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AHA SCIENTIFIC STATEMENT

2021 Dietary Guidance to Improve Cardiovascular Health: A Scientific Statement From the American Heart Association

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ABSTRACT: Poor diet quality is strongly associated with elevated risk of cardiovascular disease morbidity and mortality. This scientific statement emphasizes the importance of dietary patterns beyond individual foods or nutrients, underscores the critical role of nutrition early in life, presents elements of heart-healthy dietary patterns, and highlights structural challenges that impede adherence to heart-healthy dietary patterns. Evidence-based dietary pattern guidance to promote cardiometabolic health includes the following: (1) adjust energy intake and expenditure to achieve and maintain a healthy body weight; (2) eat plenty and a variety of fruits and vegetables; (3) choose whole grain foods and products; (4) choose healthy sources of protein (mostly plants; regular intake of fish and seafood; low-fat or fat-free dairy products; and if meat or poultry is desired, choose lean cuts and unprocessed forms); (5) use liquid plant oils rather than tropical oils and partially hydrogenated fats; (6) choose minimally processed foods instead of ultra-processed foods; (7) minimize the intake of beverages and foods with added sugars; (8) choose and prepare foods with little or no salt; (9) if you do not drink alcohol, do not start; if you choose to drink alcohol, limit intake; and (10) adhere to this guidance regardless of where food is prepared or consumed. Challenges that impede adherence to heart-healthy dietary patterns include targeted marketing of unhealthy foods, neighborhood segregation, food and nutrition insecurity, and structural racism. Creating an environment that facilitates, rather than impedes, adherence to heart-healthy dietary patterns among all individuals is a public health imperative.

Key Words: AHA Scientific Statements ■ cardiovascular diseases ■ diet, food, and nutrition ■ diet, healthy ■ nutrition policy

This scientific statement supersedes the 2006 American Heart Association (AHA) scientific statement on diet and lifestyle recommendations.[1] The evidence documenting aspects of diet that improve cardiovascular health and reduce cardiovascular risk is summarized, focusing on dietary patterns and food-based guidance. Poor diet quality is strongly associated with elevated risk of cardiovascular disease (CVD) morbidity and mortality.[2] In this context, the purpose of this scientific statement is to (1) emphasize the importance of dietary patterns beyond individual foods or nutrients; (2) underscore the critical role of initiating heart-healthy dietary habits early in life; (3) present common features of dietary patterns that promote cardiometabolic health; (4) discuss additional benefits of heart-healthy dietary patterns, beyond cardiovascular health; and (5) highlight structural challenges that impede the adoption of heart-healthy dietary patterns.

DIETARY PATTERNS

Dietary patterns encompass the balance, variety, and combination of foods and beverages habitually consumed. This includes all foods and beverages, whether prepared and consumed at home or outside the home. Adherence to heart-healthy dietary patterns is associated with optimal cardiovascular health.[3] Because CVD starts during

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fetal development and early childhood,[4] it is essential to adopt heart-healthy dietary patterns early in life, including preconception, and maintain it throughout the life course. Food-based dietary pattern guidance is designed to achieve nutrient adequacy, support heart health and general well-being, and encompass personal preferences, ethnic and religious practices, and life stages. In general, heart-healthy dietary patterns, those patterns associated with low CVD risk, contain primarily fruits and vegetables, foods made with whole grains, healthy sources of protein (mostly plants, fish and seafood, low-fat or fat-free dairy products, and if meat or poultry are desired, lean cuts and unprocessed forms), liquid plant oils, and minimally processed foods. These patterns are also low in beverages and foods with added sugars and salt.

Some heart-healthy dietary patterns emphasized in the Dietary Guidelines for Americans include the Mediterranean style, Dietary Approaches to Stop Hypertension (DASH) style, Healthy US-Style, and healthy vegetarian diets.[5] Research on dietary patterns that used data from 3 large cohorts of US adults, the Dietary Patterns Methods Project, found a 14% to 28% lower CVD mortality among adults with high compared with low adherence to high-quality dietary patterns.[6] However, most research on dietary patterns has been conducted in Western populations; future dietary guidance would benefit from research in non-Western countries. There is insufficient evidence to support any existing popular or fad diets such as the ketogenic diet and intermittent fasting to promote heart health.[7,8]

CRITICAL ROLE OF NUTRITION EARLY IN LIFE AND THROUGHOUT THE LIFE SPAN

Nutrition-related chronic diseases are prevalent over the life course, with growing evidence of maternal-fetal nutritional origins.[9] Excess gestational weight gain, especially among women who experience overweight or obesity at conception, can lead to adverse pregnancy outcomes, subclinical CVD and CVD risk factors in mothers, and an increased risk for pediatric obesity in the offspring.[10,11] There is well-documented evidence that the prevention of pediatric obesity is key to preserving and prolonging ideal cardiovascular health.[12,13] Efforts to achieve and sustain healthy dietary and lifestyle behaviors from birth throughout the life course remain a high priority to reduce the tracking of adverse cardiometabolic conditions: obesity, elevated blood pressure, and metabolic syndrome.[14–17]

EVIDENCE-BASED GUIDANCE ON DIETARY PATTERNS TO PROMOTE CARDIOMETABOLIC HEALTH

Healthy dietary patterns comprise foods and their nutrient components. The Table and Figure summarize evidence-based guidance for dietary patterns to promote cardiovascular health. The following sections summarize the rationale and evidence for each of the 10 features.

Table. Evidence-Based Dietary Guidance to Promote Cardiovascular Health

1. Adjust energy intake and expenditure to achieve and maintain a healthy body weight
2. Eat plenty of fruits and vegetables, choose a wide variety
3. Choose foods made mostly with whole grains rather than refined grains
4. Choose healthy sources of protein
a. mostly protein from plants (legumes and nuts)
b. fish and seafood
c. low-fat or fat-free dairy products instead of full-fat dairy products
d. if meat or poultry are desired, choose lean cuts and avoid processed forms
5. Use liquid plant oils rather than tropical oils (coconut, palm, and palm kernel), animal fats (eg, butter and lard), and partially hydrogenated fats
6. Choose minimally processed foods instead of ultra-processed foods*
7. Minimize intake of beverages and foods with added sugars
8. Choose and prepare foods with little or no salt
9. If you do not drink alcohol, do not start; if you choose to drink alcohol, limit intake
10. Adhere to this guidance regardless of where food is prepared or consumed

*There is no commonly accepted definition for ultra-processed foods, and some healthy foods may exist within the ultra-processed food category.

Feature 1: Adjust Energy Intake and Expenditure to Achieve and Maintain a Healthy Body Weight

Maintaining a healthy body weight throughout the life course is an important component of CVD risk reduction.[18] Over the past 3 decades, increases in energy intake and sedentary lifestyle have shifted the population toward a positive energy balance and accumulation of excess body weight.[19] A healthy dietary pattern coupled with at least 150 minutes of moderate physical activity per week can help to optimize energy balance. However, energy needs vary widely by an individual's age, activity level, sex, and size.[20,21] During adulthood, energy needs decrease by ≈70 to 100 calories with each decade.[22] Also, large portion sizes, even for healthy foods, can contribute to positive energy balance and weight gain.[21] A public health and clinical focus on promoting adoption of a healthy dietary pattern as recommended in this scientific statement, concurrent with portion control and energy balance, is essential for reducing excess body weight gain and CVD risk. Individual physicians and patients need to balance the risks and benefits of diets that do not follow this guidance but may produce short-term weight loss, with uncertain long-term adherence and

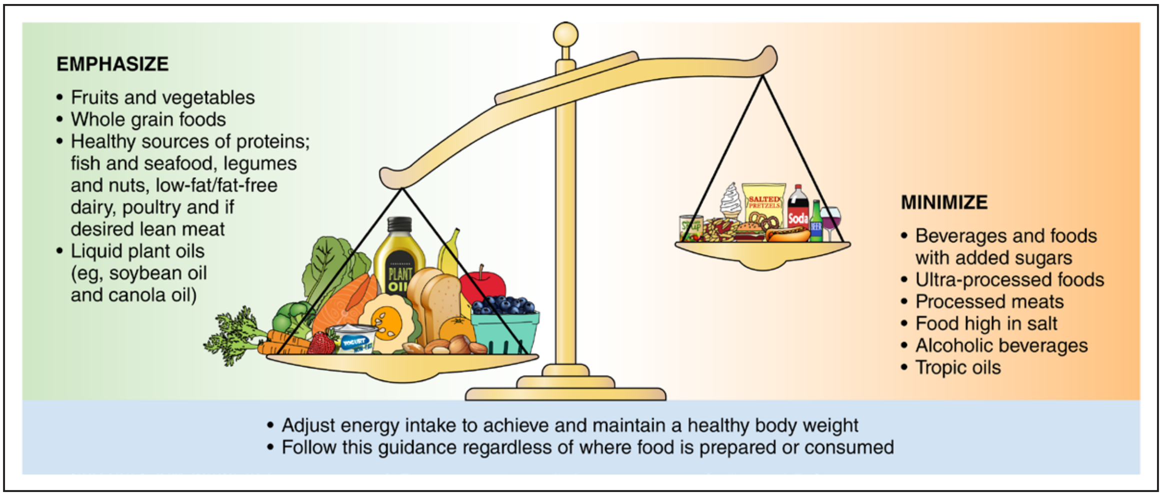

Figure. Dietary patterns to promote cardiovascular health.

outcomes. Adopting rapid diet assessment screening tools in health care settings for CVD risk reduction throughout the life course and tracking diet in electronic medical records will facilitate this goal.[23]

Feature 2: Eat Plenty of Fruits and Vegetables, Choose a Wide Variety

A strong and consistent body of evidence from observational studies has documented that dietary patterns rich in fruits and vegetables, with the exception for white potatoes, are associated with a reduced risk of CVD.[24,25] The results of intervention studies are consistent with these observations.[26-30] Deeply colored fruits and vegetables (eg, leafy greens, peaches) tend to be more nutrient dense than lighter colored and white fruits and vegetables.[31] Whole fruits and vegetables provide more dietary fiber and satiety than their respective juices; hence, the majority of fruits and vegetables should be consumed whole rather than as juice.[31] Most subgroups of fruits and vegetables have been associated with reduced mortality.[32] Consuming a wide variety within these food groups provides adequate essential nutrients and phytochemicals. All forms of fruits and vegetables (fresh, frozen, canned, and dried) can be incorporated in heart-healthy dietary patterns. Frozen fruits and vegetables have a longer shelf-life than fresh forms, are ready-to-use, have similar or higher nutrient content, and at times are lower priced. Types with added salt and sugar should be limited.

Feature 3: Choose Foods Made Mostly With Whole Grains Rather Than Refined Grains

Observational studies and clinical trials consistently report favorable associations of daily, compared to infrequent, intake of foods made with whole grains and CVD risk, coronary heart disease (CHD), stroke, metabolic syndrome, and cardiometabolic risk factors.[33] Whole grains contain intact starchy endosperm, germ, and bran,[34] and are a rich source of fiber. Products made with at least 51% whole grains are typically classified as whole grain. With the use of data from observational studies, substitution analyses indicate that the replacement of refined grain with whole grains is associated with a lower risk of CHD.[35] Beneficial effects of whole grains on laxation and gut microbiota have also been reported.[36] Eating whole grains instead of refined grains has been shown to improve cardiovascular risk factors in randomized controlled intervention studies.[37]

Feature 4: Choose Healthy Sources of Protein

Mostly Protein From Plants (Legumes and Nuts)

Soybeans (including edamame and tofu), other beans, lentils, chickpeas, and split peas are common types of legumes. These plant foods are not only rich in protein, but they are also good sources of fiber. [38] A recent systematic review that compared high and low intake of legumes concluded that higher intake was associated with lower CVD risk.[39] Higher nut intake was associated with lower risk of CVD, CHD, and stroke mortality and incidence.[40,41] Recommendations for plant-based dietary patterns have traditionally centered on replacing animal-source foods with plant-based whole foods such as legumes and nuts, and the products made thereof. Of note, replacing animal-source foods with plant-based whole foods has the additional benefit of lowering the diet's carbon footprint, thus contributing to planetary health.[42]

The rapid emergence of plant-based meat alternatives requires some caution, because, at this time, many are ultra-processed and contain added sugar, saturated fat, salt, stabilizers, and preservatives.[43,44] The nutrient profile of plant-based meat alternatives is consistently evolving. At present, there is limited evidence on the short- and long-term health effects of these plant-based meat alternatives.[45,46]

Regular Intake of Fish and Seafood

Dietary patterns containing fish and seafood are consistently associated with lower CVD risk. Systematic reviews of prospective observational studies have concluded that 2 to 3 servings of fish per week is associated with a lower incidence of all-cause mortality, CVD, CHD, myocardial infarction, stroke, and heart failure than lesser intakes of fish.[47,48] This finding has been attributed to the omega-3 fatty acid content and substitution effect when fish and seafood replaces other sources of animal protein (eg, red and processed meat or full-fat dairy products).[47] The preparation of fish and seafood matters; fried forms are not associated with the benefits.[49] Current data support dietary patterns that contain at least 2 fish meals per week.[50] The greatest benefits occur when seafood replaces foods rich in saturated fat.[50]

Low-Fat or Fat-Free Dairy Products Instead of Full-Fat Dairy Products

Based on consistent evidence from prospective cohort studies, systematic reviews and meta-analyses, the 2020 Dietary Guidelines Advisory Committee concluded that dietary patterns that included low-fat dairy are associated with a lower risk of all-cause mortality, CVD, overweight, and obesity.[9] Nonfat and low-fat dairy products are 1 component of the DASH dietary pattern.[26,51] A long-term observational study in Finland examined the role of multifactorial lifestyle modifications consisting of multiple dietary changes, including a shift from full-fat to low-fat dairy products and butter to vegetable oils in primary CHD prevention.[52] Over 40 years, the population-wide diet and lifestyle changes were associated with significant reductions in serum cholesterol concentrations and CHD mortality. It was estimated that about half of the benefit was derived from reductions in serum cholesterol,[53] with additional favorable dietary changes including increased fruits, vegetables, and fish, decreased sugar and salt, and a shift from fatty to lean meats contributing to the lower CHD mortality. Prospective observational studies found that replacing dairy fat with vegetable fat or polyunsaturated fat was associated with a lower risk of CHD and stroke.[54] However, it is important to note that the benefits of low-fat and fat-free dairy products compared with full-fat dairy products is not without controversy and continues to be debated.[55] Emerging evidence suggests potential cardiometabolic benefits of consuming fermented dairy such as yogurt, but the evidence remains inconclusive.[56,57] Taken together, replacing full-fat dairy products with nonfat and low-fat dairy products and other sources of unsaturated fat shifts the composition of dietary patterns toward higher unsaturated to saturated fat ratios that are associated with better cardiovascular health.

If Meat or Poultry Are Desired, Choose Lean Cuts and Avoid Processed Forms

Dietary patterns rich in red meat have been associated with higher CVD incidence and mortality,[58–62] and body mass index and waist circumference, as well.[63,64] Several systematic reviews and meta-analyses have documented a direct association between red meat intake and CVD incidence and mortality, although the magnitude of the association is less strong than that for processed meat.[58,65,66] Substitution analyses based on large cohort studies found that the replacement of red and processed meat with alternative foods such as unprocessed poultry, fish, nuts, and legumes was associated with a lower risk of total and CVD mortality.[62] The potential adverse effect of red meat on CVD risk has been attributed to a combination of factors, including saturated fat and heme iron content, and gut microbiota metabolism of L-carnitine and phosphatidylcholine.[45,67,68]

The term "processed meats" includes meat, poultry, or seafood products preserved by smoking, curing, or salting or the addition of chemical preservatives.[9] Common examples include bacon, sausage, hot dogs, deli meat (eg, turkey, ham), pepperoni, and salami. Ingredients used to make these foods include sodium and nitrites. Many processed meats are high in salt, saturated fat, cholesterol, heme iron, and polycyclic aromatic hydrocarbons, and heterocyclic amines (depending on the heating method), as well. Substitution analyses indicate that the replacement of processed meats with other protein sources is associated with lower mortality rates.[69] Available evidence does not support an adverse association of unprocessed poultry with CVD.[70–72]

Feature 5: Use Liquid Plant Oils Rather Than Tropical Oils (Coconut, Palm, and Palm Kernel), Animal Fats (Butter and Lard), and Partially Hydrogenated Fats

Robust scientific evidence demonstrates the cardiovascular benefits of dietary unsaturated fats (polyunsaturated and monounsaturated fats), in particular, when they replace saturated and *trans* fats. The cardioprotective effects of unsaturated fat, including reducing low-density lipoprotein (LDL) cholesterol concentrations and CVD risk, are somewhat stronger for polyunsaturated than for monounsaturated fats.[73] This difference between the 2 major classes of unsaturated fatty acids may be related, in part, to the 2 primary food sources. Polyunsaturated fat comes primarily from plant oils, whereas monounsaturated fat comes from both meat fat and plant oils. Diets and drugs that lower LDL cholesterol concentrations reduce atherosclerotic progression and have been consistently associated with significant reductions in CVD risk, proportional to the extent of LDL cholesterol lowering.[74] Major dietary sources of polyunsaturated fat include plant oils such as soybean, corn, safflower and sunflower oils, walnuts, and flax seeds. Major plant sources of monounsaturated fat include canola and olive oils, and nuts; high oleic acid safflower and sunflower oils; and peanuts and most tree nuts and their butters. In addition, fish with a high fat content are a good source of omega-3 fatty acids. To achieve a healthy dietary pattern, saturated and *trans* fats (animal and dairy fats, and partially hydrogenated fat) should be replaced with nontropical liquid plant oils.

Feature 6: Choose Minimally Processed Foods Instead of Ultra-Processed Foods

Food processing has resulted in both beneficial and adverse effects on food availability and nutritional properties. The category of foods termed ultra-processed (also known as industrial food processing, highly processed) is frequently used, despite the lack of an accepted, standard definition. At present, the most commonly used classification system is NOVA.[43,75,76] In the NOVA system, foods are grouped into (1) unprocessed or minimally processed (edible parts of plants and animals); (2) processed culinary ingredients (food ingredients derived from a minimally processed food by pressing, refining, grinding, or milling); (3) processed foods (foods from either of the 2 previous groups that have added salt, sugar, or fats); and (4) ultra-processed foods (foods from the previous group that go beyond the incorporation of salt, sweeteners, or fat to include artificial colors and flavors and preservatives that promote shelf stability, preserve texture, and increase palatability). Sales of processed foods have increased dramatically worldwide and are predicted to increase further through 2024.[43]

Consumption of many ultra-processed foods is of concern because of their association with adverse health outcomes, including overweight and obesity, cardiometabolic disorders (type 2 diabetes, cardiovascular disease), and all-cause mortality.[77–79] In a 4-week, randomized controlled trial of ad libitum food intake, greater intake of ultra-processed food was associated with excess energy intake and short-term weight gain.[80] Recent prospective studies have also found that high compared with low intake of ultra-processed foods is associated with greater risk of type 2 diabetes,[81] incident CVD,[82,83] and all-cause mortality.[83] A general principle is to emphasize unprocessed or minimally processed foods.

Feature 7: Minimize Intake of Beverages and Foods With Added Sugars

Added sugars refer to any sugars added to a food or beverage during preparation or processing. Common types of added sugar include glucose, dextrose, sucrose, corn syrup, honey, maple syrup, and concentrated fruit juice.[84] Added sugars have consistently been associated with elevated risk of type 2 diabetes, CHD, and excess body weight.[85–88] There is strong evidence to support a recommendation to minimize the intake of added sugars across the life span, as recommended by the 2020 Dietary Guidelines Advisory Committee.[9]

Using low-energy sweeteners to replace added sugars in beverages has been proposed as a means to reduce intake of added sugars and energy. However, meta-analyses of clinical trials have reported mixed findings with regard to the effects of low-energy sweeteners on body weight and metabolic outcomes.[89–92,92a] Concern about the influence of reverse causality as a reason for the inconsistent findings from observational studies has been raised.[92–95] Low-abundance mono- and disaccharides, which are metabolized differently than traditional sugars, have recently emerged as potentially preferable, lower-energy substitutes. It is too early to determine how these sugars, in particular, as part of ultra-processed foods, may influence satiety, food cravings, gut microbiota, and long-term health outcomes.[96]

Feature 8: Choose and Prepare Foods With Little or No Salt

In general, there is a direct, positive relationship between salt (sodium chloride) intake and blood pressure.[97] In randomized trials, lowering sodium intake lowers blood pressure in both nonhypertensive and hypertensive individuals, including those treated with antihypertensive medication, thereby improving the prevention and control of hypertension.[1,98] In observational studies, a reduced sodium intake is associated with a blunted age-related rise in systolic blood pressure[99] and, in some studies, a lower cardiovascular disease risk.[98] In general, the effects of sodium reduction on blood pressure tend to be greater in Black individuals, middle-aged and older-aged people, and individuals with hypertension.[97] The combination of the DASH diet and reduced sodium is greater than either approach alone.[51] In the United States, the leading sources of dietary sodium are processed foods, foods prepared outside the home, packaged foods, and restaurant foods, together accounting for almost three-quarters of total dietary sodium.[100] Of note, even foods labeled 100% whole wheat or organic can be high in sodium. Public health approaches to lower sodium in the food supply are likely the most effective strategy.[101] A promising alternative is replacement of regular salt with potassium-enriched salts, especially in settings in which the addition of salt during food preparation is the most common source.[102]

Feature 9: If You Do Not Drink Alcohol, Do Not Start; If You Choose to Drink Alcohol, Limit Intake

The relationship between alcohol intake and CVD is complex. Risk appears to differ by amount and pattern of alcohol intake; age and sex of individuals; and type of CVD outcome. For certain outcomes, the relation is direct, that is, as alcohol intake increases, so does the risk of hemorrhagic stroke and atrial fibrillation.[9,103] For CHD and ischemic stroke, there is a J- or U-shaped relationship, with the lowest risk at low alcohol intake, ≈1 to 2 drinks per day, and higher risks at no intake and higher intake.[103] These relations are based on observational studies; hence, confounding by other variables cannot be excluded. There has been no intervention trial of alcohol on hard clinical/CVD outcomes, except for a small trial that documented that abstinence from alcohol reduced recurrences of arrhythmia in regular drinkers with atrial fibrillation.[104]

Although low intake has been associated with a lower risk of CHD and ischemic stroke, the AHA does not support initiation of alcohol intake at any level to improve CVD health, given the uncertainty about net health effects, especially in light of the deleterious effects of alcohol on numerous other outcomes (injuries, violence, digestive diseases, infectious diseases, pregnancy outcomes, and cancer).[103] The 2020 Dietary Guidelines Advisory Committee recently concluded that those who do drink should consume no more than 1 drink per day and should not drink alcohol in binges.[9] In contrast, the 2020 to 2025 Dietary Guidelines for Americans continues to recommend no more than 1 drink per day for women and 2 drinks per day for men.[19]

Feature 10: Adhere to This Guidance Regardless of Wherever Food Is Prepared or Consumed

Food-based dietary guidance applies to all foods and beverages, regardless of where prepared, procured, and consumed. Food is prepared and consumed nearly everywhere in the environment where we live. Policies should be enacted that encourage healthier default options such as making whole grain rather than refined grain products available and minimizing the sodium and sugar content in products.

ADDITIONAL BENEFITS OF HEART-HEALTHY DIETARY PATTERNS

Desirable Nutrient Profile

Rich in Fiber

Dietary fiber found in plant foods, including fruits, vegetables, whole grains, nuts, seeds, beans, and legumes, is consistently inversely associated with lower risk of metabolic syndrome,[105] cardiometabolic risk,[106] and CVD.[107–111] Fiber also has beneficial effects on digestive health.[112] Although fiber is commonly categorized as either soluble or insoluble, the underlying biological mechanisms appear to be the degree of fermentability and viscosity in the gastrointestinal tract.[112]

Fulfill Essential Nutrient Requirements for Most Individuals

It is preferable to obtain essential nutrients from foods and beverages that are part of heart-healthy dietary patterns rather than nutrient supplements. This approach avoids the risk of individual nutrient overconsumption. This approach also promotes the consumption of phytochemicals, a group of compounds that have emerged as likely contributors to the desirable nutrient profiles of many plant foods.[113] In addition, at this time, there is insufficient evidence to support the use of high-dose vitamin and mineral supplements to prevent CVD.[114] Trials to date on the effect of nutrient supplements and CVD outcomes have yielded largely null results.[115–123] Healthy dietary patterns are rich in potassium, which has been associated with lower blood pressure especially in people with hypertension.[98] Likewise, heart-healthy dietary patterns tend to be nutrient dense and rich in essential nutrients.[9] Therefore, heart-healthy dietary patterns should continue to emphasize foods to meet nutrient requirements. Vitamin and mineral supplementations should not be used as a replacement for a healthy dietary pattern. However, individual nutrient supplements may be needed in cases of nutrient inadequacy or for those eating restricted diets (eg, vegans, certain groups of older adults).

Low in Saturated Fat, Partially Hydrogenated (Trans) Fat, Cholesterol, Added Sugar, and Salt

Healthy dietary patterns are inherently low in saturated fat, *trans* fat, cholesterol, added sugar, and salt. However, some of these components are commonly added to foods during food preparation. Such products should be limited, as discussed earlier (see features 6–8).

Saturated Fat

A comprehensive systematic review and meta-analysis documented the detrimental effects of saturated fat relative to unsaturated fat on CVD outcomes and risk factors.[73] Major dietary sources of saturated fats are meats, full-fat dairy products, and tropical oils (coconut, palm, and palm kernel). A meta-analysis that included only high-quality randomized clinical trials concluded modification lowered CVD by ≈30%, similar to the effect of statin drugs.[73] When all randomized trials were combined, regardless of quality, the reduction in CVD was diminished but still significant. Many population studies in which research participants are followed for years showed that diets low in saturated fats and rich in unsaturated fat were associated with lower risk of CVD, diabetes, and other causes of death.[9,73] A similar benefit has not been observed when saturated fat is replaced with refined carbohydrate.[35] Over the past several years, the use of coconut oil has become increasingly prevalent despite its high saturated fat content. These oils raise LDL cholesterol, with little evidence of positive healthy benefits.[124]

Partially Hydrogenated (Trans) Fat

The major source of dietary *trans* fatty acid has been partially hydrogenated fat.[125] Consistent evidence has documented the adverse effects of *trans* fatty acids on cardiometabolic risk factors.[126] In the United States, these data led to mandatory inclusion of *trans* fat on the Nutrient Facts label and removal of partially hydrogenated fat from the Generally Recognized As Safe list,[82,127] resulting in drastic reductions of *trans* fatty acid content of the food supply.[73,128] Similar trends were recently documented in Canada.[129] Currently, the other source of dietary *trans* fatty acids is animal (ruminant) fat. Following current guidance to replace saturated fat (meat and dairy) with nontropical plant oils also reduces dietary *trans* fatty acids.[130]

Dietary Cholesterol

Guidance for reducing CVD risk and LDL cholesterol concentrations have historically included recommendations to limit dietary cholesterol, although more recently numerical limits have not been explicit.[131] A positive relation between dietary cholesterol and LDL cholesterol concentrations has been documented; still, the current US intake is similar to the historical 300 mg/d upper level.[132] Consistent with these findings, the 2020 Dietary Guidelines Advisory Committee report noted that current intakes should not be increased.[9] Assessing the independent effect of dietary cholesterol on CVD risk is complicated by the lack of evidence at plausible, rather than extremely high intakes, and the difficulty in isolating the effects of eggs from those of frequently paired foods such as bacon and sausage. Adhering to a dietary pattern consistent with the guidance in this document will result in relatively low dietary cholesterol intakes. An in-depth analysis of the topic can be found in the AHA scientific statement on dietary cholesterol and cardiovascular risk.[132]

Reduced Risk of Other Chronic Conditions

Suboptimal diet quality is the leading risk factor for death from major noncommunicable diseases in the United States.[18] A comprehensive systematic review recently concluded that the highest-quality diet scores were associated with lower risk of all-cause mortality, CVD incidence or mortality, cancer incidence or mortality, type 2 diabetes, and neurogenerative diseases.[133]

Type 2 Diabetes

Type 2 diabetes is a major risk factor for CVD. Evidence from prospective observational studies has consistently identified an inverse association between diet quality and type 2 diabetes risk[134,135]; likewise, the Mediterranean-style eating pattern has been inversely associated with risk for type 2 diabetes.[136,137] The association has been attributed to lower body mass index and reduced insulin resistance and inflammation.

Cognitive Decline

Healthy dietary patterns are linked to better cognitive abilities and slower decline with advancing years.[71] DASH-style dietary patterns, with and without a physical activity program component, are associated with a slower decline in age-associated cognitive tasks.[138–141] Observational studies and randomized clinical trials have also found that a Mediterranean-style diet was associated with a slower decline in cognitive status.[140,142,143] The Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND) diet, which is a hybrid of the DASH and Mediterranean diets, has been associated with slower rates of age-related cognitive decline[144] and a lower incidence of Alzheimer disease.[145] In contrast, a small and short-term randomized trial conducted in Australia reported no significant benefit of Mediterranean-style diet on cognitive functioning.[146]

Kidney Function Decline

Heart-healthy foods and dietary patterns promote kidney health. Observational studies have reported that higher intake of low-fat dairy, nuts, and legumes; greater adherence to the DASH diet, Mediterranean-type diet, and plant-based diet; and moderate alcohol consumption were associated with lower risk of adverse kidney outcomes; and higher intake of artificially sweetened beverages, sugar-sweetened beverages, and red and processed meat was associated with higher risk of adverse kidney outcomes.[147–154] Clinical trials have demonstrated that restricting sodium and increasing fruits and vegetable intake reduces kidney injury.[155–157]

Low Environmental Impact

There are increasing concerns about the environmental impact of current dietary patterns and food systems that favor animal-based food production and consumption, which contribute substantially to human-generated, greenhouse gas emissions, and water and land usage.[42] Commonly consumed animal products, particularly red meat, have the largest environmental impact. Reducing meat intake from current high levels will improve diet quality and result in more sustainable dietary patterns and lower carbon footprint.[42] Multiple dietary patterns such as DASH, Mediterranean, Healthy US-Style, and healthy vegetarian patterns are consistent with heart-healthy dietary patterns and also associated with a smaller environmental impact than the average US diet.[158] Of note, sustainability is not always synonymous with heart-healthy dietary patterns. For example, plant-based diets high in refined carbohydrate and added sugar have been associated with increased risk of type 2 diabetes[159] and CVD.[160]

CHALLENGES TO ADHERING TO HEART-HEALTHY DIETARY PATTERNS

The food environment has a substantial influence on people's food choices, diet quality, and subsequently cardiovascular health at many levels, making it difficult for many Americans to adhere to heart-healthy dietary patterns. In the background of rampant nutrition misinformation,[161] there are numerous systemic federal, state, and local practices and policies that impede the adoption of these dietary patterns. As discussed later on in this scientific statement, factors including targeted food marketing, structural racism, neighborhood segregation, unhealthy built environments, and food and nutrition insecurity create environments in which unhealthy foods are the default option where we eat, work, and live. Moreover, varied access, availability, price, promotion, and placement of products in different environments often make it easier to choose unhealthy versus healthy foods. Improving diet quality and related chronic health conditions across all populations will require addressing these upstream systemic problems, in particular, among people of underrepresented races and ethnicities.[162,163] An important adjuvant approach alongside widespread environmental changes is to directly combat nutrition misinformation among the public and health care professionals. Reintroduction of food and nutrition education in curricula for K-12 and medical school may facilitate these efforts.[164,165]

Socioeconomic Factors and Food and Nutrition Insecurity

Despite widespread knowledge of the components of a heart-healthy dietary pattern, the United States has made little progress in achieving dietary goals.[15] Disparities in dietary quality by income, race and ethnicity, education, and use of food assistance programs have been well documented,[162,166] yet there has been little action to reduce these gaps that contribute to suboptimal diet quality.

Food and nutrition insecurity is defined as limited or uncertain access to safe and nutritious food, a condition that was estimated to affect 37 million Americans in 2018, with a disproportionate burden on Black and Hispanic households.[167] Numerous studies have shown that food and nutrition insecurity is associated with poor diet quality and high chronic disease rates.[168–172] Federal food assistance programs, such as the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), provide supplemental assistance for food purchases, but these programs only support a fraction of the monthly household food supply.[173] Many food and nutrition–insecure individuals, such as those who are not US citizens or permanent residents, are not eligible for SNAP or WIC benefits. The WIC program was revised in 2009 to increase fruits, vegetables, whole grains, and low-fat milk, and these changes were associated with the purchase of healthier foods.[174,175] Studies have demonstrated the effectiveness of providing incentives for healthier purchases in the SNAP program, in particular, fruits and vegetables,[176–179] yet corresponding SNAP policies that incentivize healthier purchases have not been implemented.

Structural Racism and Neighborhood Segregation

Longstanding inequities in consumption of heart-healthy dietary patterns and diet-related chronic diseases risk are exacerbated by factors related to residential segregation and inequitable institutional systems, such as education, employment, criminal justice, and health care (collectively termed, structural racism).[180] Reaching population-level dietary goals will not occur without addressing structural factors responsible for neighborhood segregation, low educational attainment, and low-income. Discriminatory housing policies have led to neighborhood segregation that contributes to built environments that promote unhealthy dietary patterns,[162] such as low consumption of fruits and vegetables and high consumption of unhealthy snacks, desserts, and fast food.[181,182] Many communities with a high proportion of people from underrepresented races and ethnicities have few supermarkets but many fast food, convenience, and dollar stores.[183] Lack of access to adequate transportation adds to the difficulty in purveying healthy foods in these communities.[184] The US Department of Agriculture recently piloted a program in several states that allowed the use of SNAP benefits for online grocery shopping, a policy change intended to improve access to healthy foods for SNAP recipients by eliminating some of the environmental barriers.[185]

Targeted Marketing of Unhealthy Foods and Beverages

Black and Hispanic children are more likely to be exposed to advertising for processed food and beverages through outdoor, television, digital, and print advertising than non-Hispanic White children.[163,181,186–188] Similar to the tobacco industry, the food and beverage industry has combined targeted advertising efforts with sponsorship of events and organizations targeted toward people of underrepresented races and ethnicities, and through corporate giving, as well, aimed at establishing a goodwill presence in those communities.[163] Online shopping, initially thought to be an opportunity for reducing disparities in food purchases, actually might have the opposite effect by using artificial intelligence to promote unhealthy foods and beverages. These practices are likely to have a disproportionate and deleterious effect on shoppers who may come from low-income, underresourced, and underrepresented groups.[189] Such marketing of unhealthy food and beverages compounds the adverse dietary and health effects related to the built environment, social determinants, and structural racism.[163]

LOOKING TO THE FUTURE: PRECISION NUTRITION TO IMPROVE DIETARY PATTERNS AND HEALTH FOR ALL PEOPLE

The National Institutes of Health 2020 to 2030 Strategic Plan for National Institutes of Health Nutrition Research focuses on precision nutrition to determine the impact on health of not only what individuals eat, but also of why, when, and how they eat throughout the life course.[190] Precision nutrition stems from increasing evidence that individual differences (interindividual variability) in dietary intake, behaviors, genetic background, microbiome, and socioeconomic and physical environments influence disease risk.[190–192] The National Institutes of Health strategic plan aims to advance understanding of the interactions and synergies among these factors to inform the development of clinically relevant strategies to improve dietary intake and health.[190] Precision nutrition harnesses the power of genotyping, bioinformatics, and artificial intelligence in combination with implementation and behavioral sciences.[191,193] In the future, multilevel precision nutrition strategies could help reduce socioeconomic and racial and ethnic disparities in dietary intake and cardiovascular disease outcomes.[194] However, although precision nutrition has future potential to provide personalized diets for CVD prevention, the field is still developing. Hence, the current focus on public health nutrition strategies to improve the food environment is warranted.

CONCLUSION

This AHA scientific statement on dietary guidance to improve cardiovascular health summarizes available evidence, provides contextual guidance for the key components of dietary patterns to reduce CVD morbidity and mortality, and discusses population-wide adoption of the guidance. Challenges to adhering to heart-healthy dietary patterns include targeted marketing of unhealthy foods and beverages, structural racism, neighborhood segregation, and food and nutrition insecurity. Creating an environment that facilitates, rather than impedes, adherence to heart-healthy dietary patterns among all individuals is a public health imperative.

ARTICLE INFORMATION

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

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Disclosures

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*Significant.

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*Modest.

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