Delivering on the Dietary Guidelines

How Stronger Nutrition Policy Can Cut Healthcare Costs and Save Lives

Union of Concerned Scientists

Today, 60 percent of all adults in the United States live with one or more chronic diseases. Research shows that many of these illnesses—including cancer, cardiovascular disease, and type 2 diabetes— are caused in part by poor diets.

Such diseases are the leading causes of death and disability and, along with mental health conditions, account for 90 percent of the nation's $3.5 trillion in annual health care expenditures (CMS 2017; NCCDPHP 2019). According to a recent study, nearly half of all US deaths from heart disease, stroke, and type 2 diabetes may be attributed to poor dietary quality (Micha et al. 2017). Most of us fall far short of meeting the daily recommended levels of fruits, vegetables, and whole grains, and consume added sugar, refined grains, sodium, and some meats in excess. Our current diets have serious implications for both population health and planetary health (Willett et al. 2019; NHANES 2016).

The barriers to achieving a healthy diet are numerous, including the real and perceived costs of nutritious foods, poor geographic access, lack of time and skills needed to prepare foods, and cultural norms. In addition, our food and agriculture systems make cheap and unhealthy convenience foods readily available for consumers, and the food manufacturing industry aggressively markets these products. Many of these barriers are features of an economic system that fosters extreme inequality and persistent poverty, with disproportionate negative impacts on communities of color—a reality reflected in deeply entrenched health disparities and systemic inequities in healthy food access, sometimes labeled as "food apartheid" (Brones 2018; Bower et al. 2014).

Better nutrition will not address all the causes of health disparities, high diet-related disease and death rates, and high medical costs in the United States. However, it remains a vastly underutilized tool to improve health outcomes and reduce costs. The federal government plays a critical role in providing the information and resources needed to improve population health through nutrition.

Among the most powerful tools at its disposal is the *Dietary Guidelines for Americans (Dietary Guidelines)*, intended to be a comprehensive set of science-based nutrition recommendations with the potential to influence dietary choices made by millions of people each day. If the US population is

to achieve a healthier diet—and the quality of life and medical cost savings that come with it—these guidelines must be unambiguously grounded in the best available science and accompanied by actions and investments to ensure their effective implementation. Unfortunately, due in part to political leadership that has allowed industry to interfere with the scientific process, this has not always been the case. Moreover, the Trump administration's record of undermining science and public health protections suggests additional oversight may be required as Trump-appointed agency secretaries lead the process to update the *Dietary Guidelines* by 2020. In this report, we estimate the lives and healthcare dollars that could be saved if guidelines followed the latest science and were coupled with greater investments to help all of us follow them.

[***The* Dietary Guidelines for Americans *is a complete set of science-based nutrition recommendations and a powerful tool to improve health.***]

The *Dietary Guidelines*: A Public Health Tool with Powerful Potential

The *Dietary Guidelines for Americans* is the nation's leading set of science-based nutrition recommendations, informing federal programs and educational materials that serve millions of kids, parents, seniors, veterans, and other members of the general public every day. It is a critical tool for health professionals helping patients achieve healthy lifestyles;

Though the primary purpose of the Dietary Guidelines *is to inform federal food, nutrition, and health programs, they can also provide consumers with useful information about healthy diets.*

policymakers working to pass laws that expand healthy food accessibility and affordability; and administrators of federal food programs such as the National School Lunch Program, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and Supplemental Nutrition Assistance Program (SNAP). The primary goal of the guidelines is disease prevention: to reduce the risk of chronic disease by making it easier for individuals and families to choose foods that promote good health (HHS and USDA 2015).

Since 1990, Congress has required that these guidelines be revised every five years to ensure they reflect the best available science and respond to population health needs (US Congress 1990). The multiyear process of revising the guidelines begins with the appointment of a scientific advisory committee—a panel of independent experts in the fields of health, medicine, or nutrition charged with producing a scientific report on current topics in nutrition—and concludes with the issuance of final guidelines by the secretaries of the US Department of Agriculture (USDA) and the US Department of Health and Human Services (HHS).

All relevant scientific recommendations made by the committee should be included in the final guidelines, but this has not always been the case. Discrepancies between the scientific recommendations and the final guidelines may be due to political pressure from Congress or from external parties with a financial stake in the outcome, factors that lead

agency secretaries to omit recommendations that might conflict with the interests of political allies and the food industry.

Learning from the Last *Dietary Guidelines*

The process to create the *2015–2020 Dietary Guidelines for Americans* was notable for both the important developments and political disputes it introduced. A Dietary Guidelines Advisory Committee (DGAC), comprising 15 highly qualified members with extensive research experience,[1] produced a final report concluding that a healthy dietary pattern "is higher in vegetables, fruits, whole grains, low- or non-fat dairy, seafood, legumes, and nuts; moderate in alcohol (among adults); lower in red and processed meat;[2] and low in sugar-sweetened foods and drinks and refined grains" (DGAC 2015).

Though the overall findings were largely consistent with past DGAC reports, the 2015–2020 scientific report made several key advancements. Firstly, it set new quantitative limits on added sugar, recommending individuals consume no more than 10 percent of their total calories from added sugar. Secondly, the 2015–2020 DGAC framed its recommendations within a conceptual model recognizing the environmental, organizational, personal, and social contexts in which people make choices about their diets.

> *The primary goal of the guidelines is to reduce the risk of chronic disease by helping people to make healthy food choices.*

This science-based framework, designed to strengthen the real-world application of the guidelines, incorporated findings that diets higher in plant-based foods are both healthier and less damaging to the environment than the typical US diet. With this inclusion, the framework thereby helped to ensure that future generations could access healthy diets (DGAC 2015). This particular finding has been supported by extensive research, including information from the 2019 EAT-Lancet Commission on Healthy Diets from Sustainable Food Systems, which reaffirms the vast, unrealized health and environmental benefits of diets high in plant-based foods and lower in animal protein (Willett et al. 2019).

However, the DGAC's consideration of plant-based diets and environmental sustainability incited vigorous debate, prompting Congress to pass legislative language limiting

the scope of the *Dietary Guidelines* strictly to diet (US Congress 2015). This legislation was driven in part by pressure from industries, including the meat industry, whose markets would have been threatened by such recommendations. In 2014 and 2015, nearly four dozen food and beverage companies and trade associations reported spending more than $77 million combined to lobby Congress on issues including the *Dietary Guidelines* (see box).

Ultimately, the USDA and HHS secretaries omitted considerations of environmental sustainability from the final guidelines, claiming the issue was outside of the document's scope (USDA 2015). Many experts saw this decision as an overt override of scientific evidence by meat industry groups that opposed the recommendations (Sifferlin 2016; HSPH 2015; NAMI 2015). The *2015–2020 Dietary Guidelines* also failed to acknowledge the relationship between processed meat and colorectal cancer risk—which was well established in scientific literature and affirmed by the World Health Organization.

Further, the guidelines did not explicitly recommend consuming less red meat, which is classified as "probably carcinogenic to humans" and may increase risk of

> *The development of science-based guidelines can be undermined by the political appointees who oversee them.*

cardiovascular disease, type 2 diabetes, and death (Wang et al. 2019; AICR 2018; HHS and USDA 2015; IARC 2015; Micha, Michas, and Mozaffarian 2012; Pan et al. 2012).

The updating process for the *2015–2020 Dietary Guidelines for Americans* demonstrated how the development of science-based guidelines can be undermined by the political appointees who oversee them. Though many of the recommendations were consistent with those in past editions, these departures from science and deference to industry represent a missed opportunity to deliver guidelines that may have put the US population on a path to better health. The development of the

The Dairy, Meat, and Soda Industries Lobby Congress in Hopes of Shaping the *Dietary Guidelines*
Is the Infant Formula Industry Next?

Many sectors of the food industry have an interest in affecting each update of the *Dietary Guidelines for Americans*. In addition to submitting public comments and meeting with officials from the US Department of Agriculture and US Department of Health and Human Services to advocate for their products, companies and trade associations seek to influence the process by lobbying Congress. In 2014 and 2015 (the two years preceding the release of the *2015–2020 Dietary Guidelines*), food and beverage companies and trade associations did so aggressively. Legally required reporting forms filed by such groups during that two-year period show more than $77 million in lobbying activities directed at Congress, on issues including the *Dietary Guidelines* (CRP n.d.).

Certain segments of the industry are responsible for large amounts of that total. For example:

- Soda makers Coca-Cola and PepsiCo and their industry lobby group, the American Beverage Association, spent a combined $23.8 million.

- The dairy industry, represented by the International Dairy Foods Association and Land O'Lakes, spent more than $21 million.

- Meat industry interests—including the Livestock Marketing Association, the National Cattlemen's Beef Association, the National Chicken Council, the National Pork Producers Council, Smithfield Foods, the Texas Cattle Feeders Association, and the United States Cattlemen's Association—collectively spent $4.5 million.

By 2018, the industry was beginning to lobby on the *Dietary Guidelines* again, and another sector had joined in: the infant formula industry. With the *2020–2025 Dietary Guidelines* required, for the first time, to make recommendations for infant nutrition, the formula industry is expected to make its presence felt throughout the process.

Among those weighing in is Switzerland-based Nestlé S.A., the world's largest food company. Known for its long, troubling history as a global purveyor of infant formula, the company reorganized its infant nutrition business in 2017, listing the area as a priority for growth (Goldberg 2018; Geller and Koltrowitz 2017). In 2018, Nestlé spent $1.3 million lobbying Congress on issues including the *Dietary Guidelines* (CRP n.d.).

2020–2025 Dietary Guidelines for Americans offers the Trump administration, including USDA and HHS leadership, a chance to course-correct with consistent adherence to nutrition science and a stronger commitment to effective implementation of the guidelines—and many thousands of lives and billions in health care costs hang in the balance.

Analysis: Following the Science on Healthy Diets Can Save Lives and Slash Spending

There is vast untapped potential to save lives and health care dollars through better nutrition. To estimate just how substantial such reductions in deaths and health care spending could be, we conducted an analysis based on recent high-quality scientific research. Our analysis focuses on three key food categories and their respective relationships to common chronic diseases: processed meat and colorectal cancer, sugar-sweetened beverages and type 2 diabetes, and fruits and vegetables and cardiovascular disease.

We selected these foods and diseases based on the strength of their relationships and the availability of research. They were also chosen to illustrate the different ways the DGAC's science-based recommendations are developed and translated to formal dietary guidelines. For example, the *2015–2020 Dietary Guidelines* omitted recommendations to reduce processed meat intake because the USDA and HHS secretaries yielded to the meat industry. In the case of added-sugar limits, the guidelines incorporated strong scientific research that established added-sugar limits—though the committee would have been justified in setting a lower threshold. Finally, the guidelines included the DGAC's recommendations to consume adequate amounts of fruits and vegetables, consistent with science and with past editions (HHS and USDA 2015).

This report does not consider numerous other important foods and nutrients—such as refined grains, sodium, and whole grains—that also affect health in significant ways, both positively and negatively.

It should be noted that dietary changes do not instantaneously change disease risk; rather, healthy dietary patterns are built over a lifetime. This report's analysis assumes that the US population was already following science-based dietary recommendations in 2018, and it does not account for any lag time between changing diet and accumulating long-term

health benefits. Furthermore, the causes of disease are complex, with diet being only one contributing factor, and there is often interplay between related diseases (often called comorbidities). For example, a person with type 2 diabetes has a greater risk of developing cardiovascular disease (AHA 2015).

The three cases presented below account for only the relationships between one food or food group and one disease and assume no interaction among comorbidities. As a result, our projections of lives saved and costs averted may be an underestimate, as each proposed dietary change may reduce the risk of multiple diseases. All results are based on the US adult population, as chronic diseases are most often diagnosed in adulthood and childhood deaths from chronic diseases are exceedingly rare. All dollar values, unless otherwise stated, are reported in 2018 USD.

CUTTING BACK ON PROCESSED MEAT TO CURB COLORECTAL CANCER

Colorectal cancer is the third most commonly diagnosed cancer among men and women in the United States, accounting for more than 140,000 new cases, or 8.1 percent of all cancer cases, and 50,000 deaths in 2018 (Seigel, Miller, and Jemal 2018). It is also among the cancers that are most strongly linked to diet. The annual estimated cost of treating colorectal cancer amounts to more than $19 billion, while the sum of productivity costs lost to premature colorectal cancer deaths totals nearly $12 billion (Mariotto et al. 2011; Cradley et al. 2008). While overall rates of new colorectal cancer cases have steadily declined in recent decades (driven primarily by increases in screening), there has been a sharp rise in colorectal cancer rates among adults age 20 to 39 and a moderate increase among adults age 40 to 54 (Siegel et al. 2017; SEER 2015).

The implications are alarming: those born in 1990 now have double the risk of colon cancer and quadruple the risk of rectal cancer as those born in 1950. Researchers believe that trends among younger adults may be fueled by factors that contribute to obesity, including unhealthy dietary patterns and sedentary lifestyles (Siegel et al. 2017). The persistent racial and ethnic disparities in colorectal cancer rates are also most pronounced in younger populations: compared with non-Hispanic whites, people of color are twice as likely to be diagnosed with colorectal cancer under the age of 50 and tend to have more advanced cancer stages at diagnosis (Jackson et al. 2016; Rubayat et al. 2015).

[*Those born in 1990 now have double the risk of colon cancer and quadruple the risk of rectal cancer as those born in 1950.*]

While there is no certain way to prevent cancer, behaviors that can help prevent colorectal cancer include eating a diet low in red and processed meats and high in fruits and vegetables, maintaining a healthy body weight, engaging in regular physical activity, avoiding alcohol and smoking, and getting regularly screened beginning at age 45 (ACS 2018). Recent research has called attention to the carcinogenic properties of processed meat—a category that includes foods such as bacon, deli meat, hot dogs, sausages, and other meats that have been preserved by processes such as curing, fermenting, salting, and smoking (AICR 2018).

In 2015, a panel of experts convened by the International Agency for Research on Cancer (IARC) found sufficient evidence to classify processed meat as carcinogenic to humans, concluding that each daily 50 gram serving of processed meat—equivalent to about two to four pieces of deli meat, two to four strips of bacon, or one hot dog—increases the risk of colorectal cancer by 18 percent (ARS 2019; IARC 2015). Additional studies published since the IARC report have supported its conclusions: a 2018 report from the American Institute for Cancer Research (AICR) presented results from a meta-analysis of more than 10,700 cases and revealed a 16 percent increase in colorectal cancer risk per daily 50 g serving of processed meat (AICR 2018).[3]

FIGURE 1. Processed Meat Consumption among Adults in the United States
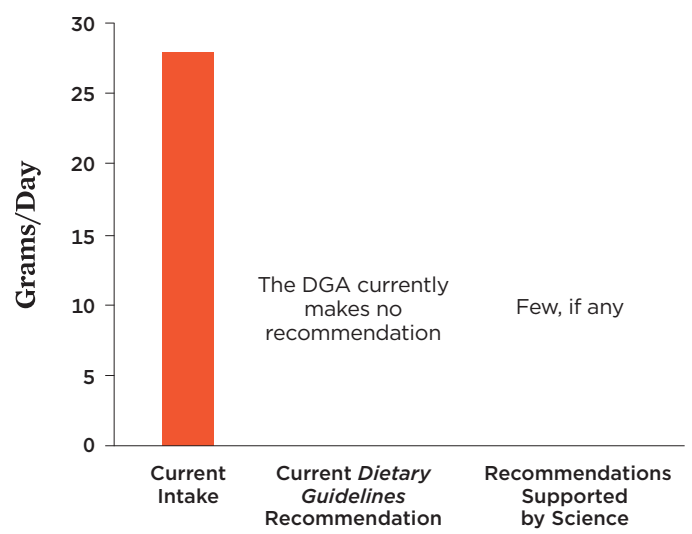
The current intake of processed meat far exceeds science-based recommendations, but the Dietary Guidelines *have not addressed this issue.*

SOURCES: AICR 2018; NHANES 2016; HHS AND USDA 2015.

TABLE 1. Mortality Reductions and Cost Savings Resulting from Limited Consumption of Processed Meat

Actual 2018 Processed Meat Consumption Levels	
2018 deaths	50,630
2018 estimated medical costs (billions USD)	$19.5
2018 estimated indirect/productivity costs (billions USD)	$11.8
Consumption of Little to No Processed Meat (daily decrease of 24 g)	
Reduction in risk of colorectal cancer	7.7%
Prevented deaths	3,890
Reduced medical costs (billions USD)	$1.5
Reduced indirect/productivity costs (billions USD)	$0.9

Reducing processed meat intake to one serving (28 g) per week, on average, would yield significant reductions in deaths from and medical costs associated with colorectal cancer.

Notes: This analysis assumes colorectal cancer incidence is proportional to colorectal cancer mortality. Direct medical costs projected through 2018 account for population change, trend incidence, trend survival, and 2% overall annual cost increase. Indirect medical costs projected through 2018 are likely overestimated, as Cradley et al. (2008) used annual inflation conversion factors of 2.1% in 2007 and 2.2% in 2008–2020. Following the 2008 recession, actual inflation rates were 2.9% in 2007, and averaged 1.75% between 2008 and 2018.

SOURCES: BLS 2019; AICR 2018; SEER 2018; NHANES 2016; MARIOTTO ET AL. 2011; CRADLEY ET AL. 2008; MURPHY AND TOPEL 2006.

On average, people age two and older in the United States currently consume about one ounce (28 g) of processed meat per day—equivalent to about one to two pieces of deli meat, one to two strips of bacon, or half of one hot dog (see Figure 1) (ARS 2019; NHANES 2016). Of course, there is wide variation in the size and weight of processed meat portions, and in the frequency of actual processed meat intake; some people consume very little processed meat, and some consume high amounts.

> *An international panel of experts found sufficient evidence to classify processed meat as carcinogenic to humans.*

Using the results from the AICR, our analysis estimated the decreases in colorectal cancer and associated medical costs, and productivity savings that would be expected if adults in the US population, on average, had consumed little to no processed meat daily in 2018—in other words, if the average adult decreased their intake of processed meat from about one ounce per day to one ounce per week. Direct medical cost estimates are based on the most recent assessment of total colorectal cancer medical costs in the literature,[4] projected through 2018 (Mariotto et al. 2011).[5] Productivity cost estimates are based on the average value of lifetime earnings lost due to premature death from colorectal cancer (Cradley et al. 2008).[6] For the purposes of our analysis, we assume that premature deaths attributable to colorectal cancer are proportional to the incidence of the disease.

We found that if the USDA and HHS had made science-based recommendations to eat very little processed meat—equivalent to consuming just one ounce per week—and the public was able to follow them, these actions could have averted an estimated 3,900 deaths from colorectal cancer, decreased medical costs by $1.5 billion, and saved nearly $1 billion in productivity costs in 2018 (see Table 1).

These significant reductions in deaths and medical costs are accompanied by another dollar value—what economists refer to as the "value of a statistical life." Though it is impossible to put a price on human life, this concept provides an estimate of how much people would be willing to pay to reduce the likelihood of death by certain causes. A 2006 study applied this method to estimate the economic value of a 10 percent reduction in deaths from a variety of chronic diseases,

including cancer, between 1970 and 2000 (Murphy and Topel 2006). The findings indicated that a 10 percent reduction in colorectal cancer deaths would have a value of more than $1.3 trillion dollars.[7] Assuming these figures remain applicable at this time, we estimated that the present value of reducing colorectal cancer deaths via reducing processed meat consumption would total $1 trillion.

SICKENINGLY SWEET: ADDED SUGAR AND TYPE 2 DIABETES

More than 30 million people in the United States, or 9.4 percent of the population, live with diabetes. The vast majority of these cases (90–95 percent) are classified as type 2 diabetes, a chronic condition characterized by insulin resistance that impairs the body's ability to digest glucose, a key source of energy (CDC 2017). The burden of diabetes is borne disproportionately by people of color: non-Hispanic whites are diagnosed at a rate of 7.3 percent, far lower than rates among non-Hispanic black (13.4 percent), Hispanic (11.9 percent), and non-Hispanic Asian (10.3 percent) populations (CDC 2017). The cost of diabetes totaled $327 billion in 2017, with $237 billion in direct medical costs and $90 billion in lost productivity costs (ADA 2018). We estimate that the costs attributable to type 2 diabetes alone would have equaled $220 billion in direct medical costs and $85 billion in productivity costs.[8]

Risk factors for type 2 diabetes include family history of heart disease, stroke, or type 2 diabetes; gestational diabetes; high blood pressure or cholesterol; obesity; and physical inactivity (NIDDK 2016). Research suggests that diet can play an important role in reducing the risk of developing type 2 diabetes. A 2014 systematic review of dietary patterns and health outcomes concluded that dietary patterns higher in sugar-sweetened foods and drinks are associated with a greater risk of type 2 diabetes—as well as cardiovascular disease, colorectal cancer, and obesity (CNPP 2014).[9]
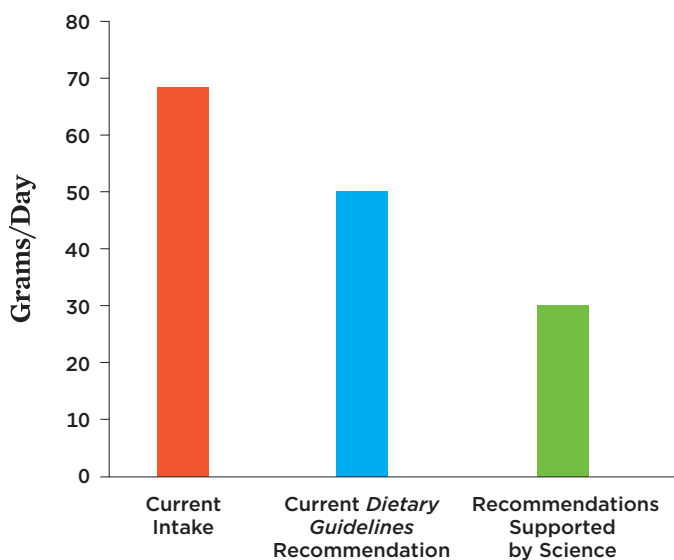
> *The burden of diabetes is borne disproportionately by people of color.*

Because sugar-sweetened beverages contain high amounts of added sugar, with little nutritional value, and their consumption is easily quantified, much research on the link between added sugar and chronic disease has focused on sugar-sweetened beverages. Sugar-sweetened beverages—including fruit drinks, soft drinks, sports and energy drinks, and

sweetened coffee and tea—constitute the primary source of added sugars in the diet, accounting for nearly half of all added sugars consumed in the United States (see Figure 2) (HHS and USDA 2015). On average, US adults and youths consume just under 150 calories from sugar-sweetened beverages per day—equal to approximately one 12 oz can of soda or equivalent sugar-sweetened beverage (see Figure 3) (HSPH N.D.). However, there is wide variation in soda consumption across the population, with more than 20 percent of all adults consuming two or more sugar-sweetened beverages daily (Rosinger et al. 2017).

The 2015–2020 DGAC scientific advisory report described a strong positive association between sugar-sweetened beverages and type 2 diabetes but found insufficient data to determine a dose-response relationship (DGAC 2015; Greenwood et al. 2014; Xi et al. 2014; Romaguera et al. 2013; Sonestedt et al. 2012; Malik et al. 2010).[10] Recent studies continue to offer supporting evidence: three meta-analyses published between 2015 and 2017 reported that, for each additional eight to 12 oz serving of sugar-sweetened beverages, the risk of type 2 diabetes increases between 18 and 21 percent.[11] After adjusting for body

mass index (BMI), risk increases by between 13 and 18 percent (Schwingshakl et al. 2017; Lofvenborg et al. 2016; Imamura et al. 2015). New research has also found that higher intake of sugar-sweetened beverages increases risk of early death. A recent study showed that those who drink one to two sugar-sweetened beverages per day have a 14 percent greater risk of early death than those who drink less than one per month, and those who drink two or more per day have a 21 percent greater risk of early death (Malik et al. 2019).

While the final *2015–2020 Dietary Guidelines* took a step forward with the new recommendation to limit added sugars to no more than 10 percent of total calories, research appears to support a lower threshold. The 10 percent limit is based on the percent of daily calories that would be "left over" once all other

## FIGURE 2. Added Sugar Consumption among Adults in the United States

The 2015–2020 Dietary Guidelines *was the first edition to set a limit for added sugar intake, at 10 percent of total calories. Research suggests an even lower limit could deliver greater health benefits.*

Notes: Per current *Dietary Guidelines* recommendation limiting added sugar intake to 10% of total calories; based on 2,000 calorie diet. Science-based recommendations (6%) are consistent with average added sugar limits for range of calorie needs and 2,000 calorie diet, per US Healthy-Style diet.

SOURCES: NHANES 2016; DGAC 2015; HHS AND USDA 2015.

FIGURE 3. Sources of Added Sugar in the US Diet
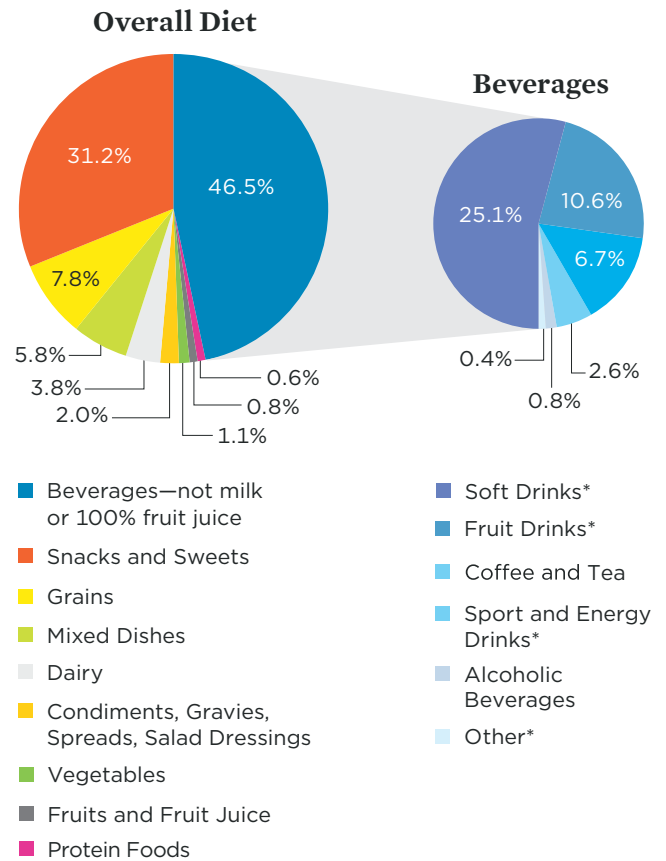
Beverages account for half of sources of added sugars for ages two and up, while snacks and sweets make up about one-third.

*Sugar-sweetened beverages

Note: Values do not add up to 100% because baby foods, infant formulas, milk, and 100% fruit juices are excluded.

SOURCE: HHS AND USDA 2015.

dietary needs were met—meaning a person could still eat a healthy amount and variety of foods while getting 10 percent of their calories from added sugars. However, this limit actually ranges from 3 percent to 9 percent, depending on the number of total calories needed per day, with an average of 5.8 percent across the entire population (DGAC 2015).[12] Many leading health experts and organizations, including the American Heart Association and the World Health Organization, recommend reducing added sugar intake to less than 5 percent of total calories for additional health benefits (Willett et al. 2019; AHA 2018; WHO 2015).

Applying the results from the meta-analysis published by Schwingshakl et al. (2017), we estimated the expected reductions in deaths and medical costs from type 2 diabetes if all US adults consumed one fewer serving (8.5 oz) of sugar-sweetened beverages per day. We selected this study because it differentiated among the benefits of reducing daily sugar-sweetened beverage intake from three or more servings to two servings, from two to one serving, and from one to zero servings. However, a limitation of the study by Schwingshakl et al. (2017) is that it did not explicitly adjust for BMI. Because sugar-sweetened beverage intake is also associated with obesity—another risk factor for type 2 diabetes—some of the increased risk in type 2 diabetes reported in our analysis could also be attributable to body weight. For the purposes of this

> *New research has also found that higher intake of sugar-sweetened beverages increases risk of early death.*

analysis, we assume that premature deaths attributable to type 2 diabetes are proportional to the incidence of the disease.

We found that if adults in the United States who drink sugar-sweetened beverages consumed about one cup (8.5 oz) less per day, that could have averted nearly 19,000 deaths from type 2 diabetes, decreased medical costs by $16 billion, and saved more than $6 billion in productivity costs in 2018 (see Table 2). The value of this reduction in deaths, as captured by the value of a statistical life, would total $470 billion.[13]

FRUITS AND VEGETABLES: A FRESH APPROACH TO CARDIOVASCULAR DISEASE

Cardiovascular disease is the leading cause of death for both men and women in the United States, accounting for more

TABLE 2. Mortality Reductions and Cost Savings Resulting from Limited Consumption of Sugar-Sweetened Beverages

Actual 2018 Sugar-Sweetened Beverages Consumption Levels	
2018 deaths	256,230
2018 estimated medical costs (billions USD)	$220
2018 estimated indirect/productivity costs (billions USD)	$85
Decreased Consumption (daily decrease of 8.5 oz among those who drink sugar-sweetened beverages)	
Reduction in risk of type 2 diabetes	7.3%
Prevented deaths	18,630
Reduced medical costs (billions USD)	$16
Reduced indirect/productivity costs (billions USD)	$6

Reducing consumption of sugar-sweetened beverages would have many benefits for population health, including lower risk of type 2 diabetes and associated health care costs.

Notes: Assumes that deaths due to type 2 diabetes are proportional to prevalence of type 2 diabetes, compared with type 1 diabetes. Between 90 and 95% (average 92.5%) of diabetes cases are classified as type 2 diabetes. Direct medical and indirect productivity costs are based on the ratio of direct and indirect medical costs attributable to type 1 and type 2 diabetes, as reported by Dall et al. (2009). Estimates of direct medical costs attributable to type 2 diabetes do not account for increases in insulin costs during the last decade, as reported by Hua, Carvalho, and Tew (2016), and may therefore slightly overestimate the current percent of all diabetes costs attributable to type 2 diabetes. All 2018 costs are based on 2017 estimates.

SOURCES: BLS 2019; FUGLESTEN BINIEK AND JOHNSON 2019; ADA 2018; CDC 2017; ROSINGER ET AL. 2017; SCHWINGSHAKL ET AL. 2017; HUA, CARVALHO, AND TEW 2016; DALL ET AL. 2009.

Current Dietary Guidelines *call for adults to eat 2 cups of fruit and 2.5 cups of vegetables each day—a science-based recommendation that many of us consistently fall short of.*

than 800,000 deaths annually, or about one in three deaths (NCHS 2018). Cardiovascular disease encompasses a range of conditions, including coronary heart disease, heart failure, hypertension (high blood pressure), and stroke. African Americans, in particular, are disproportionately affected by cardiovascular disease due to a higher overall prevalence of risk factors, including inequities in health care access and multiple forms of structural racism (Bailey et al. 2017). African Americans have the highest rate of hypertension among all demographic categories and have a higher burden of heart attack, heart failure, stroke, and other cardiovascular events (Graham 2015).

Cardiovascular disease is also the nation's costliest chronic disease. Annual medical costs of treating cardiovascular disease—including hospital services, physician visits, and prescribed medications—totaled $209 billion in 2014. This amount is expected to more than double by the year 2035 (AHA 2017; AHRQ 2014). Estimates of indirect costs attributable to cardiovascular disease in terms of lost work days and other productivity measures range between $126 and $237 billion annually (Benjamin et al. 2018; AHA 2017).

While nutrition interventions such as the Dietary Approaches to Stop Hypertension diet have gained traction in recent years, dietary change remains a widely underutilized tool to address cardiovascular disease. Research has shown that increased consumption of fruits and vegetables can have a protective effect against cardiovascular disease and deaths. Much research has supported the relationship between fruit and vegetable intake and lower cardiovascular disease incidence and mortality—including a 2013 study by the Union of Concerned Scientists (Zhan et al. 2017; Wang et al. 2014;

O'Hara 2013). Recently, a meta-analysis identified the relative risk of cardiovascular deaths based on each additional 200 g of fruits and vegetables eaten each day (Aune et al. 2017).[14] The meta-analysis showed that each additional 200 g of fruits and vegetables consumed daily would decrease risk of cardiovascular disease by 8 percent. Though the relationship is nonlinear (meaning the change in risk differs with each additional serving), we assume linearity for the purpose of this analysis. We also assume that premature deaths attributable to cardiovascular disease are proportional to the incidence of the disease.

Using this research as a foundation, our analysis estimated the number of lives that could have been saved—and the resulting direct medical cost savings and averted productivity losses—if the US population had consumed the recommended amounts of fruits and vegetables in 2018. The potential for savings is great precisely because Americans, both youths and adults, are falling far short of meeting dietary recommendations for fruit and vegetable intake. The US population, on average, consumes just 2.5 cups of fruits and vegetables per day—a full two cups short of the 4.5 cups recommended by the *2015–2020 Dietary Guidelines* and supported by research (see Figure 4) (HHS and USDA 2015).

FIGURE 4. Fruit and Vegetable Intake among Adults in the United States
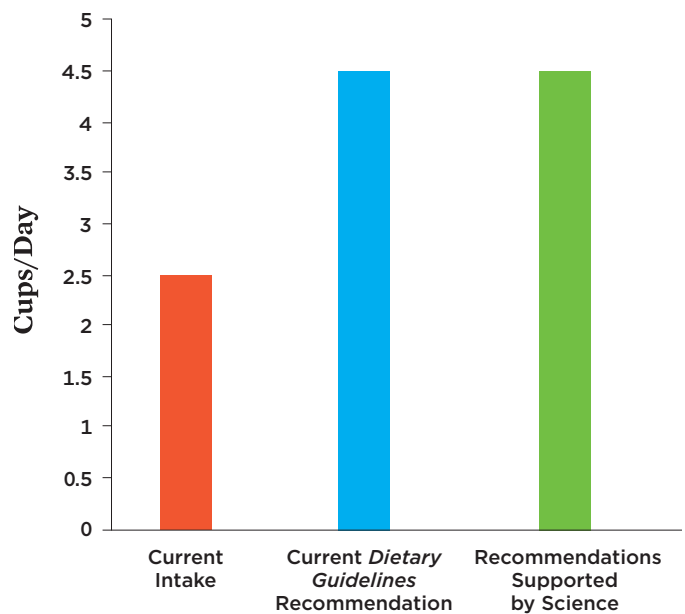
Despite consistent dietary guidance, fruit and vegetable intake remains well below recommended levels.

SOURCES: AUNE ET AL. 2017; NHANES 2016; HHS AND USDA 2015.

According to our analysis, if the US population had been able to meet science-based recommendations for fruit and vegetable intake, this could have averted nearly 110,000 premature cardiovascular deaths, decreased medical costs by more than $32 billion, and saved $20 billion in productivity costs in 2018 (see Table 3). The value of this reduction in deaths, as captured by the value of a statistical life, would have totaled nearly $10 trillion. These findings are consistent with recent research that has demonstrated expected reductions in cardiovascular deaths as a result of increased fruit, nut, vegetable, and whole grain consumption associated with price reduction strategies (Wilde et al. 2018).

Implications for Racial Equity

The implications of this analysis require recognition that the stakes are highest for communities of color. In theory, policies aimed at improving diet and reducing chronic disease across the population should disproportionately benefit people of color—but in practice, policies that do not offer practical solutions to the root causes of poor diets and health fall far short of achieving their intended impact and may risk unintended

> *It is no coincidence that the least healthy foods are also often the most affordable, appealing, and readily available.*

negative consequences. Because the US food system is largely structured to generate profit, rather than benefit the public, any recommendations to reduce intake of unhealthy yet affordable, readily available, and widely accepted foods—including both sugar-sweetened beverages and processed meat—must be accompanied by a commitment to ensure that all communities have access to healthier alternatives.

It is no coincidence that the least healthy foods are also often the most affordable, appealing, and readily available—or that so much of this food ends up in low-income neighborhoods and communities of color. The US food system is shaped by policies and practices that tend to favor productivity and

TABLE 3. Mortality Reductions and Cost Savings Resulting from Meeting Fruit and Vegetable Recommendations

Actual 2018 Fruit and Vegetable Consumption Levels	
2018 deaths	859,130
2018 estimated medical costs (billions USD)	$252
2018 estimated indirect/productivity costs (billions USD)	$153
Consumption at Recommended Levels (daily increase of 2 cups)	
Reduction in risk of cardiovascular death	12.8%
Prevented deaths	109,968
Reduced medical costs (billions USD)	$32
Reduced indirect/productivity costs (billions USD)	$20

Increasing consumption of fruits and vegetables to meet Dietary Guidelines *recommendations could substantially reduce cardiovascular deaths and health care costs.*

Notes: Cardiovascular mortality includes coronary heart disease, diseases of arteries, heart failure, high blood pressure, stroke, and other causes, as well as deaths due to congenital heart disease. Data represent underlying cause of death only for International Classification of Diseases, 10th Revision codes I00 to I99 (diseases of the circulatory system). Cardiovascular medical costs include Medical Expenditure Panel Survey categories of heart conditions (acute myocardial infarction; cardiomyopathy [except that caused by tuberculosis or sexually transmitted disease]; coronary atherosclerosis and other heart disease; nonspecific chest pain; peri-, endo-, and myocarditis; pulmonary heart disease; valve disorders; other and ill-defined heart disease); cerebrovascular disease (cardiac arrest; cardiac dysrhythmias; conduction disorders; congestive heart failure, nonhypertensive; and ventricular fibrillation); hypertension; and other circulatory conditions in arteries, veins, and lymphatics. Productivity costs are based on the value of lifetime earnings from unpublished estimates furnished by the Institute for Health and Aging, University of California, San Francisco, by Wendy Max, PhD, on April 29, 2015.

SOURCES: BLS 2019; AHA 2017, TABLE 26-2; BENJAMIN ET AL. 2018; NCHS 2018; AUNE ET AL. 2017; KHAVJOU, PHELPS, AND LEIB 2016; NHANES 2016; HHS AND USDA 2015; AHRQ 2014; MURPHY AND TOPEL 2006.

Melissa Hesse

The US food system routinely exploits people of color when it comes to marketing and access, compounding the challenge of eating more healthily. Programs such as the Minnesota Healthy Corner Store Program, developed by the state's health department, are taking steps toward provided better access to healthy foods in communities of color, and the federal government has a responsibility to follow suit.

profitability over public health and routinely exploit people of color, from the food and agricultural workers who endure low wages and inhumane working conditions to the families who are disproportionately viewed as target markets for junk food (Harris et al. 2019; Kelly et al. 2019; FCWA and SRC 2016).

The social and economic disadvantages resulting from discrimination and structural racism both drive food insecurity and limit access to healthy, high-quality food options (Odoms-Young and Bruce 2018). An estimated 11.8 percent of all households nationwide are food insecure—that is, they have difficulty providing enough food for the household at times due to a lack of money or other resources—but rates of food insecurity in communities of color tend to be much higher (Coleman-Jensen et al. 2018). In 2017, the food insecurity rate of non-Hispanic white households (8.8 percent) was less than half those of non-Hispanic black (21.8 percent) and Hispanic households (18 percent) (Coleman-Jensen et al. 2018).

Research has shown that many low-income neighborhoods and communities of color have fewer supermarkets and more convenience stores than wealthier, white communities, and a number of studies have found that the stores in low-income neighborhoods and communities of color offer lower-quality foods and fewer healthy food options overall (Bower et al. 2014; Treuhaft and Karpyn 2010).

Policy Recommendations

In developing the *2020–2025 Dietary Guidelines for Americans*, the USDA and HHS secretaries have the opportunity to ensure that the scientific report produced by the DGAC is effectively translated to a final set of guidelines that offers the best opportunities for all people to achieve healthy diets.[15] Among other things, the USDA and HHS secretaries should take the following actions:

- **Publish final *Dietary Guidelines* explicitly recommending that people consume little to no processed meat.** The 2015–2020 scientific advisory report concluded that healthier dietary patterns—including those that reduce the risk of cardiovascular disease, certain cancers, obesity, and type 2 diabetes—are lower in red and processed meats. Further, a strong body of scientific research links processed meat intake to increased risk of colorectal cancer (AICR 2018; DGAC 2015; IARC 2015). Yet the final *2015–2020 Dietary Guidelines for Americans* neglected to make any mention of its demonstrated carcinogenicity and failed to explicitly recommend reducing intake of processed meat. Failure of the *2020–2025 Dietary Guidelines* to establish stronger recommendations related to processed meat will put the general public at higher

> *For the guidelines to achieve their full potential impact, there needs to be a robust and consistent implementation effort across all federal agencies.*

risk for cancer and other chronic diseases and may prove particularly harmful for the millions of children who participate in federal school breakfast, lunch, after-school, and summer programs—many of which serve processed meat on a daily basis.

- **Lower added-sugar limits based on average dietary needs.** The *2015–2020 Dietary Guidelines for Americans* was the first to recommend that no more than 10 percent of total calories should come from added sugars. This limit was based on the percent of daily calories that would be "left over" once all other dietary needs were met, which means that a person could still eat a healthy amount and variety of foods while getting 10 percent of their calories from added sugars. However, this limit ranges from 3 percent to 9 percent for different populations, with an average of 5.8 percent (DGAC 2015). Rather than setting a 10 percent limit, which would not allow most populations to meet their dietary needs, the *2020–2025 Dietary Guidelines* should set limits for added sugar at no higher than 6 percent of total calories, representing the average across all calorie requirements and the limit for a standard 2,000 calorie diet.

- **Develop age-appropriate recommendations.** Although our analysis focuses on adult populations, it is essential that age-appropriate dietary recommendations are developed to ensure health throughout the life span. Extensive research shows that dietary habits and preferences are shaped early in life and can have lasting impacts. This is particularly true for added sugar preferences among infants and youth (IOM 2016; Park et al. 2014; Ventura and Mennella 2011). Because the *2020–2025 Dietary Guidelines for Americans* will be the first to include recommendations for pregnant women, as well as infants and toddlers through 24 months, it is of the utmost importance that there is careful consideration of the nutritional needs of this population and that guidelines are driven by the best available science.

- **Make substantial targeted investments in the implementation of the *Dietary Guidelines*.** The next set of dietary guidelines will only be as effective as its implementation. For the guidelines to achieve their full potential impact, there needs to be a robust and consistent implementation effort across all federal agencies, including federal nutrition programs operated by the USDA. Effective application of the guidelines should extend beyond educating individuals to change attitudes, behaviors, or knowledge regarding healthy eating, and should focus on comprehensive environmental, policy, and systems changes that can broadly support the social determinants of diet and health. Prior to the $12.3 million authorized through the 2019 appropriations bill, there had never been a congressional investment in the development, implementation, or revision of the *Dietary Guidelines*. Adequate funding will be an essential component of translating the recommendations to results, including future cost savings.

- **Identify and commit to complementary actions to support anti-poverty programs and healthy food access among low-income populations and communities of color.** Like the 2015–2020 edition, the *2020–2025 Dietary Guidelines for Americans* should continue to apply a socioecological framework to consider the cultural norms, environments, and other contextual factors that shape healthy eating patterns. Furthermore, the guidelines should apply this framework to explicitly acknowledge the links among diet-related health disparities, healthy food access, and racism, and support anti-poverty programs that can help address their root causes. As stated in the above recommendation, substantial investment in the implementation of the *Dietary Guidelines* is needed to achieve healthier diets across the population and to address health disparities that disproportionately affect marginalized groups of people.

In addition, Congress should use its oversight authority, if it becomes necessary, to protect the scientific integrity of the *Dietary Guidelines* updating process, while resisting pressure from the food industry to interfere with the process.

Conclusion

By and large, the US population falls far short of consuming a healthy diet, with serious consequences for our health, longevity, and medical costs. Based on our analysis, if the secretaries of the USDA and HHS had supported the development and implementation of science-based dietary guidelines—and if the public had been able to follow them—in 2018, it could have saved:

- nearly 3,900 lives and $1.5 billion in medical costs due to colorectal cancer, by reducing processed meat intake;

- nearly 19,000 lives and $16 billion in medical costs due to type 2 diabetes, by reducing sugar-sweetened beverage intake; and

- nearly 110,000 lives and more than $32 billion in medical costs due to cardiovascular disease, by increasing fruit and vegetable intake.

The human and financial costs summed in this report represent the vast untapped potential of a healthy diet as a tool for disease prevention and health promotion. If the United States is ever to achieve these gains, the Trump administration, its agency secretaries, and Congress must resist industry lobbying, choosing instead to fully support the development of science-based nutrition guidelines, and invest in effective implementation strategies that prioritize public health.

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ENDNOTES

1 Dr. Gary Foster, one of the appointed 2015–2020 Dietary Guidelines Advisory Committee members, left the committee in 2013 after taking a new position, leaving only 14 members for the remainder of the term.

2 "As lean meats were not consistently defined or handled similarly between studies, they were not identified as a common characteristic across the reviews. However, as demonstrated in the food pattern modeling of the Healthy U.S.-style and Healthy Mediterranean-style patterns, lean meats can be a part of a healthy dietary pattern" (DGAC 2015).

3 More research is required to fully understand the underlying biological mechanisms linking processed meat to cancer, which are likely numerous. One commonly proposed pathway in the development of colorectal cancer involves the formation of carcinogenic N-nisotro-compounds, produced when nitrogen oxide and nitrous acid (generated from nitrates and nitrites added to processed meat) react with amino acids in the body (AICR 2018).

4 Direct medical costs include emergency room visits, home health costs, hospital visits, inpatient stays, prescribed medicines, and provider visits. Costs reflect the total amount paid out of pocket and by Medicaid; Medicare; private insurance; and other federal, state, or local programs (AHQR 2014).

5 Projections of 2018 direct medical costs provided by Mariotto et al. (2011) account for a 2 percent overall annual medical cost increase, population change, survival, and trend incidence.

6 Projections of 2018 productivity costs provided by Cradley et al. (2008) are likely an overestimate, as the study used annual inflation conversion factors of 2.1 percent in 2007 and 2.2 percent in 2008–2020. Actual inflation rates were 2.9 percent in 2007 and averaged only 1.75 percent between 2008 and 2018 (FRBM 2018).

7 Approximated by the value of a 10 percent reduction in mortality from malignant neoplasms in digestive organs. All costs are reported in 2018 USD.

8 Calculated based on the ratio of direct and indirect medical costs attributable to type 1 and type 2 diabetes, as reported by Dall et al. (2009). Estimates of direct medical costs attributable to type 2 diabetes do not account for increases in insulin costs during the last decade, as reported by Hua, Carvalho, and Tew (2016), and may therefore slightly overestimate the current percent of all diabetes costs attributable to type 2 diabetes.

9 Evidence grade: moderate to strong.

10 A dose-response relationship describes a measurable change in outcome resulting from a measurable exposure—in this case, the outcome is type 2 diabetes, and the exposure is drinking sugar-sweetened beverages.

11 A majority of studies focused on adult populations, but several, including Malik et al. (2010), also included youths.

12 Table D6.1. Added sugars available in the "USDA Food Patterns" appendices ("Healthy U.S.-Style", "Healthy Mediterranean-Style," and "Healthy Vegetarian Eating Patterns") in calories, teaspoons, and percent of total calories per day.

13 Approximated by the value of a 10 percent reduction in mortality from all diabetes. All costs are reported in 2018 USD.

14 Relative risk describes the difference in risk (in this case, of death by cardiovascular disease) between two populations who have different exposures to a certain risk factor (in this case, fruit and vegetable consumption).

15 In 2017, the National Academies of Sciences, Engineering, and Medicine completed an extensive evaluation of the process for establishing the *Dietary Guidelines for Americans*. While the review broadly affirmed the integrity of the process, it recommended that "the secretaries of USDA and HHS should provide the public with a clear explanation when the DGA omit or accept only parts of conclusions from the scientific report" (NASEM 2017).

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Delivering on the Dietary Guidelines

*How Stronger Nutrition Policy Can Cut
Healthcare Costs and Save Lives*

[**There is vast untapped potential
to save lives and health care dollars
through better nutrition.**]

Today, 60 percent of all adults in the United States live with one or more chronic diseases—many of which are related to the foods we eat. The *Dietary Guidelines for Americans* is a widely under-utilized tool for promoting public health and curbing chronic disease through healthier diets. This Union of Concerned Scientists' analysis shows that if the US government had supported actionable, science-based guidelines that limit consumption of processed meats and added sugar—and people had been able to follow them—it could have saved 22,500 lives and $17.5 billion in healthcare costs in 2018. Furthermore, if all people had been able to meet fruit and vegetable recommendations, it could have saved an additional 110,000 lives and $32 billion in 2018. The Trump administration must resist industry lobbying, publish guidelines that prioritize public health, and invest in strategies to address systemic barriers to healthier diets in order to allow the *Dietary Guidelines for Americans* to reach its full life- and cost-saving potential.