**Online Supporting Material**

Details of Methods

*Diet assessment methods in DPMP*

In all three cohorts, diet was measured using a comprehensive self-administered FFQ that assessed dietary intake over the past year in AARP and MEC and the past three months in WHI. The AARP cohort included a 124 line-item FFQ with 44 adjustment questions and 2 summary questions which was an earlier version of the Diet History Questionnaire (10, 18, 22, 23). MEC used a 182 line-item FFQ with 14 adjustment questions and 6 summary questions (12, 19). The WHI-FFQ included 122 line-items with 19 adjustment questions and 4 summary questions and was adapted from the Health Habits and Lifestyle Questionnaire (11, 20, 21). The questionnaires can be found at:
http://dietandhealth.cancer.gov/docs/diet_questionnaire_baseline.pdf;
http://www.crch.org/multiethniccohort/mec_questionnaires.htm;
https://www.whi.org/studydoc/WHI%20Forms/Forms/WHI.aspx.

Use of nutrient databases varied between cohorts. AARP used the USDA Survey Nutrient Database associated with the Continuing Survey for Food Intake by Individuals 1994-96 supplemented with additional nutrients from the Nutrition Data System for Research (10). MEC used a food composition table specific to the MEC that relied on the USDA Standard Reference as a foundation (12). WHI-OS used the Nutrition Data Systems for Research (NDS-R, version 2005, University of Minnesota, Minneapolis, MN) food and nutrient database (11). Conversion of reported food and beverage intake amounts into a uniform system of nutritionally meaningful groups in all three cohorts was achieved by merging data with the MyPyramid Equivalents Database (MPED) and calculating components using MPEDs (17). This is a standardized, guidance-based food grouping method that systematizes calculation of food group and nutrient amounts by disaggregating foods into their ingredients and allocating those ingredients to one of 32 food groups and subgroups. MPED units are cup and ounce equivalents versus servings per day. The MPED units can be converted to metric units using 1 oz = 28.3 g and 1 cup = 225 mL. The MPED groups and subgroups were used in the scoring of each dietary index.

*Dietary index definitions and approaches*

Four dietary indices were considered, HEI-2010, AHEI-2010, the aMED, and DASH. An overview of the scoring criteria is presented in Supplemental Table 2.

HEI-2010. The HEI was developed to quantify adherence to US federal dietary guidance, with a higher score reflecting better quality and adherence (27). The version employed in DPMP, corresponds to the 2010 Dietary Guidelines for Americans (6). The HEI-2010 scores 12 components for a total of 100 points. Six components (i.e., total vegetables, greens and beans, total fruit, whole fruit, seafood and plant proteins, and total protein foods) are worth 0-5 points, 5 components (i.e., whole grains, low fat dairy, fatty acids ratio [(PUFA + MUFA)/SF], refined grains, and sodium) are worth 0-10 points, and 1 component (i.e., empty calories, which include energy intake from solid fats, added sugars, and any alcohol in excess of 13 g/1,000 kcal) is worth 0-20 points and is reverse scored, such that a lower intake was given a better score. Refined grains and sodium are also reverse scored. All components except the fatty acids ratio are scored based on a density basis (per 1,000 kcal or as a percent of total energy).

AHEI-2010. The AHEI was developed based on foods and nutrients associated with lower chronic disease risk drawn from extensive epidemiological and clinical studies (28-30) and has recently been updated as AHEI-2010 (7). The AHEI-2010 scores 11 components for a total of 110 points. Each component is worth 0-10 points and components include whole grains, vegetables, fruit, nuts and legumes, trans fat, EPA + DHA (n-3 fatty acids, long-chain n-3 fats), PUFA, alcohol, red and processed meat, sugar sweetened beverages and fruit juices, and sodium. Components that were reverse-scored included sodium, trans fats, red and processed meats, and sugar-sweetened beverages. The alcohol criteria was gender specific, with maximum points given for intake with target range and reverse scoring outside of range.

aMED. The aMED score used in DPMP was the one adapted for use in a US population (9) from earlier work on dietary patterns associated with lowered mortality in Mediterranean or Southern European populations (31). The aMED scores 9 components for a total of 9 points. One point is scored for intake at or greater than the sex-specific median for seven food groups and nutrients (i.e., whole grains, vegetables excluding potatoes, fruit, nuts, legumes, nuts, and fatty acid ratio), one point is given for intake less than the sex-specific median for red and processed meat (i.e., reverse scored), and one point is given for meeting gender-specific alcohol intake ranges, with maximum points given within range and reverse scoring applied outside target ranges.

DASH Score. The DASH score was designed to capture the diet tested in two DASH randomized controlled feeding trials (1, 32), which examined the role of dietary patterns on blood pressure. Several different DASH scores exist, and we used the one most commonly found in the literature with US populations (9). DASH scores 8 components (7 food groups and one nutrient)—each worth 5 points—for a total of 40 points. The scoring system is based on sex-specific quintile rankings within the study population. Points are given from 5 (highest quintile) to 1 (lowest quintile) for whole grains, vegetables (excluding white potatoes), fruit, the combined group of nuts, seeds, and legumes, low-fat dairy, and then reverse scored from 1 (highest quintile) to 5 (lowest quintile) for sodium, sugar-sweetened beverages, and red and processed meat. Alcohol intake is not considered in this version of the DASH index.

In order to develop a uniform protocol for scoring and coding these indices, the DPMP discussed and agreed upon the standardization process for each FFQ. As with any nutrient or food group variable that is added to a database file, all line items from each FFQ were included. To score each index component, the MPED variables were used. In a few instances, such as for sugar-sweetened beverages, decisions were made collectively regarding how to define variables based on similar line items across the FFQs (i.e., AARP summed line items for soft drinks, fruit drinks, and presweetened teas; MEC combined soft drinks, Tang/Gatorade®-type products, and fruit drinks such as Hawaiian Punch®; and WHI-OS added together soft drinks and Koolaid®-type beverages).

*Covariates*

The DPMP group developed a unified approach to consideration of potential covariates. but slight differences between covariate categorizations were present because of the need to respect cohort-specific analysis policies. In several instances, if one of the cohorts had more detailed data on a given covariate, a simplified categorization scheme was used to maximize the similarity across cohorts. The following covariates were included in the models for all three cohorts (10-12): age and total energy intake (continuously), education (less than high school,

high school, some college, college graduate) and history of diabetes (yes, no). In MEC, marital status was categorized as married vs. not married. In WHI-OS, marital status was categorized using the following categories: married/living as married; never married/divorced/separated/widowed. In AARP, more categories were used (married, widowed, divorced, separated, never married). Body mass index (BMI) was categorized in MEC as <25 kg/m$^2$, 25-29.9 kg/m2, and ≥30 kg/m$^2$, in WHI-OS as less than 18.5, 18.5–24.9, 25.0–29.9, 30.0–34.9, or ≥35.0 kg/m$^2$, and in AARP as 18.5 to <25, 25 to <30, 30 to <35, 35 to <40, ≥40 kg/m$^2$. MEC and AARP BMI values were based on self-reported height and weight, while WHI-OS used measured height and weight. Smoking was categorized as current smoker, past smoker, never smoked in MEC and WHI-OS, and as never smoker, former smoker of one pack or less per day, former smoker of more than one pack per day, current smoker of one pack or less per day, current smoker of more than one pack per day in AARP. Ethnicity (as indicator variables) was included as a covariate in all three cohorts, grouped as non-Hispanic White, non-Hispanic Black, and other in AARP, White or Caucasian, Black or African-American, Mexican or other Hispanic, Japanese, and Hawaiian in MEC, and as non-Hispanic White, Black, Hispanic, and other in WHI-OS. Because physical activity was assessed with different instruments in the cohorts; all cohorts attempted to characterize moderate or vigorous activity. In AARP, vigorous physical activity was categorized as ≥20 daily minutes reported rarely or never, 1 to 3 times per month, 1 to 2 times per week, 3 to 4 times per week, ≥5 times per week. In MEC, moderate-to-vigorous physical activity was categorized as <2.5 hours/week, ≥2.5 hours/week. In WHI-OS metabolic equivalent task hours (MET-h)/week of recreational physical activity were calculated and physical activity level was categorized as 0 MET-h/week, 0.1-3 MET-h/week, 3.1 to 8.9 MET-h/week; 9 or more MET-h/week. Hormone replacement therapy in women (yes, no) was included as a covariate in the analyses in AARP and MEC. In WHI-OS, use of postmenopausal hormone therapies was classified as never, past, current.

Note: reference numbers refer to Reference List in main paper.

**Supplemental Table 1. Description of the cohorts participating in The Dietary Patterns Methods Project[1]**

|  | AARP | MEC | WHI-OS |
|---|---|---|---|
| Characteristics of the cohorts |  |  |  |
| Sample size | 424,663 | 156,804 | 63,805 |
| Place | Detroit, MI; New Jersey; Pennsylvania; North Carolina; Atlanta, GA; Florida; Louisiana; California | Hawaii & the greater Los Angeles area | 40 clinical centers situated in the US |
| Time | 1995-96—Present | 1993-96—Present | 1993-98—Present |
| Diet assessment method | 124-item FFQ | 182-item FFQ | 122-item FFQ |
| Participant age at entry | 50-71 | 45-75 | 50-79 |
| Participant race/ethnicity (%) | Non-Hispanic White - 92.2 Non-Hispanic Black - 4.1 Other[2] -3.7 | White or Caucasian - 24.2 Black or African American - 16.0 Mexican or other Hispanic- 23.2 Japanese - 29.4 Hawaiian -7.2 | Non-Hispanic White - 84 Black- 7 Hispanic - 4 Others[3] 5 |

[1] AARP: American Association of Retired Persons, AARP Diet & Health Study; MEC: Multiethnic Cohort; WHI-OS: Women's Health Initiative Observational Study;

[2] Other race/ethnic groups in AARP included Hispanic, Asian, Pacific Islander, American Indian/Alaskan Native, and Unknown;

[3] Other race/ethnic group in WHI-OS included American Indian or Alaskan Native; Asian or Pacific Islander; and Other;

**Supplemental Table 2. Scoring standards for each component of the HEI-2010, AHEI-2010, aMED, and DASH Score, using standardized cup and ounce equivalents (as shown in Reedy et al. 2014 (10)[1]**

| Component | HEI-2010[2] 100 points total 12 components: 5-20 points each | | AHEI-2010[3] 110 points total 11 components: 10 points each | | aMED[4] 9 points total 9 components: 1 point each | | DASH[5] 40 points total 8 components: 5 points each | |
|---|---|---|---|---|---|---|---|---|
| | Criteria for minimum score | Criteria for maximum score | Criteria for minimum score | Criteria for maximum score | Criteria for minimum score | Criteria for maximum score | Criteria for minimum score | Criteria for maximum score |
| Whole Grains | 0 oz eq/1000 kcal | ≥1.5 oz eq/1000 kcal | 0 oz eq/d | ≥5 & ≥6 oz eq/d (men & women) | < median | ≥ median | Lowest quintile | Highest quintile |
| Total Vegetables | 0 c eq/1000 kcal | ≥1.1 c eq/1000 kcal | — | — | — | — | — | — |
| Vegetables Excluding Potatoes | — | — | 0 c eq/d | ≥2.5 c eq/d | < median | ≥ median | Lowest quintile | Highest quintile |
| Greens and Beans[6] | 0 c eq/1000 kcal | ≥0.2 c eq/1000 kcal | — | — | — | — | — | — |
| Total Fruit | 0 c eq/1000 kcal | ≥0.8 c eq/1000 kcal | 0 c eq/d | ≥2 c eq/d | < median | ≥ median | Lowest quintile | Highest quintile |
| Whole Fruit | 0 c eq/1000 kcal | ≥0.4 c eq/1000 kcal | — | — | — | — | — | — |
| Nuts and Legumes | — | — | 0 oz eq/d | ≥1 oz eq/d | — | — | Lowest quintile | Highest quintile |
| Nuts | — | — | — | — | < median | ≥ median | — | — |
| Legumes | — | — | — | — | < median | ≥ median | — | — |
| Seafood and Plant Proteins | 0 oz eq/1000 kcal | ≥0.8 oz eq/1000 kcal | — | — | — | — | — | — |
| Fish | — | — | — | — | < median | ≥ median | — | — |
| Total Protein Foods | 0 oz eq/1000 kcal | ≥2.5 oz eq/1000 kcal | — | — | — | — | — | — |
| Low-Fat | 0 c eq/1000 | ≥1.3 c | — | — | — | — | Lowest | Highest |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dairy | kcal | eq/1000 kcal | | | | | quintile | quintile |
| Ratio of Fatty Acids | PUFA + MUFA/SFA: <1.2 | PUFA + MUFA/SFA: ≥2.5 | — | — | MUFA/SF: < median | MUFA/SF: ≥ median | — | — |
| Trans Fat | — | — | ≥4 % | ≤0.5% | — | — | — | — |
| EPA + DHA | — | — | 0 mg/d | 250 mg/d | — | — | — | — |
| PUFA | — | — | ≤2% | ≥10% | — | — | — | — |
| Alcohol | — | — | ≥3.5 & ≥2.5 drinks/d (men & women) | 0.5-2 & 0.5-1.5 drinks/d (men & women) | <5 or >15 g/d & <10 or >25 g/d | Alcohol: 5-15 g/d & 10-25 g/d | — | — |
| Red & Processed Meat | — | — | ≥1.5 oz eq/d | 0 oz eq/d | ≥median | <median | Highest quintile | Lowest quintile |
| Refined Grains | ≥4.3 oz eq/1000 kcal | ≤1.8 oz eq/1000 kcal | — | — | — | — | — | — |
| Empty Calories[7] | ≥50% kcal | ≤19% kcal | | | | | | |
| Sugar Sweetened Beverages and Fruit Juices | — | — | ≥1 c eq/d | 0 c eq/d | — | — | — | — |
| Sugar Sweetened Beverages | — | — | — | — | — | — | Highest quintile | Lowest quintile |
| Sodium | ≥2.0 g/1000 kcal | ≤1.1 g/1000 kcal | Highest decile | Lowest decile | — | — | Highest quintile | Lowest quintile |

[1]Scoring standards are based on cup and ounce equivalents (c and oz eq) from the MyPyramids Equivalents Database; 1 oz = 28.3 g; 1 c = 225 ml. HEI-2010, Healthy Eating Index-2010; AHEI-2010, Alternate Healthy Eating Index-2010; aMED, Alternate Healthy Eating Index; DASH, Dietary Approaches to Stop Hypertension.

[2]HEI-2010: components are given different point values and prorated based on minimum and maximum scores: Whole Grains (10 points),Total Vegetables (5 points), Greens and Beans (5 points),  Total Fruit (5 points), Whole Fruit (5 points), Seafood and Plant Proteins (5 points), Total Protein

Foods (5 points), Low Fat Dairy (10 points), Fatty Acids Ratio (10 points), Refined Grains (10 points), Empty Calories (20 points, includes kcal from Solid Fats, Added Sugars, and any Alcohol in excess of 13 g/1000 kcal), Sodium (10 points).

[3]AHEI-2010: components are each worth 10 points and prorated based on minimum and maximum scores.

[4] aMED: median values for each component for men & women, respectively: Whole Grains (0.87 & 0.72 oz eq/d), Vegetables Excluding Potatoes (1.32 & 1.34 c eq/d), Total Fruit: (1.67 & 1.67 c eq/d), Nuts (0.28 & 0.17 oz eq/d), Legumes (0.07 & 0.04 oz eq/d), Fish (0.49 & 0.37 oz eq/d), Ratio of Fatty Acids (1.23 & 1.22), Alcohol (cutpoints: 5-15 g/d & 10-25 g/d), Red & Processed Meat (2.24 & 1.27 oz eq/d).

[5]DASH: median value for optimal quintile for each component for men & women, respectively: Whole grains (2.13 & 1.75 oz eq/d), Vegetables excluding potatoes (3.47 & 3.40 c eq/d), Total Fruit (3.95 & 3.83 c eq/d), Nuts, Seeds, Legumes (1.55 & 0.96 oz eq/d), Low-Fat Dairy (2.97 & 2.70 c eq/d), Red & Processed Meat (0.74 & 0.37 oz eq/d), Sugar Sweetened Beverages (0 & 0 c eq/d), Sodium (1620 & 1240 mg/d).

[6]Greens and beans are dark green vegetables and any legumes that are not already counted as protein foods.

[7]Empty calories are defines as energy from solid fats, added sugars, and any alcohol in excess of 13 g/1,000kcal.

Also refer to Reedy et al., 2014 (10)

**Supplemental Table 3. Socio-economic and lifestyle characteristics and all-cause, CVD and cancer mortality rates by gender and cohort. The Dietary Patterns Methods Project. [1]**

| | Women | | | Men | |
|---|---|---|---|---|---|
| | **AARP** | **MEC** | **WHI-OS** | **AARP** | **MEC** |
| Other participant characteristics | | | | | |
| Education (% college graduates) | 30.5 | 23.6 | 43.0 | 45.5 | 28.8 |
| Marital status (% married) | 44.7 | 59.5 | 64.0[2] | 84.8 | 76.1 |
| Smoking (% never smokers) | 46.2 | 54.6 | 51.0 | 31.9 | 29.6 |
| BMI (kg/m$^2$) | 26.7±5.9 | 26.4±5.7 | 27.1±5.7 | 27.2±4.3 | 26.7±4.2 |
| Mortality rates (Per 1,000 person year) | | | | | |
| All-cause mortality | 12.4 | 11.8 | 7.6 | 16.7 | 17.1 |
| CVD mortality | 4.2 | 4.0 | 2.0 | 5.7 | 6.0 |
| Cancer mortality | 3.1 | 3.7 | 3.2 | 4.7 | 5.5 |

[1] Values of BMI are means and standard deviations; CVD: Cardiovascular Disease;

[2] For WHI-OS only this category corresponds to married and living as married.