Importance of Diet Screening and Counseling in Clinical Practice to Prevent and Manage Diet-Related Chronic Diseases

Maurita A. Greene, MPH-C, CHES[1], Jerome E. Kotecki, HSD[2*], Natalie A. Kruzliakova, PhD, RDN[3], Jay Kandiah, PhD, RD, LD[4], Alyce D. Fly, PhD[5]

[1]Master of Public Health Candidate, Richard M. Fairbanks School of Public Health, Indianapolis, IN 46202, USA.

[*2]Professor of Health Science, Department of Nutrition and Health Science, College of Health, Ball State University, Muncie, IN 47306, United States of America, USA.

[3]Professor of Nutrition and Dietetics, Department of Nutrition and Health Science, College of Health, Ball State University, Muncie, IN 47306, USA.

[4]Professor of Nutrition and Dietetics, Department of Nutrition and Health Science, College of Health, Ball State University, Muncie, IN 47306, USA.

[5]Professor of Nutrition and Health Science, Department of Nutrition and Health Science, College of Health, Ball State University, Muncie, IN 47306, USA.

COMMENTARY

Please cite this paper as: Greene MA, Kotecki JE, Kruzliakova NA, Kandiah J, Fly AD. Importance of diet screening and counseling in clinical practice to prevent and manage diet-related chronic diseases. Journal of Food & Nutritional Sciences [2020] 2(4): 125-137.

***Corresponding Author:**

Jerome Kotecki,

Professor of Health Science, Department of Nutrition and Health Science, College of Health, Ball State University, Muncie, IN 47306, USA, E-mail: jkotecki@bsu.edu

ABSTRACT

Chronic diseases are the leading cause of death in the modern era [1]. An underappreciated primary cause of these diseases is poor diet quality. In fact, poor diet quality has surpassed all other mortality risk factors globally, accounting for approximately 11 million deaths annually [1]. Likewise, in the United States, poor diet quality is the leading underlying cause of death and even surpasses cigarette smoking in rates of preventable death [1]. Paralleling these trends, poor diet quality is considered a leading risk factor for years of life lost and years lived with chronic disability [2]. Furthermore, the current COVID-19 pandemic highlights the intersection between communicable and noncommunicable diseases, given the emerging evidence implicating nutrition factors in underlying pathophysiologic mechanisms in COVID-19 disease susceptibility and severity [3].

Despite compelling evidence that dietary behaviors are the top modifiable risk factor for morbidity and mortality in the United States and play an important role in managing health for those living with chronic conditions, clinicians seldom address patients' dietary behaviors during routine office visits [4, 5]. This largely stems from several factors, including time constraints during assessment by clinicians, minimal nutrition training of clinicians, and a deficiency of appropriate diet screening tools suitable for the clinical setting. One way to make dietary assessment and counseling part of routine care is to provide clinicians and their healthcare teams with a brief, evidence-based

screening tool. Screening allows for a quick assessment of patients' diet quality and facilitates a conversation about the strong connection between diet and health.

To prioritize the critical need to address diet, the 2020 American Heart Association (AHA) scientific statement called for routine health care visits to include dietary screening and counseling [6]. The AHA advisory panel strongly recommends that diet be included in patients' overall health assessment. Routine point-of-care dietary screening is critical during health evaluation. The AHA conducted an extensive systematic review of existing screening tools that can be easily administered without specialized nutritional knowledge. The top tools discussed in the statement allow clinicians and certain subspecialists to evaluate dietary behavior and guide counseling based on patients' needs.

This article describes the benefits of diet screening and counseling in clinical practice, analyzes the AHA's evaluation of diet screening tools, and describes the development of a new screening tool that assesses diet-related chronic disease risk.

Benefits of Diet Screening and Counselling in Clinical Practice

With the soaring rise in U.S. health care expenditures coupled with longevity and age-associated noncommunicable diseases, a primary focus in medicine today is chronic disease prevention and management [7]. One of the cornerstones of chronic disease prevention and management is encouraging population adherence to health-promoting dietary habits [8]. Nutrition counseling is recognized as a first-line approach by front-line health care practitioners in managing a myriad of chronic diseases due to the crucial impact nutrition has on physiological biomarkers and symptoms of different conditions [9]. Diet-related chronic diseases continue to rise significantly, as current interventions have not decreased these trends. An opportunity exists for constructive efforts and strategies to deliver basic nutrition counseling by primary care professionals, and alternative interventions are warranted to prevent, ameliorate, or treat these diseases with minimal adverse effects. The benefits of compressing morbidity and increasing the average length of healthy life "healthspan" through nutrition education and interventions have the potential to make measurable improvements in the physiological integrity throughout the lifespan [10].

In primary care settings, the consequences of poor dietary practices chronically manifest as multiple morbidities, including heart disease, type 2 diabetes, high blood pressure, obesity, dyslipidemia, and mental health disorders. Recognizing that nutrition is a vital component of clinical care, the U.S. Department of Health and Human Services established goals in its Healthy People 2030 initiatives to increase the proportion of clinical office visits that include nutrition counseling for patients to prevent and manage these health conditions [11]. Educating patients on the benefits of diet quality has the potential to create health-promoting dietary behavioral change and can have a considerable impact on chronic disease prevention and management [12, 13].

This growing understanding of the fundamental importance of nutrition to overall health has led to a current interest in nutrition assessment and counseling by healthcare providers who are not extensively trained in nutrition [14]. Recently, clinical guidelines have reintroduced an emphasis on preventing or delaying age-associated diseases by focusing on the impact of dietary behaviors [5, 6]. Research shows that more systematic health screenings, along with brief interventions in clinical settings, could reach large numbers of at-risk individuals and aid in effectively changing dietary habits [14]. Screening enables clinicians to influence patients' health and improve patient-centered care by identifying those who would benefit from a brief discussion or a referral. Also, patients are primed to think about their wellness during their health care visit, providing clinicians an opportunity to communicate the role nutrition plays in disease development and clear up conflicting and confusing nutrition messages. Moreover, clinicians play a key role in interprofessional collaboration as health care moves toward

the concept of Whole-Person Care [15]. Clinicians are ideally suited to initiate the conversation about diet and serve as the "nudge" for nutrition counseling that is best continued by registered dietitians or certified health education specialists.

While registered dietitians are the food and nutrition experts among healthcare providers, not all patients have access to evaluation and counseling by a registered dietitian or a registered dietitian nutritionist. Though specific nutrition assessment, counseling, or referral is appropriate and necessary in certain patients (e.g., those affected by diabetes, renal disease, gastrointestinal disorders, or obesity), patients with subclinical conditions may not require a highly detailed nutrition assessment. For the majority of the population, it is generally adequate to review a patients' dietary practices by asking specific questions to identify areas of nutrition inadequacies related to health that provide opportunities for focused patient education. Thus, clinicians and their health care team do not have to be nutrition experts to facilitate screening. However, it is essential that they take a leading role in the assessment of results, provision of nutrition counseling, and addressing diet at a population level by incorporating dietary screening into the daily workflow of their clinical practice.

With the passage of the Affordable Care Act, 86% of adults now see a clinician three to five times annually [16]. This increased access allows clinicians the opportunity to reach a vast number of adults who previously lacked access to care and nutritional education as it relates to their health. Increased reimbursement coverage for diet-related screening and counseling makes adoption more financially feasible [17]. Moreover, clinicians do not have to do it alone. The American Medical Association's approval of three distinct "Category III" codes for "health coaching" went into effect in 2020 [18]. These codes allow non-physician health care professionals certified by the National Commission for Health Education Credentialing and the National Board for Health and Wellness Coaching to provide reimbursable patient counseling [18]. Evidence demonstrates that implementation of screening is acceptable to patients and clinicians, as most patients trust their clinician's health and nutritional advice, and many clinicians are interested in addressing diet with their patients [12, 19, 20, 21]. Furthermore, screening during routine health care visits provides patients immediate and actionable dietary feedback that can reduce the incidence and improve the management of diet-related chronic diseases [6].

Brief Dietary Screeners Suitable for Clinical Practice

In September 2020, the AHA published a scientific statement, "Rapid Diet Assessment Screening Tools for Cardiovascular Disease Reduction Across Healthcare Settings" [6]. This scientific statement explained how point-of-care dietary screening could be adopted in the clinical setting. Furthermore, the statement calls for accelerating efforts to use diet screening to obtain a snapshot of what a patient usually eats/drinks and what a clinician says next. Encouraging conversations among clinicians and patients about healthier eating patterns is a critical component of office-based preventive care. Such discussions allow clinicians to connect patients with fee-based counseling by registered dietitians or community resources that are often free and underutilized.

To make the selection of a diet screener easier, the AHA panel of experts completed an extensive systematic review of available screening tools. They evaluated 15 tools developed or used within the past decade relevant to adults aged 20 to 75 years. Furthermore, each tool focused on dietary patterns rather than a single food group or nutrients and was utilizable with little or no nutritional training [6]. Finally, the 15 tools were scored based on 10 pre-established validity criteria factors (i.e., five theoretical and five practice-based).

The five theoretical factors included (1) evaluation of total diet quality, (2) test-retest reliability, (3) validity appraised against another dietary assessment method, (4) validity assessed within multiple U.S. adult populations aged 20-75 years, across diverse racial and socioeconomic, and clinical/nonclinical populations, and (5) validity evaluated on

the relationship between the diet screener tool score and health biomarkers. The five practice-based factors included (1) a brief tool (takes < 10 min to complete), (2) clinical decision support for immediate guidance or more intensive nutrition or behavioral therapies, (3) sensitive to dietary, behavioral changes over time, (4) an easily completed and administered tool without special knowledge or software, and (5) useful information for chronic disease management (i.e., patients/clients interpretation and understanding of the score and ways to improve their score). For each identified benchmark, the reviewers assigned 0, 0.5, or 1 point depending on the criteria met. The scores were added together to calculate a total score. The 15 screener's scores ranged from 2.5 to 9.0 out of 10 (a detailed summary is provided in the Supplemental Tables 1 and 2) [22].

Though the review panel did not recommend a specific tool, the panel presented the advantages and disadvantages of the tools for use in the clinical setting. Three screening tools exhibited prominence for providing the best rapid snapshot of dietary habits based on the theoretical and practice-based factors: Mediterranean Diet Adherence Screener (MEDAS), Starting the Conversation (STC), and Rapid Eating Assessment for Participants Shortened Version (REAPS). A brief description of each screener is highlighted below.

The MEDAS tool consists of 14 questions developed to measure adherence to the Mediterranean dietary pattern and evaluates total diet quality (Table 1). This tool takes approximately 5-10 minutes to complete and can be administered across diverse populations, either remotely or in person. It is easily scored (score range from 0-14), available in English and Spanish, and accessible digitally for integration into electronic health records with autoscoring and interpretation to tailor nutrition interventions [23]. The AHA advisory panel scored the MEDAS 5/5 for theoretical factors and 4/5 for practice-based factors [22].

The STC is an eight-item food frequency questionnaire that assesses intake of fast-foods, fruits, vegetables, sugary beverages, beans, chicken and fish, regular snacks chips or crackers, sweets, and unhealthy fats and is derived from a validated 54-item instrument (Table 2). It is the shortest of the recommended screening tools, which requires a completion time of less than 10 minutes. The tool is available in English and Spanish and is explicitly designed to help clinicians and their staffs identify dietary patterns and guide counseling. Additionally, the STC consisted of a detailed scoring sheet (24). The AHA advisory panel scores for theoretical and practice-based factors were 2.5/5 and 4/5, respectively [22].

Lastly, REAPS consists of 16 questions developed from the original 31 item REAP questionnaire which was validated with the Healthy Eating Index (Table 3). The completion time ranges from 5-10 minutes. The instrument includes a question about an individual's willingness to change their diet, is accompanied by a detailed score sheet and a provider key for clinician guidance [25]. The AHA scored the REAPS 3/5 for the theoretical factors and 3/5 for practice-based factors [22].

The AHA advisory panel recommended that researchers and clinicians collaborate interprofessionally in the future and use consensus group methods when developing new diet screening tools [6]. This process will better ensure that tool development reflects theoretical and practice-based validity criteria. The panel’s recommendations could expand the collaborative nature of translational research related to 'Bench, Bedside, Curbside, and Home' that would provide the most transformative preventive diet-related behaviors resulting in a sustainable impact on actual outcomes for priority populations [26]. Collaborative partnerships between researchers, clinicians, registered dietitians, certified health education specialists, and other members of the healthcare team would allow for optimal patient-centered care.

Development of a New Diet Screening Tool

This article emphasizes the routine use of diet screening tools in clinical practice and following the AHA's theoretical and practice-based criteria and benchmarks. The AHA's criteria provide researchers a framework to develop

tools that easily and accurately measure and reflect up-to-date dietary guidance. The authors of this article have begun work on the development of a new brief diet quality screening tool based on their published research [27]. The research employed a 16-item validated dietary questionnaire to measure the relationship between diet quality and mental health outcomes in university students [27]. The questionnaire's items were based on the Alternative Healthy Eating Index (AHEI), an 11-component diet quality research metric that identified foods and nutrients most predictive of major chronic disease risk [28]. Each AHEI component has a score ranging from 0 to 10, with a maximum score of 110 (Table 4). The validity of the questionnaire was assessed by 10 university nutrition and disease population researchers familiar with the AHEI [29]. The findings confirmed the validity of the 16 questions. These 16 questions formed the foundation of the brief diet quality screening tool, the Rapid Diet Quality Screener (RDQS).

Following the above steps, to effectively communicate the questions to patients with limited health-related print literacy, a suitability assessment was conducted to address the overall understandability of the questionnaire. Understandability refers to whether the health information can be comprehended by diverse health consumers with different backgrounds and varying levels of health literacy [30]. Suitability was measured using the Suitability Assessment of Materials (SAM) with experienced health professionals who design effective communication materials [31]. The SAM consists of 6 evaluation criteria: content, literacy demand, graphics, layout and typography, learning stimulation and motivation, and cultural appropriateness. The step-by-step SAM evaluation assessing the understandability and appropriateness of the questions for individuals with low health literacy levels is reported elsewhere [32]. Upon completion of the external review process, 13 dietary behavior questions met the SAM validity criteria and were retained for inclusion in the new RDQS.

The RDQS tool begins with a question stem, 'in a typical week how often do you:', followed by a list of 13 dietary behavior questions on intake of specified foods and beverages predictive of preventing or increasing chronic disease risk (Table 5). Seven questions measure the consumption of high-quality foods (i.e., unrefined, minimally processed foods) such as vegetables and fruits, whole grains, lean sources of protein, and health-promoting fats. Six questions measure low-quality foods (i.e., highly processed and food high in added sugar, saturated and trans fat, and sodium) such as desserts and sugar-sweetened beverages, red meat, fried foods, and alcohol. Each item includes examples of specific frequently consumed foods within that food group and portion estimates. After the SAM assessment, a pilot test of the RDQS's implementation feasibility was conducted with a convenience sample of upper-level health education majors enrolled in a chronic disease management course. This test revealed high rankings regarding the tool's utility. Participants reported the RDQS tool was advantageous in several aspects such as readability, usefulness in understanding dietary risk and importance of nutritional behaviors, helpfulness, practicality, likeability, and length.

In summary, poor diet quality is the leading underlying cause of morbidity and mortality in the U.S. Diet screening at the point-of-care enables clinicians to influence patients' health and improve patient-centered care to reduce the incidence and improve the management of diet-related chronic diseases. Thus, there is a critical need to address patients' dietary behaviors during routine health care visits. The 2020 AHA scientific statement established 10 validity criteria for developing an optimal diet screener tool and provides three tools that meet the highest number of criteria. Currently, the authors are developing a new brief diet quality screening tool, the RDQS.

Moving forward with the RDQS research and development, the authors will adhere to AHA's recommendation to collaborate interprofessionally to ensure the tool meets the theoretical and practice-based validity criteria. As health education researchers, we look forward to opportunities to partner collaboratively with other health care researchers, clinicians, registered

dietitians, and certified health education specialists to ensure this tool truly reflects translational research related to 'Bench, Bedside, Curbside, and Home' [33]. This research will include a focus on the last step (Home) and the transformative preventive behaviors that will likely result in a sustainable impact on actual outcomes for priority populations. We will continue to apply the knowledge, skills, and processes inherent in the new 2020 NCHEC Responsibilities and Competencies to ensure the most successful outcomes [34]. Ensuring that a dietary screening tool can be easily adopted into the clinician's busy practice workflow is essential for consistent implementation and can only be obtained by sharing lessons learned, so refinements are feasible in real-world practice.

REFERENCES

1. GBD 2017 Diet Collaborators, Afshin, A., Sur, P. J., Fay, K. A., Cornaby, L., Ferrara, G., Salama, J. S.,… Murray, C. J. L. (2019). Health effects of dietary risks in 195 countries, 1990-2017: A systematic analysis for the global burden of disease study 2017. Lancet, 393(10184): 1958-1972.

2. US Burden of Disease Collaborators, Mokdad, A. H., Ballestros, K., Echko, M., Glenn, S., Olsen, H.E., Mullany, E.,… Murray, C. J. L. (2018). The state of US health, 1990-2016: Burden of diseases, injuries, and risk factors among US states. Journal of the American Medical Association, 319(14): 1444-1472.

3. Belanger, M.J., Hill, M.A., Angelidi, A.M., Dalamaga, M., Sowers, J. R., & Mantzoros, C. S. (2020). Covid-19 and disparities in nutrition and obesity. New England Journal of Medicine, 383: e69.

4. Barnard, N. (2019). Ignorance of nutrition is no longer defensible. Journal of the American Medical Association Internal Medicine, 179(8): 1021-1022.

5. Kahan, S., & Manson, J. (2017). Nutrition counseling in clinical practice: How clinicians can do better. Journal of the American Medical Association, 318(12): 1101-1102.

6. Vadiveloo, M., Lichtenstein, A., Anderson, C., Aspry, K., Foraker, R., Griggs, S., … Thorndike, A. (2020). Rapid diet assessment screening tools for cardiovascular disease risk reduction across healthcare settings: A scientific statement from the American Heart Association. Circulation: Cardiovascular Quality and Outcomes, 13(9).

7. Milani, R.V., & Lavie, C.J. (2015). Health care 2020: Reengineering health care delivery to combat chronic disease. The American Journal of Medicine, 128(4), 337-343.

8. Fanzo, J., Drewnowski, A., Blumberg, J., Miller, G., Kraemer, K., & Kennedy, E. (2020). Nutrients, foods, diets, people: Promoting healthy eating. Current Developments in Nutrition, 4(6): nzaa069.

9. Vasiloglou, M .F., Fletcher, J., & Poulia, K. (2019). Challenges and perspectives in nutritional counselling and nursing: A narrative review. Journal of Clinical Medicine, 8, 1489.

10. Kalache, A., de Hoogh, A. I., & Howlett, S. E. (2019). Nutrition interventions for healthy ageing across the lifespan: a conference report. European Journal of Nutrition, 58(Suppl 1): S1-11.

11. Office of Disease Prevention and Health Promotion. (2020). Healthy People 2030. U.S. Department of Health and Human Services.

12. Crowley, J. J., Ball, L., & Hiddink, G. J. (2019). Nutrition in medical education: a systematic review. Lancet Planetary Health, 3(9): e379-389.

13. Locke, A., Schneiderhan, J., & Zick, S. M. (2018). Diets for health: Goals and guidelines. American Family Physician, 97(11): 721-728.

14. US Preventive Services Task Force. (2017). Behavioral counseling to promote a healthful diet and physical activity for cardiovascular disease prevention in adults without known cardiovascular disease risk factors: US Preventive Services Task Force recommendation statement. Journal of the American Medical Association, 318(2): 167-174.

15. Thomas, H., Mitchell, G., Rich J, & Best, M. (2018). Definition of whole person care in general practice in the English language literature: a systematic review. BMJ Open, 8: e023758.

16. Ashman, J. J., Rui, P., Okeynode, T. (2019). Characteristics of office-based physicians visits, 2016. NCHS Data Brief, no 331. Centers for Disease Control and Prevention.

17. Barghi, A., Torres, H., Kressin, N.R., McCormick, D. (2019). Coverage and access for Americans with cardiovascular disease or risk factors after the ACA: A quasi-experimental study. Journal of General Internal Medicine, 34: 1797-1805.

18. National Commission for Health Education Credentialing (NCHEC). (2020). CPT code for health and wellbeing coaching: Update May 2020.

19. Mullen, P. D., Evans, D., Forster, J., Gottlieb, N. H., Kreuter, M., Moon, R., O'Rourke, T., & Strecher, V. J. (1995). Settings as an important dimension in health education/promotion policy, programs, and research. Health Education Quarterly, 22: 239-345.

20. American Dietetic Association. (2008). Nutrition and You: Trends 2008. Where did you hear that? American Dietetic Association Survey reveals popular and credible sources of nutrition information.

21. Soltesz, K. S., Price, J. H., Johnson, L. W., & Tellijohann, S. K. (1995). Family physicians' views of the Preventive Services Task Force recommendations regarding nutritional counseling. Archives of Family Medicine, 4: 589–593.

22. Vadiveloo, M., Lichtenstein, A., Anderson, C., Aspry, K., Foraker, R., Griggs, S.,… Thorndike, A. (2020). Rapid diet assessment screening tools for cardiovascular disease risk reduction across healthcare settings: A scientific statement from the American Heart Association [Supplemental material]. Circulation: Cardiovascular Quality and Outcomes, 13(e000094).

23. Schröder, H., Fitó, M., Estruch, R., Martínez-González, M. A., Corella, D., Salas-Salvadó, J.,… Covas, M. I. (2011). A short screener is valid for assessing Mediterranean diet adherence among older Spanish men and women. Journal of Nutrition, 141(6): 1140-5.

24. Paxton, A. E., Strycker, L. A., Toobert, D. J., Ammerman, A. S., & Glasgow, R. E. (2011). Starting the conversation performance of a brief dietary assessment and intervention tool for health professionals. American Journal of Preventative Medicine, 40(1): 67-71.

25. Segal-Isaacson, C. J., Wylie-Rosett, J., & Gans, K. M. (2004). Validation of a short dietary assessment questionnaire: The rapid eating and activity assessment for participants short version (REAP-S). The Diabetes Educator, 30(5): 774-781.

26. Felege, C., Hahn, E., Hunter, C., & Gleditsch, R. (2016). Bench, bedside, curbside, and home: Translational research to include transformative change using educational research. Journal of Research Practice, 12(2): 1.

27. Kotecki, J., Greene, M., Kandiah, J., & Khubchandani, J. (2020). Self-efficacy and dietary behaviors in university students with high and low perceived stress. Journal of Food & Nutritional Sciences, 2(1): 19-28.

28. Chiuve, S. E., Fung, T. T., Rimm, E. B., Hu, F. B., McCullough, M. L., Wang, M. J., Stampler, M.J., & Willett, W. C. (2012). Alternative dietary indices both strongly predict risk of chronic disease, The Journal of Nutrition, 142(6): 1009-1018.

29. Kotecki, J. E., Greene, M., Greene, C., Kandiah, J., & Kent, A. (2019). Psychometric validation of the behavioral rapid dietary assessment screening tool for chronic disease prevention. American Association for Behavioral and Social Sciences Conference, Las Vegas, NV.

30. Shoemaker, S. J., Wolf, M. S., & Brach, C. (2014). Development of the Patient Education Materials Assessment 149 Tool (PEMAT): A new measure of understandability and actionability for print and audiovisual patient 150 information. Patient Education and Counseling, 96(3): 395-403.

31. Doak, C. C., Doak, L., & Root, J. H. (1996). Teaching patients with low literacy skills (2nd ed.). Philadelphia, PA: JB Lippincott Company.

32. Kotecki J., Greene M., Bayer, R., & Kandiah, J. (2020). Suitability assessment of a brief diet screening tool. American Association for Behavioral and Social Sciences Conference, Las Vegas, NV.

33. Kotecki, J., Greene, M., Khubchandani, J., & Kandiah, J. (In-press). A brief dietary screening and counseling tool for health educators. American Journal of Health Education.

34. National Commission for Health Education Credentialing (NCHEC). (2020). Responsibilities and competencies for health education specialists: HESPA II 2020.

PEER REVIEW

Not commissioned. Externally peer reviewed.

TABLES

Table 1. Mediterranean Diet Adherence Screener – Theoretical and Practice-Based Validity Criteria Score+

Mediterranean Diet Adherence Screener (MEDAS)[23]	**Overall Score = 9.0/10**
1. Do you use olive oil as the principal source of fat for cooking?	
2. How much olive oil do you consume per day (including that used in frying, salads, meals eaten away from home, etc.)?	
3. How many servings of vegetables do you consume per day?	
4. How many pieces of fruit (including fresh-squeezed juice) do you consume per day?	
5. How many servings of red meat, hamburger, or sausages do you consume per day?	
6. How many servings of butter, margarine, or cream do you consume per day?	
7. How many carbonated and/or sugar-sweetened beverages do you consume per day?	
8. Do you drink wine? How much do you consume per week?	
9. How many servings of pulses do you consume per week?	
10. How many servings of fish/seafood do you consume per week?	
11. How many times do you consume commercial (not homemade) pastry such as cookies or cake per week?	
12. How many times do you consume nuts per week?	
13. Do you prefer to eat chicken, turkey or rabbit instead of beef, pork, hamburgers, or sausages?	
14. How many times per week do you consume boiled vegetables, pasta, rice, or other dishes with a sauce of tomato, garlic, onion, or leeks sauteed in olive oil?	

+ Overall scores obtained from AHA Supplemental Table 1.[22]

Table 2. Starting the Conversation – Theoretical and Practice-Based Validity Criteria Score+

Starting the Conservation (STC)[24]	**Overall Score = 6.5/10**
Over the past few months:	
1. How many times a week did you eat fast food meals or snacks?	
2. How many servings of fruit did you eat each day?	
3. How many servings of vegetables did you each day?	
4. How many regular sodas or glasses of sweet tea did you drink each day?	
5. How many times a week did you eat beans (like pinto or black beans), chicken, or fish?	
6. How many times a week did you eat regular snack chips or crackers (not low-fat)?	
7. How many times a week did you eat desserts and other sweets (not the low-fat kind)?	
8. How much margarine, butter, or meat fat do you use to season vegetables or put on potatoes, bread, or corn?	

+ Overall scores obtained from AHA Supplemental Table 1.[22]

Table 3. Rapid Eating Assessment for Participants Shortened Version – Theoretical and Practice-Based Validity Criteria Score+

Rapid Eating Assessment for Participants Shortened Version (REAPS)[25]	**Overall Score = 6.0/10**
In an average week, how often do you:	
1. Skip breakfast?	
2. Eat 4 or more meals from sit-down or take-out restaurants?	
3. Eat less than 2 servings of whole grain products or high fiber starches a day?	
4. Eat less than 2 servings of fruit a day?	
5. Eat less than 2 servings of vegetables a day?	
6. Eat or drink less than 2 servings of milk, yogurt, or cheese a day?	
7. Eat more than 8 ounces of meat, chicken, turkey or fish per day?	
8. Use regular processed meats (like bologna, salami, corned beef, hotdogs, sausage or bacon) instead of low-fat processed meats (like roast beef, turkey, lean ham; low-fat cold cuts/hotdogs)?	
9. Eat fried foods such as fried chicken, fried fish, French fries, fried plantains, tostones or fried yuca?	
10. Eat regular potato chips, nacho chips, corn chips, crackers, regular popcorn, nuts instead of pretzels, low-fat chips or low-fat crackers, air-popped popcorn?	
11. Add butter, margarine or oil to bread, potatoes, rice or vegetables at the table?	
12. Eat sweets like cake, cookies, pastries, donuts, muffins, chocolate and candies more than 2 times per day?	
13. Drink 16 ounces or more of non-diet soda, fruit drink/punch or Kool-Aid a day?	
14. You or a member of your family usually shops and cooks rather than eating sit-down or take-out restaurant food?	
15. Usually feel well enough to shop or cook?	
16. How willing are you to make changes in your eating habits in order to be healthier?	

+ Overall scores obtained from AHA Supplemental Table 1.[22]

Table 4. Alternative Healthy Eating Index Components – Minimum and Maximum Scoring Criteria +

Component	**Minimum Score Criteria 0**	**Maximum Score Criteria 10**
Vegetables, servings/day	0	≥ 5
Fruit, servings/day	0	≥ 4
Whole grains, grams/day Women Men	 0 0	 75 90
Sugar-sweetened beverages and fruit juice, servings/day	≥ 1	0
Nuts and legumes, servings/day	0	≥ 1
Red/processed meat, servings/day	≥ 1.5	0
Trans fat, percent (%) of energy	≥ 4%	≤ 0.5%
Long chain (n-3) fats (EPA + DHA), mg/day	0	250
PUFA, percent (%) of energy	≤ 2%	≥ 10
Sodium, mg/day	Highest decile	Lowest decile
Alcohol, drinks/day Women Men	 ≥ 2.5 ≥ 3.5	 0.5–1.5 0.5–2.0
Total	0	110

+ Adapted from Chiuve et al. (2012)[28]

Table 5. Rapid Diet Quality Screener

Rapid Diet Quality Screener (RDQS)
In a typical week, how often do you:
1. Eat 3 or more servings of vegetables a day (not including potatoes or french fries)? Serving: 1/2 cup fresh, frozen, or canned vegetables, or 1 cup leafy greens.
2. Eat 2 or more servings of whole fruit a day (not including fruit juice)? Serving: 1/2 cup fresh, frozen, or canned fruit, or 1 medium piece.
3. Eat 3 or more servings of whole grain foods a day? Serving: 1 slice whole grain bread, 1 cup whole grain cereal, 1/2 cup cooked oats or brown rice.
4. Eat 1 or more servings of sweets or desserts a day? Examples: candy, cakes, cookies, pies, ice cream, & frozen yogurt with added sugar.
5. Drink 1 or more servings (8 oz) of sugary drinks a day? Examples: soda, fruit juice, sports or energy drinks, & coffee or tea with added sugar.
6. Eat 1 or more servings of chicken or turkey a day (minimally processed)? Serving: 3 oz or the size of the palm of your hand.
7. Eat 1 or more servings of red meat or processed meat a day? Examples: beef, pork, lamb, or ham, hot dogs, bacon, sausage, & lunch meats.
8. Eat 1 or more servings of nuts (1 oz) or seeds (1 oz) or beans (1/2 cup) a day? Examples: walnuts & almonds (nuts); pumpkin & flax (seeds); chickpeas & tofu (beans).
9. Eat 2 or more servings of fish during the week? Serving: 3 oz or the size of the palm of your hand.
10. Add plant-based oils to salads or foods when cooking during the week? Examples: olive, canola, avocado, sunflower, safflower, & flaxseed oils.
11. Add butter to foods or eat deep fried foods during the week?
12. Add salt to food at the table or when cooking during the week?
13. Drink 1 or more alcoholic drinks a day?