more than double current dietary recommendations [51]. However, because of methodological differences between this study and earlier studies used to establish leucine recommendations, it may be misleading to make direct quantitative comparisons [52].

Contractile muscle proteins serve as the primary storage reservoir for essential amino acids during the fed state [53]. During fasting and in times of stress, skeletal muscle is broken down to supply endogenous aminos acids to support energy needs, thus playing a critical role in overall protein homeostasis. Amino acid availability is a central regulator of whole-body protein turnover, not only supporting MPS, but also contributing to the maintenance of the bone matrix through collagen formation [54]. A reduction in MPS is 1 factor that contributes to age-related muscle loss, known as sarcopenia. This age-related reduction in MPS, known as anabolic resistance, is complex, involving both resistance to protein ingestion as well as resistance to the anabolic effects of insulin [54]. Anabolic resistance with aging is associated with sarcopenia and bone loss [54], so understanding its underlying biological mechanisms is important to develop practical interventions to mitigate muscle and bone loss in older age.

Concurrent with population aging, the prevalence of older adults living with obesity is also increasing [55]. When excess adiposity is accompanied by age-related loss of skeletal muscle, it is referred to as sarcopenic obesity [56]. However, recommending weight loss for individuals with sarcopenic obesity is controversial. Although weight loss helps mitigate metabolic dysfunction associated with obesity, it can also accelerate loss of muscle mass and function [56]. A meta-analysis of RCTs of adults aged ≥50 y with overweight or obesity undergoing dietary energy restriction found that those who consumed >25% of energy from protein per day (1.0 g/kg/d) retained more lean mass and lost more fat mass during weight loss than those who consumed less [57]. These findings support the recommendation to increase protein intake during weight loss to help preserve lean mass. However, results of studies completed since the publication of this meta-analysis in 2016 [57] are inconsistent. In older adults (79% female) with obesity and poor physical function who underwent a 6-mo weight loss intervention, those who consumed a higher protein diet (1.2 g/kg/d) lost a similar amount of weight and lean mass as those who consumed the RDA for protein (8.1% compared with 7.5%). However, those randomly assigned to the higher protein diet group had greater improvements in physical performance [58]. In postmenopausal women with obesity undergoing dietary energy restriction, body composition, including lean mass, did not differ between those who received 1.5 g/kg/d protein and those who received 0.8 g/kg/d [59]. In older men and women undergoing energy restriction, lean mass loss and strength also did not differ between those who consumed 1.7 g/kg/d protein and those who consumed 0.9 g/kg/d [60]. Although higher protein intake appears to have favorable effects on muscle mass and function in older age, its effect on preserving lean mass during hypocaloric weight loss is equivocal. The optimal protein dose and meal distribution needed to minimize lean mass loss while promoting clinically meaningful weight loss in older adults with obesity merits further research.

Cardiometabolic health

The typical American dietary pattern is characterized by lower than recommended intakes of fruits, vegetables, dairy foods, and dietary fiber and excessive consumption of total energy, sodium, saturated fat, refined grains, and added sugars. This contributes to widespread underconsumption of essential nutrients, such as vitamin D, calcium, potassium, magnesium, and iron [61]. Dietary patterns that are rich in fruits, vegetables, whole grains, dairy, seafood, legumes, and nuts; lower in red and processed meats; and low in sugar-sweetened foods and drinks are associated with reduced risk of all-cause mortality, cardiovascular disease (CVD), T2D, overweight, and obesity [61]. The 2015–2020 DGA Committee reported that the evidence of inverse association between healthy dietary patterns and risk of CVD and T2D in adults was strong and moderate, respectively [19]. However, their recommendations did not explicitly consider older adults in the patient/population, intervention, comparison, and outcomes framework. Because

~60% of Americans over the age of 65 y were living with ≥1 diet-related chronic disease in 2018, it is important to consider older age in diet and disease associations [62].

Therefore, the 2025 Dietary Guidelines Advisory Committee expanded its analysis to consider older adults specifically [63]. Their systematic review of dietary patterns and CVD included 9 RCTs and 101 prospective cohort studies published since 2014. The committee concluded that dietary patterns consumed by adults and older adults that are higher in vegetables, fruits, legumes, nuts, whole grains, unsaturated relative to saturated fats and lower sodium, with lower intakes of red and processed meat, refined grains, and sugar-sweetened foods and beverages are associated with lower risk of CVD, including clinically meaningful improvements in blood lipids and blood pressure. Some of these patterns also included low-fat dairy and seafood. Consistent findings across diverse racial, ethnic, and socioeconomic groups supported their conclusion that the evidence linking healthy dietary patterns to lower risk for CVD is strong [64]. Similarly, the committee's systematic review of dietary patterns and T2D, which included 14 RCTs and 104 prospective cohort studies published since 2014, concluded that dietary patterns higher in vegetables, fruits, whole grains, legumes, nuts, and fish/seafood, and lower in red and processed meats, high-fat dairy products, refined grains, and sugar-sweetened foods and beverages, were associated with a reduced risk of T2D. This conclusion was likewise supported by strong evidence [65].

Despite this strong evidence linking healthy dietary patterns to lower risk for CVD and T2D [64,65], there are outstanding research questions regarding the role of diet in cardiometabolic health for older adults. The cardiometabolic response to dietary intake is variable across individuals [66], highlighting a need to develop precision nutrition approaches [67,68]. Furthermore, research should elucidate the determinants and mechanisms driving this interindividual variability [69]. Moreover, despite strong evidence that following a healthy diet lowers risk for cardiovascular and metabolic diseases [64,65], many older adults do not consume a healthy diet [70], highlighting a need to address the behavioral and environmental factors that influence dietary choices.

Cognitive health

Diet has emerged as an important modifiable factor for maintaining cognitive health in older age [71]. Rather than being driven by any single nutrient or food group, the relationship between diet and brain health is likely multifaceted [72]. There are several pathways thought to mediate the influence of diet on brain health, with oxidative stress and inflammation being key mechanisms. Oxidative stress occurs when reactive oxygen species accumulate more rapidly than they can be neutralized by the cell's antioxidant defense systems, leading to cellular damage and inflammation. Both processes are implicated in normal aging and neurodegenerative diseases. Nutrition plays a central role in oxidative pathways because many nutrients function as direct antioxidants or as regulators of endogenous antioxidant systems. Among the most studied are the omega-3 (ω-3) fatty acids EPA and DHA, which are primarily found in fish oil and in smaller amounts in certain plant oils. A meta-analysis of RCTs that included older adults without dementia found that ω-3 supplementation was associated with modest cognitive benefits [73], whereas a meta-analysis of ω-3 supplementation trials conducted in patients with Alzheimer's disease (AD) did not find any overall benefit [74]. These findings suggest that the potential cognitive benefits of ω-3s may depend on the stage of neurodegeneration. These benefits may be attributable, in part, to the role of ω-3 fatty acids in maintaining the structural integrity of neuron cell membranes, as PUFAs have been demonstrated to support white matter myelination [75], a process essential for information transmission and synaptic response [76].

A second pathway through which dietary factors may contribute to cognitive health involves brain energetics. The brain predominantly utilizes glucose for energy. When glucose availability is diminished, such as during carbohydrate restriction or prolonged fasting, ketone bodies—mainly beta-hydroxybutyrate (BHB)—are utilized as alternate brain energy. Impaired cerebral glucose metabolism is implicated in AD pathogenesis [77]. As a result, ketogenic diets and other nutritional approaches that elevate ketone production have been proposed to support brain energetics and delay dementia onset [78,79]. There is evidence that increased BHB, produced in response to ketogenic diets, medium-chain triglyceride supplementation, or direct BHB supplementation, may improve cognitive health not only by providing an alternate brain energy source, but also by influencing key cell-signaling pathways involved in neuronal cell function. However, the evidence base to date is equivocal due, in part, to the difficulty of adhering to ketogenic diets over the long term, as well as variability in study design [80–83]. Although ketogenic diets and ketone supplementation represent potential strategies to improve brain energetics and cognitive health in older age, well-designed RCTs are needed to clarify the optimal interventional approaches, as well as long-term efficacy and safety.

Brain networks refer to the integration of modules within the cerebral cortex, which enable information to be processed more efficiently. These modules consist of cortical regions that are more strongly connected to facilitate communication across different parts of the brain. Brain networks are vital for coordinating cognitive function but are also susceptible to the effects of neurodegenerative diseases, which can then lead to cognitive decline. Emerging evidence suggests that nutrition is involved in brain network organization and integration in older age [84]. ω-6 PUFAs, ω-3 PUFAs, and carotene nutrient biomarker patterns were associated with enhanced functional brain network efficiency, whereas ω-3 PUFAs and lycopene moderated the dorsal attention network and executive function [84]. The use of fMRI in this study provided insight into how nutrient status is associated with the brain's network organization. However, the cross-sectional design is a notable limitation. Future research is needed to clarify how nutritional interventions may preserve brain network integrity and cognitive function in older age.

Despite the plausible mechanisms linking dietary factors to brain health and generally favorable evidence from observational studies that adherence to healthier dietary patterns is associated with reduced risk of cognitive decline and dementia [72,85], RCTs on this topic are few and findings are equivocal [71]. Two substudies of the Prevención con Dieta Mediterránea (PREDIMED) intervention in Spain found that the Mediterranean diet supplemented with either olive oil or mixed nuts improved cognitive function, compared with those in the

control group (who were advised to follow a low-fat diet) [86,87]. The PREDIMED was designed to test the effect of the Mediterranean diet on the primary prevention of CVDs [88], and cognitive outcomes were secondary. More recently, a 3-y RCT was designed to test the effect of adherence to the Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND) diet, a hybrid of the Mediterranean and DASH diets, in older adults from the United States with BMI $\geq$25 kg/m^2 and a family history of dementia [89]. Participants were randomly assigned to a MIND diet intervention with energy restriction or a control group with energy restriction and followed for 3 y. The MIND diet intervention group received dietary guidance and incentives to incorporate relevant foods into their diets, and those randomly assigned to the control group received guidance on portion control, energy tracking, and behavioral modifications for weight loss. Both groups included 3%–5% caloric restriction. Global and domain-specific cognitive function improved in both groups, but the improvements did not differ between them. Energy restriction has been reported to improve cognitive function in some studies [90,91], which may have confounded the diet intervention. Future randomized controlled dietary intervention trials need to be designed to address these methodological limitations and incorporate frameworks that support both personalized nutrition and broader population-level dietary guidance [71,92].

The Importance of Cultural Diversity in Nutrition and Aging Research

Over the next 2 decades, it is projected that racial and ethnic minority populations of older adults in the United States will grow by approximately 105% [93]. To ensure that research focused on the role of diet and nutrition in healthy aging reflects the diversity of the United States population, it is essential to include participants from racially, ethnically, culturally and socioeconomically diverse backgrounds. This necessitates the development and/or adaptation of culturally appropriate dietary assessment tools that query the intake of culturally specific foods [94]. The Boston Puerto Rican Health Study (BPRHS) is 1 example of a study that sought to address this issue for a large and understudied segment of the United States population. The BPRHS developed and validated a culturally tailored food frequency questionnaire for this population and enrolled 1500 older Puerto Rican adults living in the Greater Boston area, beginning in 2004 [95]. Adjustments for culturally relevant foods and portion sizes were important to improve the accuracy of dietary intake data and micronutrient status among Puerto Ricans and non-Hispanic white adults [96]. Lack of culturally adapted dietary assessment tools has been shown to result in misclassification of dietary intakes in subgroups [97–99], and therefore bias results of diet-disease associations.

Using data-driven methods, in this case principal components analysis, the BPRHS identified a Puerto Rican dietary pattern, high in rice and oil, which was associated with a higher likelihood of developing metabolic syndrome [100]. Additional findings showed that food insecurity significantly affects dietary quality, with lower intake of fruits and vegetables associated with poorer glycemic control, particularly among those with diabetes [101]. Dietary patterns differ significantly by population subgroup of Hispanic Americans [102,103], and therefore cannot be generalized to all. These findings emphasize the need for culturally tailored interventions and diet assessment tools to improve diet quality and health outcomes across diverse racial and ethnic populations in the United States.

The Importance of the Food System

Older adults' food choices and intake are influenced by age-related changes in physiology, socioeconomic status, family dynamics, such as eating alone or in an assisted living setting, and one's relationship with food [104]. To support evolving dietary needs throughout life, the food system must adopt a holistic approach to food and dietary recommendations. This approach considers not only human health, but also the composition of foods, the bioavailability and accessibility of nutrients within those foods, as well as the effects that those foods and eating patterns have on communities [105]. The food system is complex and dynamic—evolving over time due to changes in agricultural practices and pressure to produce large amounts of food that are affordable, accessible, and safe to consume [105]. Therefore, research investment in diet and human health must address the realities of the current food system and will require transdisciplinary approaches, innovative methodologies and tools, and complex data systems developed through collaboration between public and private sectors to ensure nutritional security for an aging population.

In conclusion, within 20 y, the number of adults aged $\geq$65 y is expected to reach ~80 million in the United States [55], and to exceed 2 billion worldwide [3]. Although this increased life expectancy represents a public health achievement, it brings notable challenges. The number of adults living with multiple comorbid diseases and disabilities will concomitantly increase, underscoring the importance of shifting the research priorities towards extending health span, not just lifespan. Nutrition has a central role in this regard. Obesity is now more common among older adults than being underweight. Age-related declines in chemosensory function, which are often exacerbated by comorbidities, can negatively affect diet quality. Because appetite and energy needs decline, it becomes increasingly important to consume nutrient-dense dietary patterns, yet many older adults face barriers in doing so. Dietary factors contribute to musculoskeletal, cardiometabolic, and cognitive health, yet significant research gaps persist, partly because older adults are typically considered as a homogeneous group. Precision nutrition approaches are needed to address this limitation. The dietary needs of older adults vary widely based on race, ethnicity, culture, and socioeconomic status—highlighting a need for tailored interventions and diet assessment tools to improve diet quality and health outcomes for diverse populations in the United States. Meeting these challenges will require a multidisciplinary approach involving food systems, health care, and public health to support healthy aging for all older adults.

Author contributions

The authors' responsibilities were as follows – SLB, WWC, EV: contributed to conceptualization and writing of the original draft; SLB: had primary responsibility for content; all coauthors:

participated in the forum and reviewed and edited the manuscript; and all authors: read and approved the final manuscript.

Conflict of interest

CWB is an Academic Editor for *Current Developments in Nutrition* and played no role in the journal's evaluation of this manuscript. All other authors report no conflicts of interest.

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