

Diet Patterns and Mortality: Common Threads and Consistent Results¹

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The evidence base for dietary guidance has traditionally relied on research examining the relation between individual components of diet—nutrients, foods—and various health outcomes. Evidence is steadily accruing, however, for a role of dietary patterns in chronic disease prevention, which considers the potential for additive and interactive effects of dietary constituents (1). Randomized controlled trials have demonstrated that dietary patterns can significantly lower chronic disease risk factors (2) or outcomes (3,4), but feeding trials are expensive and burdensome to participants; therefore, most evidence will likely come from observational studies.

One way to test the relation of healthy diet patterns and chronic disease outcomes in epidemiologic studies is to create dietary scores to quantify how closely study participants' diets conform to the diet pattern being examined. Dozens of diet scores have been developed as measures of adherence to dietary guidelines, regional models of diet, or other hypothesized ideals. Despite increasing recognition that diet patterns may importantly influence disease risk, a number of issues have made summarizing this body of evidence challenging. Adaptations of the same score may vary across studies depending on investigator interpretation, dietary assessment methods, and even changes over time in guidelines on which a score is based. In 2010, the U.S. Dietary Guidelines for Americans scientific expert committee considered the diet patterns literature too heterogeneous to draw conclusions on the role of diet patterns in health outcomes. This year, the 2015 U.S. Dietary Guidelines Committee will again consider the evidence on dietary patterns and chronic disease risk.

In this issue of *The Journal of Nutrition*, Reedy et al. (5) evaluated the association of 4 a priori–defined diet scores reflecting commonly examined patterns and risk of mortality from cardiovascular disease (CVD),² cancer, or all causes combined in older U.S. men and women in the NIH-AARP Diet and Health Study prospective cohort. By using information from FFQs completed by 424,662 participants at baseline, the authors calculated how closely participants' diets matched the following 4 diet quality scores: 1) the Healthy Eating Index–2010 (HEI-2010) (6), 2) the Alternate Healthy Eating Index–2010 (AHEI-2010) (7), 3) the Dietary Approaches to Stop Hypertension (DASH) diet score (8), and 4) a modified (alternate) Mediterranean Diet (aMED) (9). The HEI-2010 measures how closely participants' diets match the

2010 U.S. *Dietary Guidelines for Americans*, which serves as the cornerstone of food and nutrition policy in the United States. The AHEI-2010 is an alternative to the HEI and is based on foods and nutrients predictive of chronic disease. The DASH score highlights key components of the original (2) and DASH-Sodium (10) feeding trials that showed significant blood pressure lowering with a diet pattern high in fruit, vegetables, whole grains, low-fat dairy, and nuts and low in sodium, saturated fat, sugar, and red and processed meats. The aMED score is modified from the Greek version of the Mediterranean diet circa 1960 when chronic disease rates in the region were among the lowest in the world. The Mediterranean diet made headlines last year when the Spanish *Prevención con Dieta Mediterránea* (PRE-DIMED) trial (3) reported lower incidence of major cardiovascular events in at-risk individuals who were counseled to follow a Mediterranean diet supplemented with olive oil or nuts, compared with a low-fat control diet. In the study by Reedy et al. (5), >86,000 study participants died during 15 y of follow-up. The authors found that higher scores for all 4 diets were significantly associated with lower risk of mortality: comparing individuals whose scores were in the highest vs. lowest quintile, results ranged from 17% to 24% lower for risk of all-cause mortality, from 14% to 28% lower for risk of CVD mortality, and from 12% to 24% lower for risk of cancer mortality.

That all scores predicted lower mortality is not entirely surprising because many of their components are the same (see **Table 1**), including a diet high in fruit, vegetables, whole grains, nuts, and legumes. The correlations between scores ranged from 0.49 to 0.69. The scoring of most protein sources is similar, except that the HEI-2010 gives credit for greater consumption of any type of meat, whereas the others specifically penalize red and processed meat consumption. Where included, scores for sugar, salt, and most FAs are qualitatively similar among the patterns tested.

Some distinct differences among the scores should be noted. Moderate alcohol consumption is promoted in the aMED and AHEI-2010 scores, in contrast to the HEI-2010 and the DASH scores. Although dairy is promoted by the HEI-2010 and DASH, it is not encouraged by the other 2 patterns. The AHEI-2010 is weighted more heavily toward FA composition of the diet and is the only score to deduct points for consuming *trans* fats, which may, in part, explain its strong inverse association with CVD mortality.

Other methodologic issues in score derivation deserve consideration. How does the different weighting scheme and energy adjustment before analysis in the HEI-2010 or the use of cohort-specific distributions to define cutoffs in the aMED and DASH scores influence results? How does calculation of serving sizes using the MyPyramid Equivalents database influence individual

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² Abbreviations used: AHEI-2010, Alternate Healthy Eating Index–2010; aMED, alternate Mediterranean Diet; CVD, cardiovascular disease; DASH, Dietary Approaches to Stop Hypertension; HEI-2010, Healthy Eating Index–2010.

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TABLE 1 Qualitative comparison of scores tested by Reedy et al. (5)¹

	Score			
	HEI-2010	AHEI-2010	DASH	aMED
Fruit	↑	↑	↑	↑
Vegetables	↑	↑	↑	↑
Whole grains	↑	↑	↑	↑
Nuts/legumes	↑, in other categories	↑	↑	↑
Low fat dairy	↑	—	↑	—
Meat	↑, all types	↓, red and processed meat	↓, red and processed meat	↓, red and processed meat
Fish	↑, "seafood + plant proteins"	↑, EPA + DHA ²	—	↑, fish
SFAs	↓	—	—	↓
trans Fat	—	↓	—	—
MUFAs	↑	—	—	↑
PUFAs	↑	↑	—	—
Sugar-sweetened beverages	↓	↓	↓	—
Alcohol	> Moderate ↓	↑ (moderate)	—	↑ (moderate)
Sodium	↓	↓	↓	—
Coding	Energy-adjusted; unequal component weighting	Absolute cut-points; equal weighting	Based on cohort distribution quintiles; quintile cut-points	Based on cohort distribution; median cut-points

¹ ↑ indicates component receives credit for more intake; ↓ indicates component receives credit for limiting intake. Dashes indicate no recommendation for that component. AHEI-2010, Alternative Healthy Eating Index–2010; aMED, alternate Mediterranean Diet; DASH, Dietary Approaches to Stop Hypertension; HEI-2010, Healthy Eating Index–2010.

² EPA and DHA are long-chain (n–3) FAs, plentiful in fish and shellfish.

scores and disease risk associations? More research on the impact of scoring decisions is needed but is unlikely to meaningfully change the findings observed here.

A valuable contribution from the study by Reedy et al. (5) is that it directly addresses previous limitations in the field. This article is the first publication from the "Diet Patterns Methods Project" (11), designed to uniformly define diet pattern scores and systematically compare associations with chronic disease outcomes across several cohorts. Participating cohorts used the same diet score codes, outcome definitions, and analytic approaches. For example, as the authors note (5), there are currently 8 known versions of the Mediterranean diet score; each participating cohort used the same version. To enhance transparency and encourage replication, the authors welcome collaboration and sharing of analytic code for interested investigators. These investigators are to be commended for their efforts.

The take-home message from this article is that all 4 of these diet patterns are associated with lower risk of death from CVD, cancer, or any cause. They are all built on a common core of a diet rich in plant foods (whole grains, a variety of fruit and vegetables, nuts, and legumes), which is supported by extensive scientific evidence. Among plant food–based dietary patterns, there are likely to be many variants with fairly similar health benefits; ultimately the best diet for an individual will depend on individual risk factors, taste preference, and ease of adherence. Our next challenge is doing a better job educating the public about the health benefits of diet patterns that are built on this common core.

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