



# Strategies to Address Socioeconomic and Racial and Ethnic Disparities in Chronic Diseases by Incorporating Food and Nutrition Programs into the Primary Healthcare Setting

June 2022

## Position

Chronic diseases, such as cardiovascular disease, stroke, and diabetes, are some of the leading causes of death in the United States (U.S.).<sup>1</sup> Consuming an unhealthy diet, characterized by high intake of sodium, added sugars, and saturated fats, contribute to the development of chronic diseases. Stable availability, access, affordability, and utilization of nutritious foods across the lifecycle can help reduce the risk of chronic diseases and help treat and manage chronic diseases. Unfortunately, many individuals in the U.S. are food and nutrition insecure<sup>2</sup> and do not have access to affordable, nutritious food. Incorporating recommended food and nutrition programs into the healthcare system is a viable option to help patients access and consume healthy foods.

The American Heart Association supports efforts to increase equitable access to nutritious, affordable food in the healthcare delivery system and to connect under resourced patients with community resources that will enable consumption of healthy eating patterns. Incorporating food and nutrition programs into the healthcare system is an effective strategy to prevent and treat chronic diseases, lower healthcare costs, and improve quality of life.

## Background

### *Public Health Impact of Chronic Disease*

Chronic diseases, including diabetes, stroke, cardiovascular disease (CVD), and mental illness, are the main drivers of rising healthcare costs in the U.S., accounting for 90 percent (\$3.8 trillion) of annual healthcare costs. CVD alone accounts for 12 percent of total U.S. health expenditure, considerably more than any other disease.<sup>3</sup> CVD is the leading cause of death in the U.S.,<sup>1</sup> accounting for almost 900,000 deaths in 2019.<sup>4</sup> On average, one CVD death occurs every 36 seconds.<sup>3</sup> Nearly half (126.9 million) of all Americans adults have at least one form of CVD (i.e. coronary heart disease, stroke, heart failure or hypertension) while 28.2 million are living with diabetes.<sup>3</sup>

Underrepresented racial and ethnic groups, especially Black, Hispanic, and Native American/Alaska Natives, are at higher risk for developing chronic diseases than their white counterparts. Non-Hispanic Black women and men have a higher prevalence of CVD than any

## **Incorporating Food and Nutrition Programs into the Primary Healthcare Setting**

other racial and ethnic group, at 58.8 percent and 60.1 percent respectively.<sup>3</sup> The COVID-19 pandemic has only exacerbated these disparities.

While chronic diseases are most prevalent among adults, there is an increasing risk for chronic diseases among children and adolescents.<sup>5</sup> Over a third (35.4 percent) of American children have overweight or obesity.<sup>3</sup> Of that, 19 percent are currently living with obesity.<sup>3</sup> Overweight or obesity during childhood increases the risk of weight gain as adults, which is associated with obesity-related risk factors for chronic diseases such as hypertension and prediabetes. One in five American adolescents are living with prediabetes<sup>5</sup> and one in seven have elevated blood pressure.<sup>6</sup>

### *Role of Diet and Food and Nutrition Insecurity in Chronic Disease*

An unhealthy diet, often characterized by a high intake of calories, sodium, added sugars, and saturated fat, and low intake of vegetables, fruits, and whole grains, significantly contributes to the development of obesity, hypertension, dyslipidemia, and prediabetes, the precursors of chronic disease. The American Heart Association (AHA) reported that almost half (47.8 percent) of all American adults have poor diet quality, with higher rates found among Black (55.5 percent) and Mexican American households (48.8 percent).<sup>3</sup> Only one in ten adults meet the recommendations of the U.S. Dietary Guidelines for Americans (DGA) for fruits and vegetables while fewer than 10 percent met the guidelines for whole grains.<sup>3,7</sup>

A healthy diet may be less accessible for some populations, particularly for those with lower incomes and people of color. Factors that impact accessibility include cost, cultural preference, geographical location, and personal cognitive and physical capacity factors (i.e., dementia, physical handicap, etc.). Households that do not have access to healthy foods are at a higher risk of consuming calorie-dense, nutrient deficient foods<sup>8</sup> which increases the risk for chronic diseases.

Lack of access to affordable, healthy food makes adhering to a healthy diet difficult for people already living with chronic diseases, particularly for those experiencing food and nutrition insecurity. The U.S. Department of Agriculture (USDA) defines food insecurity as a household-level economic and social condition of limited or uncertain access to adequate food.<sup>9</sup> The AHA defines nutrition security as an individual or household condition of having equitable and stable availability, access, affordability and utilization of foods and beverages that promote well-being, prevent disease, and if need, treat disease.<sup>10</sup> In 2020, 10.5 percent of American households were food insecure, unchanged from 2019, but food insecurity rates were one and half to three times higher for Hispanic households (17 percent), Black households (21 percent) and households living at the federal poverty level (35 percent).<sup>2</sup> Food insecurity is associated with increased rates of chronic diseases,<sup>8,11,12</sup> and higher healthcare costs,<sup>8,13,14</sup> resulting in \$52.8 billion dollars in excess healthcare costs per year.

## **Nutrition Services and the Current Landscape**

### *Overview*

## Incorporating Food and Nutrition Programs into the Primary Healthcare Setting

There is increasing evidence that the healthcare system can be utilized to help patients access and consume healthy foods. To address unhealthy diets and food insecurity, key drivers of chronic diseases, evidence-based, cost-effective food and nutrition programs should be integrated into the healthcare system. For example, research suggests that nutrition counseling may be effective at increasing patients' nutritional knowledge. However, patients are not always able to adhere to the recommendations made during the counseling session because they may lack access to the recommended foods. This lack of access to the recommended foods, compounded by food insecurity, are insufficient to prevent, treat, and manage chronic diseases and decrease the equity gap in chronic diseases.

A growing body of research has shown that incorporating food and nutrition programs into the healthcare system is associated with improved health outcomes, reduced healthcare utilization and cost, and better-established patient-provider relationships with patients living with chronic diseases. Efforts to improve consumption of healthy food and reduce the burden of chronic diseases should focus on the structural factors beyond an individual's control (i.e., access, affordability, availability, and utilization of healthy food).

Nutrition services such as **Medical Nutrition Therapy (MNT)** and food and nutrition programs such as **food prescription programs** and **medically tailored meals (MTM)** are associated with reduced food insecurity, improved dietary intake, and improved mental health. They also align with recent calls for healthcare-based interventions that address social determinants of health and achieve improvements in health equity.<sup>15, 16</sup> Combining nutrition counseling with food and nutrition programs has the potential to improve health and access to healthy food. Unfortunately, despite recognition from the medical community that food and health are fundamentally linked, historically, major public insurance programs have failed to cover food and nutrition programs.

Racial disparities along with diet quality and food and nutrition security play an important role in chronic disease treatment and management. To reduce socioeconomic and racial and ethnic disparities in nutrition and chronic diseases, it is critical to improve access to food and nutrition programs in major public insurance programs, such as Medicaid and Medicare. While the ultimate desire is to enhance coverage for food and nutrition programs for all Americans, we must start by closing the equity gaps in nutrition and chronic diseases. Therefore, this policy statement provides recommendations for the expansion of food and nutrition programs and changes in policies to foster their implementation and address diet quality and food and nutrition security in the most vulnerable populations.

### *Medical Nutrition Therapy*

Medical Nutrition Therapy (MNT) is a cost-effective, evidence-based intervention to manage chronic conditions, especially obesity, diabetes, and CVD. The Centers for Medicare and Medicaid Services (CMS) defines MNT as "nutritional diagnostic, therapy, and counseling services for the purpose of disease management, which is usually conducted by a registered dietitian (RD) or nutrition professional." MNT services involve in-depth individualized nutrition assessment and use the Nutrition Care Process (NCP) to manage disease. This intervention is also designed to improve a patient's nutritional knowledge of their health condition and diet behavior.

## Incorporating Food and Nutrition Programs into the Primary Healthcare Setting

MNT helps reduce risk of chronic diseases, delays disease progression, and enhances efficacy of medical/surgical treatment. It also reduces medication use and improves patient outcomes including quality of life. The current evidence suggests that MNT is a cost-effective component of treatment for risk factors for chronic diseases such as obesity and hypertension as well as chronic diseases such as diabetes.<sup>17-19</sup> A systematic review on the cost-effectiveness and economic savings of MNT in dyslipidemia reported improved quality-adjusted life years (+0.75 to +0.78) and reduced medication use for a cost saving of an additional \$818 per patient per year.<sup>18</sup> Continuous usage of MNT services positively impacts weight, blood pressure, blood lipids, and blood sugar control, which are some of the leading risk factors for CVD and stroke.<sup>20, 21</sup>

Coverage for MNT varies depending on the insurance provider. For Medicare and Medicaid, MNT services are reimbursable for certain populations. Medicare Part B covers MNT and other related services for patients diagnosed with diabetes, non-dialysis kidney disease or patients within 36 months post kidney transplant, who are referred by a physician and when services are provided by a RD who is enrolled as a Medicare provider. Medicare covers three hours of MNT the first year of treatment and up to two hours of MNT for each subsequent year. While the costs for these services are reimbursable for patients with diabetes or chronic kidney disease, MNT services are not reimbursed through Medicare for patients with pre-diabetes or other chronic conditions (e.g., hypertension, obesity, CVD, etc.). Medicaid coverage for MNT for adults and children varies from state to state and some states do not recognize RDs as approved Medicaid providers. States are required by federal law to provide “mandatory” benefits including services like inpatient and outpatient hospital services, physician services, laboratory and x-ray services, and other “optional” benefits like prescription drugs, case management, physical therapy, and occupational therapy, which can also be covered by Medicaid. However, coverage for nutritional services is not outlined specifically by Medicaid on the list of mandatory or optional benefits.

Efforts are being made at the federal level to increase access of MNT to vulnerable populations. For the past few Congresses, legislation has been introduced to expand MNT access. The first of which was introduced in 2017.

### *Food Prescription Programs*

Food Prescription Programs (also called produce prescription programs) incorporate food access directly into the patient-provider relationship which better enables patients to follow their providers’ dietary advice. In these programs, providers “prescribe” fruits and vegetables, or other healthy foods, to at-risk patients in the form of coupons or vouchers for local farmers’ markets, grocery stores, or mobile markets. These programs are also typically accompanied by nutrition education and/or counseling and can be paired with services provided by RDs or community health workers (CHWs). Food prescription programs effectively target those with low-incomes, people living with diet-related diseases, and those living with food insecurity.

Over the last decade, food prescription programs have been identified as a cost-effective intervention to reduce food insecurity, increase healthy food consumption, and reduce healthcare costs. Research has demonstrated that food prescription programs are effective at increasing fruit and vegetable consumption<sup>22, 23</sup> and reducing household food insecurity.<sup>24</sup> The evidence also suggests that food prescription programs are associated with improved health

## Incorporating Food and Nutrition Programs into the Primary Healthcare Setting

outcomes and reduced healthcare burden including decreased hemoglobin A1C levels<sup>25</sup> and lower body mass index (BMI).<sup>26</sup> A review on the impact of food prescription programs on dietary behavior and cardiometabolic parameters found that these programs increase fruit and vegetable consumption by 22 percent and decrease BMI by 0.6 kg/m<sup>2</sup> and HBA1c by 0.8 percent.<sup>22</sup> A modelling study on food prescription programs found that adding healthy food prescriptions to Medicare and Medicaid may prevent 3.28 million CVD cases and 120,000 diabetes cases, saving \$100.2 billion in formal healthcare costs.<sup>27</sup>

Food prescription programs have largely been funded through the farm bill reauthorization process. The 2018 farm bill provided \$250 million of permanent federal funding for the Gus Schumacher Nutrition Incentives Program (GusNIP), formerly known as the Food Insecurity Nutrition Incentives (FINI) program. Part of the increased funding for FINI was earmarked for food prescription pilot programs. As data is collected on the produce prescription pilot programs, policymakers will need to decide whether to expand the pilots and make produce prescriptions a permanent program – and whether it needs to be scaled beyond GusNIP, but also work in coordination with Medicaid and Medicare.

### *Medically Tailored Meals*

Medically tailored meals (MTM) are a cost-effective intervention to address diet-related diseases and food access to at-risk individuals. MTM provides home delivery of fully prepared meals designed by an RD to meet the specific dietary needs of an individual living with one or more chronic diseases. This intervention is ideal for patients living with chronic diseases who are unable to shop for or prepare meals for themselves.

The research suggests that MTM is associated with improved health outcomes for people living with chronic diseases such as HIV, diabetes, heart failure, and chronic liver disease. A trial evaluating the impact of MTMs on patients with cancer reported higher Quality of Life scores after 12 weeks in the program.<sup>28</sup> Another trial studying food insecurity in patients with type 2 diabetes reported lower rates of food insecurity and improved Healthy Eating Index scores while receiving meals.<sup>29</sup> The research also suggests that MTM is associated with reduced hospital admissions and overall healthcare costs.<sup>30</sup> Studies looking at the impact of MTM on healthcare utilization and expenditures found that MTM participants had 70 percent fewer emergency department visits, 50 percent fewer inpatient admissions, and a net savings of \$220 per patient per month (16 percent savings on total medical expenditures).<sup>29, 31</sup>

Currently, MTM programs are funded through charitable donations, grants, and funding by state and federal programs. One of the first programs to provide MTM was the Ryan White HIV/AIDS Programs who partnered with Open Hand to provide meals to those living with AIDS. In 2000, they expanded their reach to include those with non-HIV critical conditions, those living with disabilities, and the elderly. While CMS has not explicitly allowed states to cover direct provision of food under any Medicaid benefit category, some states have incorporated MTM into their Medicaid plans. In 2022, California offered coverage for MTM through its Medicaid managed care plans. Other states, including New York, Oregon, and Massachusetts, also have coverage for MTM through their Medicaid managed care plans.

Efforts are also being made at the federal level to increase coverage for MTM. Legislation has been introduced in the past two Congresses to pilot MTM for Medicare.

## **Key considerations for implementing food and nutrition programs in healthcare settings**

Incorporating food and nutrition programs within the healthcare systems is a feasible option to address prevention and treatment of diet-related chronic diseases. However, there are a few considerations that need to be made before these programs can be effectively implemented in healthcare settings.

### *Developing a standardized tool*

A standardized dietary assessment tool is essential to effectively implement food and nutrition programs within the healthcare system. The assessment tool help providers identify vulnerable patients to refer them to appropriate services. Despite the knowledge that a healthy diet is necessary to maintain health,<sup>32, 33</sup> dietary intake is rarely quantitatively assessed. This is typically due to time constraints and other clinical barriers such as lack of training and knowledge and competing priorities during clinical visits.<sup>34, 35</sup> A dietary assessment tool provides the necessary documentation for limited or poor diet quality leading to actionable modifications for improvement. It must be quick to use, evidence-based and summarize the patient's entire dietary pattern.

Food insecurity and referrals must be tracked within the healthcare system. The electronic health record (EHR) is the ideal platform for the health care team to capture dietary data and deliver dietary resources to patients because it allows secure storage of data and access to this data at point of care.<sup>36</sup> Previous research supports conducting wellness assessments via EHR portals as a feasible strategy for assessing diet quality within healthcare settings.<sup>37, 38</sup> The U.S. Department of Health and Human Services (HHS) and CMS are taking steps to ensure that social needs screenings become normal practice within the healthcare system, such as initiating the Accountable Health Communities model, but adoption of social needs screenings in healthcare practice should be universal.<sup>39</sup>

### *Clinic to community linkages*

The healthcare system is a gateway for connecting patients with clinic-community partnerships for food and nutrition programs to address chronic disease risk factors and symptoms, as well as increase healthy food access to patients living with nutrition and food insecurity. Integrating food and nutrition programs into the healthcare system strengthens clinic to community linkages, increases existing resources, and improves service delivery. These linkages ensure that people with or at risk for chronic diseases have access to the resources they need – in this case, food – to prevent, delay or manage chronic diseases once they occur.

Access to food and nutrition programs is facilitated by RDs or other professionals such as health educators, nurses, and CHWs. Numerous studies have shown that connecting patients with community resources in the healthcare setting is effective at reducing risk factors of chronic diseases.<sup>40-43</sup> These interventions are often carried out by CHWs and in parallel to clinic visits with providers. By having CHWs lead these interventions, the accessibility of

## Incorporating Food and Nutrition Programs into the Primary Healthcare Setting

nutrition education can expand and be adapted to targeted populations, and programs can be delivered in more familiar community-based locations, which is a key asset to referring and engaging more patients.<sup>44, 45</sup> CHWs can serve as a link between food and nutrition programs and the community to promote access to services and improve the quality and cultural competence of service delivery. Coupling improved clinical training and referral capacity together with increased financial support for intervention both in and outside the healthcare system will help ensure that patients are assessed and referred to appropriate interventions available in every community.

Integrating food and nutrition programs within healthcare delivery systems also encourages collaboration with local farms and gardens. Building in sustainable models to connect healthcare settings and community farms/agriculture have the potential to bolster the local economy and indirectly address structural inequities. These programs promote sustainability of local farms and gardens while also improving the local environment in communities that historically have less access to healthy foods.

### AHA Policy Recommendations

The American Heart Association supports efforts to increase prioritization of nutrition and equitable access to healthy, affordable food in the healthcare delivery system and to connect patients with community resources that improve access to and consumption of healthy food. By increasing coverage for nutrition services through health insurers like Medicare and Medicaid and expanding existing food and nutrition programs, patients can be connected with the resources they need to prevent, treat, and manage chronic diseases that drive health care costs across the U.S.

#### Centers for Medicare and Medicaid Services (CMS):

##### *Medicaid*

1. Broaden coverage for medical nutrition therapy and other food and nutrition programs, such as food prescription programs and medically tailored meals, by adding these services to the 'mandatory' category of Medicaid benefits or broadening interpretation for existing categories to allow coverage.
2. Use existing opportunities and waiver programs to fund food and nutrition programs in state Medicaid programs (e.g., Medicare Part C Supplemental Benefits [for medically tailored meals]/Part C Value-Based Insurance Design Model; Medicaid Managed Care; 1115 Medicaid demonstration waiver; 1915C waiver) with the ultimate goal for food and nutrition programs to become standard Medicaid services.
3. Recognize RDs as qualified billing providers and expand eligibility requirements to become providers through Medicaid. Currently, many states' Medicaid programs do not credential RDs, despite them being independent providers of MNT under Medicare Part B.
4. Provide guidance and technical assistance on current opportunities to fund food and nutrition programs within Medicaid.

##### *Medicare*

## **Incorporating Food and Nutrition Programs into the Primary Healthcare Setting**

1. Expand coverage for medical nutrition therapy to include other chronic conditions, such as obesity and cardiovascular disease, and increase allowances for additional hours of medical nutrition therapy services per year under Medicare Part B.
2. Make medical nutrition therapy reimbursable for all Medicare beneficiaries.
3. Add medically tailored meals and produce prescription programs to the definition of “medical and other health services” in the Medicare statute for Medicare Part B.
4. Provide guidance and technical assistance on current opportunities to fund food and nutrition programs within Medicare.

### *Center for Medicare and Medicaid Innovation (CMMI)*

1. Expand coverage and support for the CMMI Accountable Health Communities Model to include funding for the direct provision of food and nutrition programs, such as medically tailored meals and produce prescription programs

### US Department of Agriculture (USDA):

1. Provide sustained funding and expand support for the Gus Schumacher Nutrition Incentives Program (GusNIP) to further evaluate the effectiveness of produce prescription programs and expand existing programs in the next farm bill.
2. Include language in the farm bill to pilot medically tailored meals in communities across the country.

### National Institute of Health (NIH) and Agency for Health Care Research and Quality (AHRQ):

1. Increase funding for research on the use of food and nutrition programs in preventing and treating chronic diseases and on the impact of these programs on health outcomes, use, and costs. Can have cross-agency coordination between NIH and AHRQ.

### Other:

1. Expand funding and programmatic opportunities for medically tailored meals within Title III of the Older Americans Act
2. Connect clinical systems to the social services safety net by:
  - a. Working with HL7 to create standardized measures to assess patient dietary history and risk of chronic diseases.
  - b. Developing a system to track nutrition and food insecurity and referrals within the primary care system.



## **Incorporating Food and Nutrition Programs into the Primary Healthcare Setting**

The American Heart Association is grateful to the members of the expert advisory group (EAG) who contributed to the development of this policy statement. We would like to acknowledge the following people and thank them for their input and review of this policy statement.

Judith Wylie-Rosett  
Albert Einstein College of Medicine

Deepika Laddu-Patel  
University of Illinois Chicago

Linda Van Horn  
Northwestern University Feinberg School of Medicine

Patricia Haggerty  
National Institutes of Health, Office of Dietary Supplements

Kendra Ivy  
Morehouse School of Medicine

Abby Ershow  
National Institutes of Health, Office of Dietary Supplements

Saria Lofton  
University of Illinois, College of Nursing

## Incorporating Food and Nutrition Programs into the Primary Healthcare Setting

### References

1. Murphy SL, Kochanek KD, Xu J and Arias E. Mortality in the United States, 2020. *NCHS Data Briefs*. 2021.
2. Coleman-Jensen A, Rabbitt MP, Gregory CA and Singh A. Household Food Security in the United States in 2020. *Economic Research Report No (ERR-298) 55 pp*. 2021.
3. Tsao CW, Aday AW, Almarzooq ZI, Alonso A, Beaton AZ, Bittencourt MS, Boehme AK, Buxton AE, Carson AP, Commodore-Mensah Y, Elkind MSV, Evenson KR, Eze-Nliam C, Ferguson JF, Generoso G, Ho JE, Kalani R, Khan SS, Kissela BM, Knutson KL, Levine DA, Lewis TT, Liu J, Loop MS, Ma J, Mussolino ME, Navaneethan SD, Perak AM, Poudel R, Rezk-Hanna M, Roth GA, Schroeder EB, Shah SH, Thacker EL, VanWagner LB, Virani SS, Voecks JH, Wang N-Y, Yaffe K and Martin SS. Heart Disease and Stroke Statistics—2022 Update: A Report From the American Heart Association. *Circulation*. 2022;145:e153-e639.
4. Virani SS, Alonso A, Aparicio HJ, Benjamin EJ, Bittencourt MS, Callaway CW, Carson AP, Chamberlain AM, Cheng S, Delling FN, Elkind MSV, Evenson KR, Ferguson JF, Gupta DK, Khan SS, Kissela BM, Knutson KL, Lee CD, Lewis TT, Liu J, Loop MS, Lutsey PL, Ma J, Mackey J, Martin SS, Matchar DB, Mussolino ME, Navaneethan SD, Perak AM, Roth GA, Samad Z, Satou GM, Schroeder EB, Shah SH, Shay CM, Stokes A, VanWagner LB, Wang NY and Tsao CW. Heart Disease and Stroke Statistics-2021 Update: A Report From the American Heart Association. *Circulation*. 2021;143:e254-e743.
5. Andes LJ, Cheng YJ, Rolka DB, Gregg EW and Imperatore G. Prevalence of Prediabetes Among Adolescents and Young Adults in the United States, 2005-2016. *JAMA Pediatr*. 2020;174:e194498.
6. Jackson SL, Zhang Z, Wiltz JL, Loustalot F, Ritchey MD, Goodman AB and Yang Q. Hypertension Among Youths — United States, 2001–2016. *MMWR Morb Mortal Wkly Rep*. 2018;67:758-762.
7. Lee SH, Moore LV, Park S, Harris DM and Blanck HM. Adults Meeting Fruit and Vegetable Intake Recommendations - United States, 2019. *MMWR Morb Mortal Wkly Rep*. 2022;71:1-9.
8. Seligman HK, Laraia BA and Kushel MB. Food insecurity is associated with chronic disease among low-income NHANES participants. *J Nutr*. 2010;140:304-10.
9. USAID. Policy Determination: Definition of Food Security. 1992.
10. Thorndike AN, Gardner CD, Kendrick KB, Seligman HK, Yaroch AL, Gomes AV, Ivy KN, Scarmo S, Cotwright CJ and Schwartz MB. Strengthening US Food Policies and Programs to Promote Equity in Nutrition Security: A Policy Statement From the American Heart Association. *Circulation*. 2022;145.
11. Nagata JM, Palar K, Gooding HC, Garber AK, Bibbins-Domingo K and Weiser SD. Food Insecurity and Chronic Disease in US Young Adults: Findings from the National Longitudinal Study of Adolescent to Adult Health. *J Gen Intern Med*. 34:2756-2762.
12. Berkowitz SA, Berkowitz TSZ, Meigs JB and Wexler DJ. Trends in food insecurity for adults with cardiometabolic disease in the United States: 2005-2012. *PLoS ONE*. 2017;12:e0179172.
13. Berkowitz SA, Seligman HK, Meigs JB and Basu S. Food insecurity, healthcare utilization, and high cost: a longitudinal cohort study. *Am J Manag Care*. 2018;24:399-404.
14. Berkowitz SA, Basu S, Meigs JB and Seligman HK. Food Insecurity and Health Care Expenditures in the United States, 2011-2013. *Health Serv Res*. 2018;53:1600-1620.
15. Gottlieb L, Fichtenberg C, Alderwick H and Adler N. Social Determinants of Health: What's a Healthcare System to Do? *J Healthc Manag*. 2019;64:243-257.
16. Harolds JA. Quality and Safety in Health Care, Part VI: More on Crossing the Quality Chasm. *Clin Nucl Med*. 2016;41:41-43.
17. Anderson JM. Achievable Cost Saving and Cost-Effective Thresholds for Diabetes Prevention Lifestyle Interventions in People Aged 65 Years and Older: A Single-Payer Perspective. *Journal of the Academy of Nutrition and Dietetics*. 2012;112:1747-1754.
18. Sikand G, Cole RE, Handu D, Johnson EQ, Arpino LM and Ekvall SM. Clinical and cost benefits of medical nutrition therapy by registered dietitian nutritionists for management of dyslipidemia: A systematic review and meta-analysis. *Journal of Clinical Lipidology*. 2018;12:1113-1122.

## Incorporating Food and Nutrition Programs into the Primary Healthcare Setting

19. Troyer JL, McAuley WJ and McCutcheon ME. Cost-effectiveness of medical nutrition therapy and therapeutically designed meals for older adults with cardiovascular disease. *Journal of American Dietetic Association*. 2010;110:1840-1851.
20. Parker AR, Byham-Gray L, Denmark R and Winkle PJ. The effect of medical nutrition therapy by a registered dietitian nutritionist in patients with prediabetes participating in a randomized controlled clinical research trial *Journal of the Academy of Nutrition and Dietetics* 2014;114:1739-1748.
21. Riegel GR, Ribeiro PAB, Rodrigues MP, Zuchinali P and Moreira LB. Efficacy of nutritional recommendations given by registered dietitians compared to other healthcare providers in reducing arterial blood pressure: Systematic review and meta-analysis. *Clinical Nutrition (Edinburgh, Scotland)* 2018;37:522-531.
22. Bhat S, Coyle DH, Trieu K, Neal B, Mozaffarian D, Marklund M and Wu JHY. Healthy Food Prescription Programs and their Impact on Dietary Behavior and Cardiometabolic Risk Factors: A Systematic Review and Meta-Analysis. *Advances in Nutrition*. 2021.
23. Marcinkevage J, Auvinen A and Nambuthiri S. Washington State's Fruit and Vegetable Prescription Program: Improving Affordability of Healthy Foods for Low-Income Patients. *Prev Chronic Dis*. 2019;16:e91.
24. Ridberg RA, Bell JF, Merritt KE, Harris DM, Young HM and Tancredi DJ. A Pediatric Fruit and Vegetable Prescription Program Increases Food Security in Low-Income Households. *J Nutr Educ Behav*. 2019;51:224-230.e1.
25. Bryce R, Guajardo C, Ilarraza D, Milgrom N, Pike D, Savoie K, Valbuena F and Miller-Matero LR. Participation in a farmers' market fruit and vegetable prescription program at a federally qualified health center improves hemoglobin A1C in low income uncontrolled diabetics. *Prev Med Rep*. 2017;7.
26. Cavanagh M, Jurkowski J, Bozlak C, Hastings J and Klein A. Veggie Rx: an outcome evaluation of a healthy food incentive programme. *Public Health Nutr*. 2017;20:2636-2641.
27. Lee Y, Mozaffarian D, Sy S, Huang Y, Liu J, Wilde PE, Abrahams-Gessel S, Jardim TdSV, Gaziano TA and Micha R. Cost-effectiveness of financial incentives for improving diet and health through Medicare and Medicaid: A microsimulation study. *PLoS Med*. 2019;16:e1002761.
28. Ishaq O, Vega RM, Zullig L, Wassung A, Walters D, Du NBL, Ahn J, Leichman CG, Cohen DJ, Gu P, Chachoua A, Leichman LP, Pearl K and Schiff PB. Food as medicine: A randomized controlled trial (RCT) of home delivered, medically tailored meals (HDMTM) on quality of life (QoL) in metastatic lung and non-colorectal GI cancer patients. *Journal of Clinical Oncology*. 2016;34.
29. Berkowitz SA, Delahanty LM, Terranova J, Steiner B, Ruazol MP, Singh R, Shahid NN and Wexler DJ. Medically Tailored Meal Delivery for Diabetes Patients with Food Insecurity: a Randomized Cross-over Trial. *J Gen Intern Med*. 2019;34:396-404.
30. Berkowitz SA, Terranova J, Randall L, Cranston K, Waters DB and Hsu J. Association Between Receipt of a Medically Tailored Meal Program and Health Care Use. *JAMA Intern Med*. 2019;179:786-793.
31. Berkowitz SA, Terranova J, Hill C, Ajayi T, Linsky T, Tishler LW and DeWalt DA. Meal Delivery Programs Reduce The Use Of Costly Health Care In Dually Eligible Medicare And Medicaid Beneficiaries. *Health Aff (Millwood)*. 2018;37:535-542.
32. Reedy J, Krebs-Smith SM, Miller PE, Liese AD, Kahle LL, Park Y and Subar AF. Higher diet quality is associated with decreased risk of all-cause, cardiovascular disease, and cancer mortality among older adults. *Journal of Nutrition*. 2014;144:881-889.
33. Liese AD, Krebs-Smith SM, Subar AF, George SM, Harmon BE, Neuhouser ML, Boushey CJ, Schap TE and Reedy J. The Dietary Patterns Methods Project: Synthesis of Findings across Cohorts and Relevance to Dietary Guidance. *Journal of Nutrition*. 2015;145:393-402.
34. Aspry KE, Van Horn L, Carson JAS, Wylie-Rosett J, Kushner RF, Lichtenstein AH, Devries S, Freeman AM, Crawford A and Kris-Etherton P. Medical Nutrition Education, Training, and Competencies to Advance Guideline-Based Diet Counseling by Physicians: A Science Advisory From the American Heart Association. *Circulation*. 2018;137:e821-e841.
35. Ahmed NU, Delgado M and Saxena A. Trends and disparities in the prevalence of physicians' counseling on exercise among the U.S. adult population, 2000-2010. *Prev med*. 2017;99:1-6.
36. Romano MJ and Stafford RS. Electronic health records and clinical decision support systems: impact on national ambulatory care quality. *Arch Intern Med*. 2011;171:897-903.
37. Bower J, Bollinger C, Foraker R, Hood D, Shoben A and Lai A. Active Use of Electronic Health Records (EHRs) and Personal Health Records (PHRs) for Epidemiologic Research: Sample Representativeness and Nonresponse Bias in a Study of Women During Pregnancy. *EGEMS (Washington, DC)*. 2017;5:1263.
38. Sorondo B, Allen A, Fathima S, Bayleran J and Sabbagh I. Patient Portal as a Tool for Enhancing Patient Experience and Improving Quality of Care in Primary Care Practices. *EGEMS (Washington, DC)*. 2017;4:1262.

## Incorporating Food and Nutrition Programs into the Primary Healthcare Setting

39. Centers for Medicare & Medicaid Services. Accountable Health Communities Model. 2022;2022.
40. Bennett GG, Warner ET, Glasgow RE, Askew S, Goldman J, Ritzwoller DP, Emmons KM, Rosner BA and Colditz GA. Obesity treatment for socioeconomically disadvantaged patients in primary care practice. *Archives of Internal Medicine*. 2012;172:565-574.
41. Nolan RP, Feldman R, Dawes M, Kaczorowski J, Lynn H, Barr SI, MacPhail C, Thomas S, Goodman J, Eysenbach G, Liu S, Tanaka R and Surikova J. Randomized Controlled Trial of E-Counseling for Hypertension: REACH. *Circulation Cardiovascular quality and outcomes*. 2018;11:e004420.
42. Towfighi A, Cheng EM, Ayala-Rivera M, Barry F, McCreath H, Ganz DA, Lee ML, Sanossian N, Mehta B, Dutta T, Razmara A, Bryg R, Song SS, Willis P, Wu S, Ramirez M, Richards A, Jackson N, Wacksman J, Mittman B, Tran J, Johnson RR, Ediss C, Sivers-Teixeira T, Shaby B, Montoya AL, Corrales M, Mojarro-Huang E, Castro M, Gomez P, Muñoz C, Garcia D, Moreno L, Fernandez M, Lopez E, Valdez S, Haber HR, Hill VA, Rao NM, Martinez B, Hudson L, Valle NP, Vickrey BG and Secondary Stroke Prevention by Uniting Community and Chronic Care Model Teams Early to End Disparities (SUCCEED) Investigators. Effect of a Coordinated Community and Chronic Care Model Team Intervention vs Usual Care on Systolic Blood Pressure in Patients With Stroke or Transient Ischemic Attack: The SUCCEED Randomized Clinical Trial. *JAMA Netw Open*. 2021;4:e2036227.
43. Lim S, Wyatt LC, Mammen S, Zanoziak JM, Mohaimin S, Troxel AB, Lindau ST, Gold HT, Shelley D, Trinh-Shevrin C and Islam NS. Implementation of a multi-level community-clinical linkage intervention to improve glycemic control among south Asian patients with uncontrolled diabetes: study protocol of the DREAM initiative. *BMC Endocr Discord*. 2021;21:233.
44. Laddu D, Ma J, Kaar J, Ozemek C, Durant RW, Campbell T, Welsh J and Turrise S. Health Behavior Change Programs in Primary Care and Community Practices for Cardiovascular Disease Prevention and Risk Factor Management Among Midlife and Older Adults: A Scientific Statement From the American Heart Association. *Circulation*. 2021;144:e533-e549.
45. Morgan JM, Mensa-Wilmot Y, Bowen S-A, Murphy M, Bonner T, Rutledge S and Rutledge G. Implementing Key Drivers for Diabetes Self-Management Education and Support Programs: Early Outcomes, Activities, Facilitators, and Barriers. *Prev Chronic Dis*. 2018;15.