# Carbohydrate quality index and mortality risk in the PREDIMED cohort

## Supplemental Methods

### Exposure Assessment

Determination of each of the assessed dimensions of carbohydrate quality (glycemic index, dietary fiber, whole grains to total grains ratio, and solid carbohydrates to total carbohydrates ratio) were defined based on responses to the Spanish validated version of the 137-item, semi-quantitative food frequency questionnaire administered by trained dietitians during face-to-face interviews. Intake of each food item was calculated by multiplying serving size by frequency of consumption, where there were nine options for the average frequency of consumption from never/almost never to at least six times per day, and nutrients (e.g., dietary fiber, carbohydrates) were derived from Spanish food composition tables [1,2]. Carbohydrate quality dimensions were defined as follows:

Glycemic index was determined using international tables [3].

Dietary fiber was determined based on derivations from the Spanish food composition tables in grams per day [1,2].

Whole grains intake was calculated based on FFQ responses to “whole grains: muesli, oat flakes, all-bran" [translated from the Spanish: “Cereales integrales: muesli, copos avena, all bran (30 gr.)”], “Whole-wheat and whole grain bread” [“Pan negro o integral (3 rodajas, 75 gr.”], and [Galletas integrales o de fibra (4-6 unidades, 50 gr.)”] by multiplying serving size by frequency of consumption and summing intakes across the noted relevant variables. Refined grain intake was calculated based on food frequency questionnaire responses to “white bread” [translated from Spanish: “Pan blanco, pan de molde (3 rodajas, 75 gr.”)], “white rice” [“Arroz blanco (60 gr. en crudo”)], “pasta: noodles, macaroni, spaghetti, others” [“Pasta: fideos, macarrones, espaguetis, otras (60

gr. en crudo)]", "breakfast cereals" [Cereales desayuno (30 gr.)]", pizza ["Pizza (1 ración, 200 gr)"], "Maria cookies (4-6 pieces, 50 gr)" ["Galletas tipo Maria (4-6 unidades, 50 gr.)"], "chocolate cookies (4 pieces, 50 gr)" ["Galletas con chocolate (4 unidades, 50 gr.)"], "homemade cakes and pastries (50 gr)" ["Reposteria y bizcochos hechos en casa (50 gr.)"], "croissants, ensaimada, tea biscuits, or other commercial pastries... (one, 50 gr)" ["Croissant, ensaimada, pastas de té u otra bollería industrial comercial (uno, 50 gr.)"], "donuts (one)" ["Donuts (uno)"], "muffins (1-2 pieces)" ["Magdalenas (1-2 unidades)"], "cakes (one, 50 gr)" ["Pasteles (uno, 50 gr.)"], chocolates and pralines (30 gr)" ["Chocolates y bombones (30 gr.)"], "cocoa powder - instant cocoa (1 dessert spoon)" ["Cacao en polvo-cacaos solubles (1 cucharada de postre)"], "turron (1/8 bar, 40 gr)" ["Turron (1/8 de barra, 40 gr.)"], "shortbread, marzipan (90 gr)" ["Mantecados, mazapan (90 gr.)"] by multiplying serving size by frequency of consumption and summing intakes across the noted relevant variables. Total grains intake was calculated by summing the intakes of whole grains, refined grains and their products.

Solid carbohydrates included the carbohydrate content as derived from Spanish food composition tables contained in all solid foods assessed in the food frequency questionnaire. Liquid carbohydrates were calculated as the sum of carbohydrates from sugar-sweetened beverages [translated from the Spanish: Bebidas carbonatadas con azúcar: bebidas con cola, limonadas, tónicas, etc. (1 botellín, 200 cc)], , and fruit juices [Zumo de naranja natural (1 vaso, 200 cc), Zumos naturales de otras frutas (1 vaso, 200 cc), Zumos de frutas en botella o enlatados (200 cc), Frutas en almíbar o en su jugo (2 unidades)]. Total carbohydrates intake was calculated by summing the intakes of solid carbohydrates and liquid carbohydrates.

These four components were selected based on the pre-defined composite carbohydrate quality index (CQI) [4], to capture complementary aspects of carbohydrate

quality with established but distinct associations with cardiometabolic health, including glycemic control (GI), lipid metabolism and satiety (dietary fiber), nutrient density and food structure (whole grains), and excess energy intake and metabolic dysregulation (solid-to-liquid carbohydrates ratio) [5,6].

Each CQI component was assigned equal weight. This aligns with the previously defined composite CQI and given the absence of robust comparative evidence to support differential weighting across components, equal weighting was applied as a conservative and transparent approach that minimizes arbitrary bias and ensures balanced representation of each dimension. This equal weighting of CQI components also reflects a conceptual assumption rather than an empirically derived weighting scheme. The CQI is intended to capture the multidimensional and potentially synergistic nature of carbohydrate quality, rather than to quantify the relative contribution of individual components.

**References:**


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**Supplemental Tables**

**Table S1.- Baseline characteristics of the PREDIMED participants by cumulative average carbohydrate quality index**

| Characteristic[a] | Quintiles | | | | | Total | *P* value[b] |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | | |
| Participants, No. (%) | 1,979 (27.4%) | 1,456 (20.2%) | 1,513 (21.0%) | 1,204 (16.7%) | 1,058 (14.7%) | 7,210 (100.0%) | |
| Age, mean (SD), years | 67.4 (6.4) | 67.4 (6.2) | 66.9 (6.2) | 66.7 (6.1) | 66.5 (5.9) | 67.0 (6.2) | **<0.001** |
| Women, No. (%) | 1,050 (53.1%) | 790 (54.3%) | 856 (56.6%) | 754 (62.6%) | 693 (65.5%) | 4,143 (57.5%) | **<0.001** |
| **Intervention group, No. (%)** | | | | | | | |
| MedDiet + EVOO | 638 (32.2%) | 497 (34.1%) | 515 (34.0%) | 456 (37.9%) | 367 (34.7%) | 2,473 (34.3%) | |
| MedDiet + Nuts | 569 (28.8%) | 474 (32.6%) | 531 (35.1%) | 395 (32.8%) | 390 (36.9%) | 2,359 (32.7%) | **<0.001** |
| Low fat diet | 772 (39.0%) | 485 (33.3%) | 467 (30.9%) | 353 (29.3%) | 301 (28.4%) | 2,378 (33.0%) | |
| **Educational level, No. (%)** | | | | | | | |
| Primary education or less | 1,547 (78.2%) | 1,131 (77.7%) | 1,160 (76.7%) | 943 (78.3%) | 820 (77.5%) | 5,601 (77.7%) | 0.969 |
| Secondary | 300 (15.2%) | 223 (15.3%) | 235 (15.5%) | 176 (14.6%) | 161 (15.2%) | 1,095 (15.2%) | |
| College | 132 (6.7%) | 102 (7.0%) | 118 (7.8%) | 85 (7.1%) | 77 (7.3%) | 514 (7.1%) | |
| **Smoking status, No. (%)** | | | | | | | |
| Never smoked | 146 (7.4%) | 87 (6.0%) | 108 (7.1%) | 94 (7.8%) | 87 (8.2%) | 522 (7.2%) | |
| Former smoker | 1,487 (75.1%) | 1,142 (78.4%) | 1,177 (77.8%) | 910 (75.6%) | 786 (74.3%) | 5,502 (76.3%) | 0.154 |
| Current smoker | 346 (17.5%) | 227 (15.6%) | 228 (15.1%) | 200 (16.6%) | 185 (17.5%) | 1,186 (16.4%) | |
| Physical activity, mean (SD), MET/min/d | 219.6 (246.9) | 218.7 (212.7) | 244.0 (257.9) | 238.5 (248.6) | 262.4 (270.6) | 234.0 (247.2) | **<0.001** |
| BMI, mean (SD), kg/m$^2$ | 30.2 (3.8) | 30.0 (3.7) | 30.0 (3.8) | 29.8 (4.0) | 29.7 (4.1) | 30.0 (3.9) | **0.016** |
| Obesity, No. (%) | 958 (48.4%) | 701 (48.1%) | 736 (48.6%) | 528 (43.9%) | 460 (43.5%) | 3,383 (46.9%) | 0.222 |
| Type 2 diabetes, No. (%) | 944 (47.7%) | 694 (47.7%) | 715 (47.3%) | 607 (50.4%) | 566 (53.5%) | 3,526 (48.9%) | **0.008** |
| Waist circumference, mean (SD), cm | 101.4 (10.1) | 101.1 (10.0) | 100.8 (10.1) | 99.3 (10.5) | 98.8 (11.1) | 100.5 (10.3) | **<0.001** |
| Systolic blood pressure, mean (SD), mm Hg | 145.7 (20.4) | 146.4 (19.3) | 145.7 (20.3) | 144.9 (20.1) | 144.5 (20.5) | 145.5 (20.1) | 0.516 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Diastolic blood pressure, mean (SD), mm Hg | 81.9 (10.2) | 82.1 (10.7) | 81.6 (10.4) | 80.7 (10.6) | 82.7 (31.9) | 81.8 (15.5) | 0.269 |
| **Blood parameters, mean (SD), mg/dL** | | | | | | | |
| Glucose | 142.3 (445.4) | 130.1 (262.0) | 137.5 (364.5) | 133.9 (289.9) | 126.0 (48.7) | 135.0 (332.5) | 0.710 |
| Total cholesterol | 220.4 (313.4) | 209.0 (36.3) | 225.5 (358.4) | 220.4 (286.2) | 209.8 (36.3) | 217.6 (260.9) | 0.369 |
| Low-density lipoprotein | 134.8 (19.2) | 133.0 (18.9) | 133.3 (17.7) | 132.6 (18.0) | 133.5 (17.5) | 133.6 (18.4) | **0.005** |
| High-density lipoprotein | 52.7 (8.0) | 52.9 (8.0) | 53.5 (8.1) | 53.1 (8.0) | 53.1 (8.1) | 53.1 (8.1) | **0.042** |
| Triglycerides | 152.1 (323.0) | 140.3 (87.3) | 148.4 (365.7) | 146.0 (295.6) | 131.5 (76.8) | 144.9 (271.5) | 0.326 |

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided 2 by height in meters squared); CVD, cardiovascular disease; EVOO, extra virgin olive oil; MedDiet, Mediterranean Diet; METs, metabolic equivalents; PREDIMED = Prevención con Dieta Mediterránea.

[a]Data are presented as No. (%) or mean (SD) for categorical and continuous variables, respectively.

[b]*P* values for intergroup differences by tertiles of carbohydrate quality index in the overall population were calculated with the Pearson $\chi 2$ test or univariate ANOVA, as appropriate. Significance was set at *P* values less than 0.05 and boldfaced.

**Table S2.- Dietary intake# by baseline carbohydrate quality index categories**

| Characteristic[a] | Quintiles | | | | | Total | *P* value[b] |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | | |
| Participants, No. (%) | 1,979 (27.4%) | 1,456 (20.2%) | 1,513 (21.0%) | 1,204 (16.7%) | 1,058 (14.7%) | 7,210 (100.0%) | |
| Carbohydrate quality index | 7.7 (1.3) | 10.5 (0.5) | 12.5 (0.5) | 14.5 (0.5) | 17.0 (1.1) | 11.7 (3.3) | **<0.001** |
| Glycemic index | 56.1 (3.5) | 54.3 (3.7) | 52.8 (4.0) | 51.7 (3.7) | 50.2 (3.4) | 53.5 (4.2) | **<0.001** |
| Fiber, g/day | 20.9 (4.2) | 23.9 (4.7) | 26.2 (5.7) | 28.6 (5.4) | 31.7 (5.9) | 25.5 (6.3) | **<0.001** |
| Whole-grain-to-total grain ratio | 0.0 (0.0) | 0.1 (0.1) | 0.2 (0.2) | 0.4 (0.3) | 0.5 (0.2) | 0.2 (0.3) | **<0.001** |
| Solid to total carbohydrates ratio | 1.0 (0.0) | 1.0 (0.0) | 1.0 (0.0) | 1.0 (0.0) | 1.0 (0.0) | 1.0 (0.0) | **<0.001** |
| Energy, kcal/day | 2179 (411) | 2226 (431) | 2185 (440) | 2172 (385) | 2158 (372) | 2186 (412) | **<0.001** |
| Carbohydrates, % | 41.7 (5.5) | 41.3 (5.5) | 41.3 (5.6) | 41.4 (5.0) | 41.0 (5.2) | 41.4 (5.4) | **0.029** |
| Protein, % | 15.8 (2.1) | 16.3 (2.1) | 16.6 (2.2) | 17.0 (2.0) | 17.4 (2.2) | 16.5 (2.2) | **<0.001** |
| Fat, % | 39.8 (5.1) | 40.0 (5.1) | 39.6 (5.2) | 40.0 (4.8) | 39.8 (5.0) | 39.8 (5.1) | 0.268 |
| Alcohol, g/day | 8.9 (12.9) | 8.2 (11.9) | 8.2 (11.4) | 5.7 (9.0) | 5.8 (9.5) | 7.6 (11.4) | **<0.001** |
| Cereals, g/day | 225.3 (72.2) | 220.6 (72.0) | 210.6 (74.0) | 205.9 (62.4) | 203.0 (60.4) | 214.7 (69.9) | **<0.001** |
| Fruits, g/day | 318.0 (121.2) | 381.3 (138.0) | 404.6 (149.9) | 424.8 (148.0) | 450.3 (148.7) | 386.2 (147.3) | **<0.001** |
| Vegetables, g/day | 279.8 (87.0) | 323.4 (95.7) | 351.1 (101.6) | 365.9 (109.1) | 392.4 (113.3) | 334.5 (107.3) | **<0.001** |
| Legumes, g/day | 19.2 (7.0) | 21.2 (7.9) | 22.6 (9.5) | 23.1 (9.8) | 24.8 (10.3) | 21.8 (9.0) | **<0.001** |
| Nuts, g/day | 11.0 (11.2) | 13.8 (12.8) | 15.1 (13.2) | 16.3 (14.1) | 16.9 (13.3) | 14.2 (13.0) | **<0.001** |
| Dairy products, g/day | 333.3 (168.0) | 364.9 (173.1) | 377.8 (177.4) | 395.8 (171.5) | 419.1 (185.9) | 372.0 (176.7) | **<0.001** |
| Meat, g/day | 123.3 (40.0) | 124.6 (41.5) | 121.3 (39.8) | 119.6 (37.9) | 117.4 (40.1) | 121.7 (40.0) | **<0.001** |
| Red meat, g/day | 80.6 (35.6) | 78.9 (36.4) | 74.8 (34.5) | 71.3 (32.1) | 68.0 (34.5) | 75.6 (35.1) | **<0.001** |
| Eggs, g/day | 20.3 (8.6) | 20.6 (7.9) | 19.9 (7.7) | 20.1 (7.3) | 19.8 (7.5) | 20.2 (7.9) | 0.051 |
| Fish, g/day | 95.1 (37.0) | 100.8 (35.8) | 101.5 (36.3) | 105.3 (37.0) | 108.7 (46.2) | 101.3 (38.4) | **<0.001** |
| Olive oil, ml/day | 42.9 (13.5) | 43.4 (13.3) | 41.8 (13.3) | 42.3 (12.6) | 42.2 (12.7) | 42.6 (13.2) | **0.016** |
| Sugar and honey, g/day | 8.3 (11.0) | 7.4 (10.0) | 7.0 (9.5) | 5.9 (8.5) | 4.6 (7.2) | 6.9 (9.6) | **<0.001** |
| Cookies, g/day | 21.8 (21.1) | 21.3 (22.8) | 18.6 (19.4) | 17.5 (19.0) | 13.0 (14.6) | 19.0 (20.2) | **<0.001** |
| Sugar -sweetened beverages, g/day | 52.5 (80.5) | 30.2 (52.7) | 27.8 (49.6) | 24.8 (44.6) | 13.8 (35.7) | 32.5 (59.6) | **<0.001** |
| Coffee and tea, mL/day | 34.8 (41.9) | 32.7 (41.0) | 31.9 (40.6) | 28.4 (38.5) | 32.7 (42.6) | 32.4 (41.0) | **<0.001** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Adherence to MedDiet, points | 6.9 (3.0) | 7.7 (2.8) | 7.8 (2.9) | 8.1 (2.8) | 8.2 (3.0) | 7.6 (2.9) | **<0.001** |

#Dietary intakes measured at baseline

Abbreviations: MedDiet, Mediterranean Diet.

[a]Data are presented as No. (%) or mean (SD) for categorical and continuous variables, respectively.

[b]*P* values for intergroup differences by tertiles of carbohydrate quality index in the overall population were calculated with the Pearson $\chi 2$ test or univariate ANOVA, as appropriate. Significance was set at *P* values less than 0.05 and boldfaced.

**Table S3.- Relationship between quintiles of cumulative average carbohydrate quality index and all-cause and specific-cause mortality in the PREDIMED cohort[a].**

| | Crude incidence rate (95% CI)[b] | No. Deaths (%) | Models | | | |
|---|---|---|---|---|---|---|
| | | | Model 1[c] | Model 2[d] | Model 3[e] | Model 4[f] |
| **All-cause mortality** | | | | | | |
| **Continuous#** (n=7,210) | 10.0 (9.1 to 11.0) | 425 (5.9%) | **0.96 [0.94 to 0.99]** | 0.97 [0.94 to 1.00] | 0.97 [0.94 to 1.00] | 0.98 [0.94 to 1.01] |
| **Quintiles** | | | | | | |
| 1 (n=1,979) | 13.3 (11.4 to 15.7) | 155 (7.8%) | Reference | Reference | Reference | Reference |
| 2 (n=1,456) | 9.3 (7.5 to 11.6) | 80 (5.5%) | **0.71 [0.54 to 0.93]** | **0.74 [0.56 to 0.97]** | **0.74 [0.56 to 0.97]** | 0.76 [0.57 to 1.00] |
| 3 (n=1,513) | 8.1 (6.4 to 10.2) | 73 (4.8%) | **0.65 [0.49 to 0.86]** | **0.69 [0.52 to 0.92]** | **0.69 [0.52 to 0.92]** | **0.71 [0.53 to 0.94]** |
| 4 (n=1,204) | 9.3 (7.3 to 11.8) | 66 (5.5%) | 0.79 [0.59 to 1.06] | 0.83 [0.61 to 1.12] | 0.82 [0.61 to 1.11] | 0.88 [0.64 to 1.20] |
| 5 (n=1,058) | 8.2 (6.3 to 10.9) | 51 (4.8%) | 0.76 [0.54 to 1.05] | 0.81 [0.58 to 1.13] | 0.81 [0.58 to 1.13] | 0.88 [0.62 to 1.24] |
| **P-trend*** | | | 0.054 | 0.132 | 0.130 | 0.317 |
| **CVD mortality** | | | | | | |
| **Continuous#** (n=7,210) | 2.4 (2.0 to 2.9) | 103 (1.4%) | 0.95 [0.89 to 1.02] | 0.97 [0.91 to 1.04] | 0.97 [0.90 to 1.04] | 0.97 [0.90 to 1.03] |
| **Quintiles*** | | | | | | |
| 1 (n=1,979) | 3.5 (2.6 to 4.8) | 41 (2.0%) | Reference | Reference | Reference | Reference |
| 2 (n=1,456) | 2.3 (1.5 to 3.6) | 20 (1.4%) | 0.68 [0.40 to 1.16] | 0.73 [0.43 to 1.26] | 0.70 [0.41 to 1.20] | 0.71 [0.42 to 1.20] |
| 3 (n=1,513) | 1.8 (1.1 to 2.9) | 16 (1.1%) | 0.55 [0.31 to 1.00] | 0.60 [0.33 to 1.11] | 0.58 [0.32 to 1.05] | 0.56 [0.32 to 1.00] |
| 4 (n=1,204) | 1.8 (1.1 to 3.1) | 13 (1.1%) | 0.61 [0.31 to 1.17] | 0.67 [0.35 to 1.30] | 0.65 [0.33 to 1.25] | 0.65 [0.33 to 1.27] |
| 5 (n=1,058) | 2.1 (1.2 to 3.6) | 13 (1.2%) | 0.76 [0.39 to 1.48] | 0.85 [0.43 to 1.72] | 0.86 [0.43 to 1.73] | 0.89 [0.45 to 1.74] |
| **P-trend*** | | | 0.210 | 0.391 | 0.371 | 0.388 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Cancer mortality** | | | | | | |
| **Continuous#** (n=7,210) | 4.0 (3.4 to 4.6) | 169 (2.3%) | **0.93 [0.88 to 0.98]** | **0.94 [0.89 to 0.99]** | **0.93 [0.89 to 0.98]** | **0.94 [0.89 to 0.99]** |
| **Quintiles** | | | | | | |
| 1 (n=1,979) | 5.8 (4.6 to 7.4) | 67 (3.4%) | Reference | Reference | Reference | Reference |
| 2 (n=1,456) | 4.1 (2.9 to 5.7) | 35 (2.4%) | 0.70 [0.46 to 1.07] | 0.72 [0.47 to 1.09] | 0.73 [0.48 to 1.12] | 0.77 [0.50 to 1.18] |
| 3 (n=1,513) | 2.9 (2.0 to 4.2) | 26 (1.7%) | **0.51 [0.32 to 0.82]** | **0.54 [0.34 to 0.85]** | **0.54 [0.34 to 0.86]** | **0.55 [0.34 to 0.90]** |
| 4 (n=1,204) | 3.6 (2.5 to 5.4) | 26 (2.2%) | 0.70 [0.44 to 1.13] | 0.75 [0.47 to 1.21] | 0.77 [0.48 to 1.23] | 0.82 [0.50 to 1.34] |
| 5 (n=1,058) | 2.4 (1.5 to 4.0) | 15 (1.4%) | 0.49 [0.28 to 0.87] | 0.52 [0.29 to 0.91] | 0.52 [0.29 to 0.92] | 0.54 [0.30 to 0.98] |
| **P-trend*** | | | **0.008** | **0.016** | **0.018** | **0.040** |
| **Other-causes of mortality** | | | | | | |
| **Continuous#** (n=7,210) | 3.6 (3.1 to 4.2) | 153 (2.1%) | 1.02 [0.96 to 1.07] | 1.01 [0.96 to 1.07] | 1.01 [0.96 to 1.07] | 1.03 [0.97 to 1.09] |
| **Quintiles** | | | | | | |
| 1 (n=1,979) | 4.1 (3.1 to 5.4) | 47 (2.4%) | Reference | Reference | Reference | Reference |
| 2 (n=1,456) | 2.9 (2.0 to 4.3) | 25 (1.7%) | 0.76 [0.47 to 1.24] | 0.78 [0.47 to 1.27] | 0.77 [0.47 to 1.27] | 0.80 [0.48 to 1.32] |
| 3 (n=1,513) | 3.4 (2.4 to 4.9) | 31 (2.1%) | 0.94 [0.60 to 1.50] | 1.01 [0.63 to 1.61] | 1.01 [0.63 to 1.60] | 1.08 [0.67 to 1.74] |
| 4 (n=1,204) | 3.8 (2.6 to 5.5) | 27 (2.2%) | 1.08 [0.66 to 1.78] | 1.07 [0.64 to 1.79] | 1.07 [0.64 to 1.78] | 1.19 [0.71 to 2.00] |
| 5 (n=1,058) | 3.7 (2.5 to 5.6) | 23 (2.2%) | 1.18 [0.71 to 1.97] | 1.22 [0.72 to 2.08] | 1.22 [0.72 to 2.08] | 1.45 [0.82 to 2.57] |
| **P-trend*** | | | 0.481 | 0.430 | 0.431 | 0.187 |

Abbreviations: CI – confidence interval, CQI – carbohydrate quality index, CVD = Cardiovascular Disease, PREDIMED = Prevención con Dieta Mediterránea.

#Cox Regression calculated per unit increase in CQI score with a posible score range of 4-20

*Tests of linear trend were applied for the evaluation of dose–response relationships across quintiles, assigning to each category of the total intake its quintile-specific median and using the resulting variable as continuous.

[a]Multivariable regression Cox models stratified by recruiting centre with robust standard errors to account for small deviations from individual randomization. Results are expressed as Hazard Ratios (HR) and 95% Confidence Intervals (95% CI). Cumulative average carbohydrate quality index was treated as a continuous or categorical variable by quintiles. Extremes of total energy intake (≥4000 or <800 kcal/day in men and ≥3500 or in women) were excluded. Significance was set at *P* values less than 0.05 and boldfaced. The exposure as continuous is presented per 1 unit increase.

[b]Crude incidence rate is expressed per 1000 person-years.

[c]Model 1: adjusted for age (years), sex (male or female), intervention group (control, Mediterranean diet + extra virgin olive oil, Mediterranean diet + nuts).

[d]Model 2: additionally adjusted for educational level (primary education or less, secondary education, or college/graduate), baseline physical activity (metabolic equivalent task units in min/day), smoking status (never, current, or former), cumulative average dietary alcohol intake (using the linear term and adding a quadratic term, g/day), baseline body mass index (kg/m$^2$), prevalent type 2 diabetes (yes or no) or medication (yes or no), prevalent hypertension (yes or no) or medication (yes or no), prevalent hypercholesterolemia (yes or no) or medication (yes or no).

[e]Model 3: additionally adjusted for cumulative average dietary energy intake (kcal/day).

[f]Model 4: additionally adjusted for cumulative average dietary protein intake (g/day), dietary saturated fatty acids intake (g/day), dietary monounsaturated fatty acids intake (g/day), and dietary polyunsaturated fatty acids intake (g/day). In the case of CVD and cancer mortality, family history of such diseases were included as covariates.

**Table S4.- Sensitivity analysis for the relationship between cumulative average carbohydrate quality index and all-cause and specific-**

**cause mortality after excluding early cases of mortality in the PREDIMED cohort[a].**

| | No. Deaths (%) | Models | | | |
|---|---|---|---|---|---|
| | | Model 1[b] | Model 2[c] | Model 3[d] | Model 4[e] |
| **All-cause mortality** | | | | | |
| **Continuous#** (n=7,179) | 394 (5.5%) | 0.97 [0.93 to 1.00] | 0.97 [0.94 to 1.01] | 0.97 [0.94 to 1.01] | 0.983 [0.95 to 1.01] |
| **Category*** | | | | | |
| High (n=5,217) | 256 (4.9%) | Reference | Reference | Reference | Reference |
| Low (n=1,962) | 138 (7.0%) | **1.33 [1.07 to 1.65]** | **1.26 [1.01 to 1.57]** | **1.26 [1.02 to 1.57]** | 1.23 [0.98 to 1.54] |
| **P-trend**** | | 0.061 | 0.110 | 0.124 | 0.271 |
| **CVD mortality** | | | | | |
| **Continuous#** (n=7,179) | 94 (1.3%) | 0.93 [0.87 to 1.00] | 0.95 [0.88 to 1.02] | 0.95 [0.88 to 1.02] | 0.94 [0.88 to 1.01] |
| **Category*** | | | | | |
| High (n=5,217) | 55 (1.1%) | Reference | Reference | Reference | Reference |
| Low (n=1,962) | 39 (2.0%) | **1.71 [1.11 to 2.64]** | **1.56 [1.00 to 2.45]** | **1.61 [1.03 to 2.51]** | **1.62 [1.06 to 2.47]** |
| **P-trend**** | | 0.070 | 0.156 | 0.131 | 0.141 |
| **Cancer mortality** | | | | | |
| **Continuous#** (n=7,179) | 157 (2.2%) | **0.94 [0.89 to 0.99]** | 0.95 [0.90 to 1.00] | 0.95 [0.91 to 1.00] | 0.95 [0.90 to 1.01] |
| **Category*** | | | | | |
| High (n=5,217) | 99 (1.9%) | Reference | Reference | Reference | Reference |
| Low (n=1,962) | 58 (3.0%) | **1.46 [1.04 to 2.06]** | 1.40 [0.99 to 1.97] | 1.38 [0.98 to 1.95] | 1.34 [0.92 to 1.93] |
| **P-trend**** | | 0.313 | 0.382 | 0.431 | 0.570 |
| **Other causes of mortality** | | | | | |
| **Continuous#** (n=7,179) | 143 (2.0%) | 1.02 [0.96 to 1.07] | 1.02 [0.96 to 1.08] | 1.02 [0.96 to 1.08] | 1.03 [0.97 to 1.09] |
| **Category*** | | | | | |
| High (n=5,217) | 102 (2.0%) | Reference | Reference | Reference | Reference |
| Low (n=1,962) | 41 (2.1%) | 0.96 [0.66 to 1.40] | 0.94 [0.64 to 1.37] | 0.94 [0.64 to 1.38] | 0.89 [0.60 to 1.32] |
| **P-trend**** | | 0.598 | 0.751 | 0.796 | 0.904 |

Abbreviations: CI – confidence interval, CQI – carbohydrate quality index, CVD = Cardiovascular Disease, PREDIMED = Prevención con Dieta Mediterránea.

#Regression Cox calculated per unit increase in CQI score with a posible score range of 4-20

*Cumulative average carbohydrate quality index treated as a categorical variable by low intake (lowest quintile) vs. high intake (the four upper quintiles merged, as a reference category).

**Tests of linear trend were applied for the evaluation of dose–response relationships across quintiles, assigning to each category of the total intake its quintile-specific median and using the resulting variable as continuous.

[a]Multivariable regression Cox models stratified by recruiting centre with robust standard errors to account for small deviations from individual randomization. Results are expressed as Hazard Ratios (HR) and 95% Confidence Intervals (95% CI).

Extremes of total energy intake (≥4000 or <800 kcal/day in men and ≥3500 or in women) were excluded. Significance was set at *P* values less than 0.05 and boldfaced. The exposure as continuous is presented per 1 unit increase.

[b]Model 1: adjusted for age (years), sex (male or female), intervention group (control, Mediterranean diet + extra virgin olive oil, Mediterranean diet + nuts).

[c]Model 2: additionally adjusted for educational level (primary education or less, secondary education, or college/graduate), baseline physical activity (metabolic equivalent task units in min/day), smoking status (never, current, or former), cumulative average dietary alcohol intake (using the linear term and adding a quadratic term, g/day), baseline body mass index ($kg/m^2$), prevalent type 2 diabetes (yes or no) or medication (yes or no), prevalent hypertension (yes or no) or medication (yes or no), prevalent hypercholesterolemia (yes or no) or medication (yes or no).

[d]Model 3: additionally adjusted for cumulative average dietary energy intake (kcal/day).

[e]Model 4: additionally adjusted for cumulative average dietary protein intake (g/day), dietary saturated fatty acids intake (g/day), dietary monounsaturated fatty acids intake (g/day), and dietary polyunsaturated fatty acids intake (g/day). In the case of CVD and cancer mortality, family history of such diseases were included as covariates.

**Table S5.- Relationship between baseline carbohydrate quality index and all-cause and specific-cause mortality in the PREDIMED cohort[a].**

| | No. Deaths (%) | Models | | | |
|---|---|---|---|---|---|
| | | Model 1[b] | Model 2[c] | Model 3[d] | Model 4[e] |
| **All-cause mortality** | | | | | |
| **Continuous#** (n=7,210) | 425 (5.9%) | **0.96 [0.93 to 0.99]** | 0.97 [0.93 to 1.00] | 0.97 [0.93 to 1.00] | 0.97 [0.94 to 1.00] |
| **Category*** | | | | | |
| High (n=5,026) | 265 (5.3%) | Reference | Reference | Reference | Reference |
| Low (n=2,184) | 160 (7.3%) | **1.23 [1.00 to 1.52]** | 1.20 [0.97 to 1.48] | 1.20 [0.98 to 1.48] | 1.18 [0.95 to 1.45] |
| **P-trend**** | | **0.043** | 0.070 | 0.068 | 0.116 |
| **CVD mortality** | | | | | |
| **Continuous#** (n=7,210) | 103 (1.4%) | 0.95 [0.89 to 1.02] | 0.97 [0.90 to 1.03] | 0.96 [0.90 to 1.03] | 0.96 [0.90 to 1.03] |
| **Category*** | | | | | |
| High (n=5,026) | 60 (1.2%) | Reference | Reference | Reference | Reference |
| Low (n=2,184) | 43 (2.0%) | 1.46 [0.97 to 2.19] | 1.36 [0.90 to 2.07] | 1.40 [0.92 to 2.13] | 1.43 [0.95 to 2.16] |
| **P-trend**** | | 0.152 | 0.273 | 0.252 | 0.231 |
| **Cancer mortality** | | | | | |
| **Continuous#** (n=7,210) | 169 (2.3%) | 0.95 [0.89 to 1.00] | 0.95 [0.90 to 1.00] | 0.95 [0.90 to 1.00] | 0.95 [0.90 to 1.01] |
| **Category*** | | | | | |
| High (n=5,026) | 100 (2.0%) | Reference | Reference | Reference | Reference |
| Low (n=2,184) | 69 (3.2%) | 1.37 [0.99 to 1.91] | 1.35 [0.97 to 1.87] | 1.33 [0.96 to 1.85] | 1.30 [0.93 to 1.83] |
| **P-trend**** | | 0.069 | 0.086 | 0.091 | 0.122 |
| **Other causes of mortality** | | | | | |
| **Continuous#** (n=7,210) | 153 (2.1%) | 0.99 [0.93 to 1.04] | 0.99 [0.93 to 1.04] | 0.99 [0.93 to 1.04] | 0.99 [0.94 to 1.05] |
| **Category*** | | | | | |
| High (n=5,026) | 105 (2.1%) | Reference | Reference | Reference | Reference |
| Low (n=2,184) | 48 (2.2%) | 0.95 [0.65 to 1.37] | 0.95 [0.66 to 1.37] | 0.95 [0.65 to 1.37] | 0.91 [0.63 to 1.32] |
| **P-trend**** | | 0.840 | 0.787 | 0.785 | 0.998 |

Abbreviations: CI – confidence interval, CQI – carbohydrate quality index, CVD = Cardiovascular Disease, PREDIMED = Prevención con Dieta Mediterránea.

#Regression Cox calculated per unit increase in CQI score with a posible score range of 4-20

*Baseline carbohydrate quality index treated as a categorical variable by low intake (lowest quintile) vs. high intake (the four upper quintiles merged, as a reference category).

**Tests of linear trend were applied for the evaluation of dose–response relationships across quintiles, assigning to each category of the total intake its quintile-specific median and using the resulting variable as continuous.

[a]Multivariable regression Cox models stratified by recruiting centre with robust standard errors to account for small deviations from individual randomization. Results are expressed as Hazard Ratios (HR) and 95% Confidence Intervals (95% CI).
Extremes of total energy intake (≥4000 or <800 kcal/day in men and ≥3500 or in women) were excluded. Significance was set at *P* values less than 0.05 and boldfaced. The exposure as continuous is presented per 1 unit increase.
[b]Model 1: adjusted for age (years), sex (male or female), intervention group (control, Mediterranean diet + extra virgin olive oil, Mediterranean diet + nuts).
[c]Model 2: additionally adjusted for educational level (primary education or less, secondary education, or college/graduate), baseline physical activity (metabolic equivalent task units in min/day), smoking status (never, current, or former), baseline dietary alcohol intake (using the linear term and adding a quadratic term, g/day), baseline body mass index ($kg/m^2$), prevalent type 2 diabetes (yes or no) or medication (yes or no), prevalent hypertension (yes or no) or medication (yes or no), prevalent hypercholesterolemia (yes or no) or medication (yes or no).
[d]Model 3: additionally adjusted for baseline dietary energy intake (kcal/day).
[e]Model 4: additionally adjusted for baseline dietary protein intake (g/day), dietary saturated fatty acids intake (g/day), dietary monounsaturated fatty acids intake (g/day), and dietary polyunsaturated fatty acids intake (g/day). In the case of CVD and cancer mortality, family history of such diseases were included as covariates.

**Table S6.- Relationship between cumulative average dietary glycemic index and all-cause and specific-cause mortality in the PREDIMED cohort[a].**

| | No. Deaths (%) | Models |
|---|---|---|

| | | Model 1[b] | Model 2[c] | Model 3[d] | Model 4[e] |
|---|---|---|---|---|---|
| **All-cause mortality** | | | | | |
| **Continuous#** (n=7,210) | 425 (5.9%) | 0.99 [0.86 to 1.14] | 0.99 [0.86 to 1.14] | 0.99 [0.86 to 1.14] | 0.99 [0.86 to 1.14] |
| **Category*** | | | | | |
| High (n=5,768) | 348 (6.0%) | Reference | Reference | Reference | Reference |
| Low (n=1,442) | 77 (5.3%) | 1.15 [0.89 to 1.49] | 1.10 [0.85 to 1.43] | 1.11 [0.86 to 1.44] | 1.02 [0.79 to 1.33] |
| **P-trend**** | | 0.721 | 0.814 | 0.737 | 0.842 |
| **CVD mortality** | | | | | |
| **Continuous#** (n=7,210) | 103 (1.4%) | 1.07 [0.77 to 1.49] | 1.07 [0.77 to 1.49] | 1.07 [0.77 to 1.49] | 1.07 [0.77 to 1.49] |
| **Category*** | | | | | |
| High (n=5,768) | 85 (1.5%) | Reference | Reference | Reference | Reference |
| Low (n=1,442) | 18 (1.2%) | 1.06 [0.63 to 1.78] | 0.97 [0.57 to 1.66] | 1.09 [0.63 to 1.88] | 0.89 [0.53 to 1.50] |
| **P-trend**** | | 0.273 | 0.270 | 0.579 | 0.148 |
| **Cancer mortality** | | | | | |
| **Continuous#** (n=7,210) | 169 (2.3%) | 0.98 [0.78 to 1.22] | 0.98 [0.78 to 1.22] | 0.98 [0.78 to 1.22] | 0.98 [0.78 to 1.22] |
| **Category*** | | | | | |
| High (n=5,768) | 141 (2.4%) | Reference | Reference | Reference | Reference |
| Low (n=1,442) | 28 (1.9%) | 1.08 [0.71 to 1.66] | 1.05 [0.68 to 1.61] | 0.98 [0.64 to 1.49] | 0.97 [0.62 to 1.50] |
| **P-trend**** | | 0.837 | 0.921 | 0.728 | 0.944 |
| **Other causes of mortality** | | | | | |
| **Continuous#** (n=7,210) | 153 (2.1%) | 0.95 [0.77 to 1.18] | 0.95 [0.77 to 1.18] | 0.95 [0.77 to 1.18] | 0.95 [0.77 to 1.18] |
| **Category*** | | | | | |
| High (n=5,768) | 122 (2.1%) | Reference | Reference | Reference | Reference |
| Low (n=1,442) | 31 (2.1%) | 1.29 [0.85 to 1.94] | 1.23 [0.82 to 1.86] | 1.24 [0.82 to 1.88] | 1.21 [0.80 to 1.83] |
| **P-trend**** | | 0.190 | 0.206 | 0.185 | 0.158 |

Abbreviations: CI – confidence interval, CQI – carbohydrate quality index, CVD = Cardiovascular Disease, PREDIMED = Prevención con Dieta Mediterránea.

#Regression Cox calculated per 5 units increase in glycemic index

*Cumulative average dietary glycemic index treated as a categorical variable by low intake (lowest quintile) vs. high intake (the four upper quintiles merged, as a reference category).

**Tests of linear trend were applied for the evaluation of dose–response relationships across quintiles, assigning to each category of the total intake its quintile-specific median and using the resulting variable as continuous.

[a]Multivariable regression Cox models stratified by recruiting centre with robust standard errors to account for small deviations from individual

randomization. Results are expressed as Hazard Ratios (HR) and 95% Confidence Intervals (95% CI). Cumulative average dietary glycemic index was treated as a continuous or categorical variable by tertiles. Extremes of total energy intake (≥4000 or <800 kcal/day in men and ≥3500 or in women) were excluded. Significance was set at *P* values less than 0.05 and boldfaced.

[b]Model 1: adjusted for age (years), sex (male or female), intervention group (control, Mediterranean diet + extra virgin olive oil, Mediterranean diet + nuts).

[c]Model 2: additionally adjusted for educational level (primary education or less, secondary education, or college/graduate), baseline physical activity (metabolic equivalent task units in min/day), smoking status (never, current, or former), cumulative average dietary alcohol intake (using the linear term and adding a quadratic term, g/day), baseline body mass index (kg/m$^2$), prevalent type 2 diabetes (yes or no) or medication (yes or no), prevalent hypertension (yes or no) or medication (yes or no), prevalent hypercholesterolemia (yes or no) or medication (yes or no).

[d]Model 3: additionally adjusted for cumulative average dietary energy intake (kcal/day).

[e]Model 4: additionally adjusted for cumulative average dietary protein intake (g/day), dietary saturated fatty acids intake (g/day), dietary monounsaturated fatty acids intake (g/day), and dietary polyunsaturated fatty acids intake (g/day). In the case of CVD and cancer mortality, family history of such diseases were included as covariates.

**Table S7.- Relationship between cumulative average dietary fibre and all-cause and specific-cause mortality in the PREDIMED cohort[a].**

| | No. Deaths (%) | Models | | | |
|---|---|---|---|---|---|
| | | Model 1[b] | Model 2[c] | Model 3[d] | Model 4[e] |

| | | | | | |
|---|---|---|---|---|---|
| **All-cause mortality** | | | | | |
| **Continuous#** (n=7,210) | 425 (5.9%) | **0.97 [0.95 to 0.99]** | 0.98 [0.96 to 1.01] | 0.97 [0.95 to 1.00] | 0.98 [0.96 to 1.01] |
| **Category*** | | | | | |
| High (n=5,768) | 309 (5.4%) | Reference | Reference | Reference | Reference |
| Low (n=1,442) | 116 (8.0%) | **1.68 [1.32 to 2.12]** | **1.52 [1.19 to 1.93]** | **1.67 [1.30 to 2.16]** | **1.51 [1.16 to 1.97]** |
| **P-trend**** | | **0.001** | **0.001** | **0.001** | **0.002** |
| **CVD mortality** | | | | | |
| **Continuous#** (n=7,210) | 103 (1.4%) | 0.99 [0.95 to 1.03] | 1.00 [0.96 to 1.05] | 0.97 [0.92 to 1.02] | 0.99 [0.94 to 1.03] |
| **Category*** | | | | | |
| High (n=5,768) | 78 (1.4%) | Reference | Reference | Reference | Reference |
| Low (n=1,442) | 25 (1.7%) | 1.23 [0.74 to 2.05] | 1.06 [0.63 to 1.78] | 1.48 [0.86 to 2.56] | 1.23 [0.71 to 2.12] |
| **P-trend**** | | 0.424 | 0.817 | 0.161 | 0.465 |
| **Cancer mortality** | | | | | |
| **Continuous#** (n=7,210) | 169 (2.3%) | **0.95 [0.91 to 0.98]** | **0.96 [0.92 to 0.99]** | 0.96 [0.92 to 1.01] | 0.96 [0.91 to 1.00] |
| **Category*** | | | | | |
| High (n=5,768) | 121 (2.1%) | Reference | Reference | Reference | Reference |
| Low (n=1,442) | 48 (3.3%) | **1.98 [1.37 to 2.85]** | **1.85 [1.28 to 2.67]** | **1.76 [1.17 to 2.64]** | **1.72 [1.13 to 2.62]** |
| **P-trend**** | | **0.001** | **0.001** | **0.006** | **0.012** |
| **Other causes of mortality** | | | | | |
| **Continuous#** (n=7,210) | 153 (2.1%) | 0.99 [0.96 to 1.02] | 1.00 [0.96 to 1.03] | 1.00 [0.96 to 1.03] | 1.01 [0.98 to 1.06] |
| **Category*** | | | | | |
| High (n=5,768) | 110 (1.9%) | Reference | Reference | Reference | Reference |
| Low (n=1,442) | 43 (3.0%) | **1.65 [1.12 to 2.43]** | **1.50 [1.02 to 2.21]** | **1.62 [1.08 to 2.44]** | 1.43 [0.93 to 2.20] |
| **P-trend**** | | **0.011** | **0.042** | **0.020** | 0.100 |

Abbreviations: CI – confidence interval, CQI – carbohydrate quality index, CVD = Cardiovascular Disease, PREDIMED = Prevención con Dieta Mediterránea.

#Regression Cox calculated per 1 unit increase in dietary fibre

*Cumulative average dietary fibre treated as a categorical variable by low intake (lowest quintile) vs. high intake (the four upper quintiles merged, as a reference category).

**Tests of linear trend were applied for the evaluation of dose–response relationships across quintiles, assigning to each category of the total intake its quintile-specific median and using the resulting variable as continuous.

[a]Multivariable regression Cox models stratified by recruiting centre with robust standard errors to account for small deviations from individual randomization. Results are expressed as Hazard Ratios (HR) and 95% Confidence Intervals (95% CI). Cumulative average dietary fibre was

treated as a continuous or categorical variable by tertiles. Extremes of total energy intake (≥4000 or <800 kcal/day in men and ≥3500 or in women) were excluded. Significance was set at *P* values less than 0.05 and boldfaced. The exposure as continuous is presented per 1 unit increase.

[b]Model 1: adjusted for age (years), sex (male or female), intervention group (control, Mediterranean diet + extra virgin olive oil, Mediterranean diet + nuts).

[c]Model 2: additionally adjusted for educational level (primary education or less, secondary education, or college/graduate), baseline physical activity (metabolic equivalent task units in min/day), smoking status (never, current, or former), cumulative average dietary alcohol intake (using the linear term and adding a quadratic term, g/day), baseline body mass index (kg/m$^2$), prevalent type 2 diabetes (yes or no) or medication (yes or no), prevalent hypertension (yes or no) or medication (yes or no), prevalent hypercholesterolemia (yes or no) or medication (yes or no).

[d]Model 3: additionally adjusted for cumulative average dietary energy intake (kcal/day).

[e]Model 4: additionally adjusted for cumulative average dietary protein intake (g/day), dietary saturated fatty acids intake (g/day), dietary monounsaturated fatty acids intake (g/day), and dietary polyunsaturated fatty acids intake (g/day). In the case of CVD and cancer mortality, family history of such diseases were included as covariates.

**Table S8.- Relationship between cumulative average whole-grain-to-total grain ratio and all-cause and specific-cause mortality in the PREDIMED cohort[a].**

| No. Deaths (%) | Models | | | |
|---|---|---|---|---|
| | Model 1[b] | Model 2[c] | Model 3[d] | Model 4[e] |
| **All-cause mortality** | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Category*** | | | | | |
| High (n=4,138) | 179 (4.3%) | Reference | Reference | Reference | Reference |
| Low (n=3,072) | 246 (8.0%) | **1.68 [1.36 to 2.06]** | **1.60 [1.29 to 1.97]** | **1.59 [1.29 to 1.97]** | **1.53 [1.24 to 1.90]** |
| **P-trend**** | | 0.236 | 0.387 | 0.406 | 0.604 |
| **CVD mortality** | | | | | |
| **Category*** | | | | | |
| High (n=4,138) | 43 (1.0%) | Reference | Reference | Reference | Reference |
| Low (n=3,072) | 60 (2.0%) | **1.75 [1.14 to 2.68]** | **1.64 [1.06 to 2.54]** | **1.59 [1.02 to 2.47]** | 1.51 [0.97 to 2.36] |
| **P-trend**** | | 0.858 | 0.915 | 0.710 | 0.666 |
| **Cancer mortality** | | | | | |
| **Category*** | | | | | |
| High (n=4,138) | 68 (1.6%) | Reference | Reference | Reference | Reference |
| Low (n=3,072) | 101 (3.3%) | **1.83 [1.31 to 2.55]** | **1.74 [1.25 to 2.43]** | **1.76 [1.26 to 2.45]** | **1.71 [1.22 to 2.40]** |
| **P-trend**** | | 0.242 | 0.352 | 0.283 | 0.377 |
| **Other causes of mortality** | | | | | |
| **Category*** | | | | | |
| High (n=4,138) | 68 (1.6%) | Reference | Reference | Reference | Reference |
| Low (n=3,072) | 85 (2.8%) | **1.47 [1.04 to 2.06]** | **1.42 [1.00 to 2.01]** | **1.42 [1.00 to 2.01]** | 1.34 [0.93 to 1.93] |
| **P-trend**** | | 0.551 | 0.598 | 0.603 | 0.808 |

Abbreviations: CI – confidence interval, CQI – carbohydrate quality index, CVD = Cardiovascular Disease, PREDIMED = Prevención con Dieta Mediterránea.

*Cumulative average whole-grain-to-total grain ratio treated as a categorical variable by low intake (lowest quintile) vs. high intake (the four upper quintiles merged, as a reference category).

**Tests of linear trend were applied for the evaluation of dose–response relationships across quintiles, assigning to each category of the total intake its quintile-specific median and using the resulting variable as continuous.

[a]Multivariable regression Cox models stratified by recruiting centre with robust standard errors to account for small deviations from individual randomization. Results are expressed as Hazard Ratios (HR) and 95% Confidence Intervals (95% CI). Cumulative average whole-grain-to-total grain ratio was treated as a categorical variable by tertiles. Extremes of total energy intake (≥4000 or <800 kcal/day in men and ≥3500 or in women) were excluded. Significance was set at *P* values less than 0.05 and boldfaced.

[b]Model 1: adjusted for age (years), sex (male or female), intervention group (control, Mediterranean diet + extra virgin olive oil, Mediterranean diet + nuts).

[c]Model 2: additionally adjusted for educational level (primary education or less, secondary education, or college/graduate), baseline physical activity (metabolic equivalent task units in min/day), smoking status (never, current, or former), cumulative average dietary alcohol intake (using

the linear term and adding a quadratic term, g/day), baseline body mass index (kg/m$^2$), prevalent type 2 diabetes (yes or no) or medication (yes or no), prevalent hypertension (yes or no) or medication (yes or no), prevalent hypercholesterolemia (yes or no) or medication (yes or no).
[d]Model 3: additionally adjusted for cumulative average dietary energy intake (kcal/day).
[e]Model 4: additionally adjusted for cumulative average dietary protein intake (g/day), dietary saturated fatty acids intake (g/day), dietary monounsaturated fatty acids intake (g/day), and dietary polyunsaturated fatty acids intake (g/day). In the case of CVD and cancer mortality, family history of such diseases were included as covariates.

**Table S9.- Relationship between cumulative average solid- to-all carbohydrates ratio and all-cause and specific-cause mortality in the PREDIMED cohort[a].**

| | No. Deaths (%) | Models | | | |
|---|---|---|---|---|---|
| | | Model 1[b] | Model 2[c] | Model 3[d] | Model 4[e] |
| **All-cause mortality** | | | | | |
| **Category*** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| High (n=5,745) | 320 (5.6%) | Reference | Reference | Reference | Reference |
| Low (n=1,434) | 74 (5.2%) | 1.09 [0.85 to 1.40] | 1.12 [0.87 to 1.44] | 1.12 [0.87 to 1.44] | 1.07 [0.83 to 1.38] |
| **P-trend**** | | 0.936 | 0.894 | 0.914 | 0.914 |
| **CVD mortality** | | | | | |
| **Category*** | | | | | |
| High (n=5,745) | 78 (1.4%) | Reference | Reference | Reference | Reference |
| Low (n=1,434) | 16 (1.1%) | 0.86 [0.51 to 1.44] | 0.84 [0.50 to 1.40] | 0.81 [0.49 to 1.34] | 0.75 [0.44 to 1.28] |
| **P-trend**** | | 0.344 | 0.303 | 0.220 | 0.179 |
| **Cancer mortality** | | | | | |
| **Category*** | | | | | |
| High (n=5,745) | 120 (2.1%) | Reference | Reference | Reference | Reference |
| Low (n=1,434) | 37 (2.6%) | **1.56 [1.09 to 2.24]** | **1.58 [1.09 to 2.29]** | **1.60 [1.10 to 2.32]** | **1.51 [1.03 to 2.21]** |
| **P-trend**** | | 0.055 | 0.051 | **0.039** | 0.065 |
| **Other causes of mortality** | | | | | |
| **Category*** | | | | | |
| High (n=5,745) | 122 (2.1%) | Reference | Reference | Reference | Reference |
| Low (n=1,434) | 21 (1.5%) | 0.79 [0.49 to 1.26] | 0.87 [0.54 to 1.40] | 0.87 [0.54 to 1.40] | 0.84 [0.52 to 1.35] |
| **P-trend**** | | 0.142 | 0.305 | 0.293 | 0.246 |

Abbreviations: CI – confidence interval, CQI – carbohydrate quality index, CVD = Cardiovascular Disease, PREDIMED = Prevención con Dieta Mediterránea.

*Cumulative average solid- to all- carbohydrates ratio treated as a categorical variable by low intake (lowest quintile) vs. high intake (the four upper quintiles merged, as a reference category).

**Tests of linear trend were applied for the evaluation of dose–response relationships across quintiles, assigning to each category of the total intake its quintile-specific median and using the resulting variable as continuous.

[a]Multivariable regression Cox models stratified by recruiting centre with robust standard errors to account for small deviations from individual randomization. Results are expressed as Hazard Ratios (HR) and 95% Confidence Intervals (95% CI). Cumulative average solid to all carbohydrates ratio was treated as a categorical variable by tertiles. Extremes of total energy intake (>4000 or < 800 kcal/day in men and >3500 or in women) were excluded. Significance was set at *P* values less than 0.05 and boldfaced.

[b]Model 1: adjusted for age (years), sex (male or female), intervention group (control, Mediterranean diet + extra virgin olive oil, Mediterranean diet + nuts).

[c]Model 2: additionally adjusted for educational level (primary education or less, secondary education, or college/graduate), baseline physical activity (metabolic equivalent task units in min/day), smoking status (never, current, or former), cumulative average dietary alcohol intake (using the linear term and adding a quadratic term, g/day), baseline body mass index (kg/m$^2$), prevalent type 2 diabetes (yes or no) or medication (yes

or no), prevalent hypertension (yes or no) or medication (yes or no), prevalent hypercholesterolemia (yes or no) or medication (yes or no).
[d]Model 3: additionally adjusted for cumulative average dietary energy intake (kcal/day).
[e]Model 4: additionally adjusted for cumulative average dietary protein intake (g/day), dietary saturated fatty acids intake (g/day), dietary monounsaturated fatty acids intake (g/day), and dietary polyunsaturated fatty acids intake (g/day). In the case of CVD and cancer mortality, family history of such diseases were included as covariates.

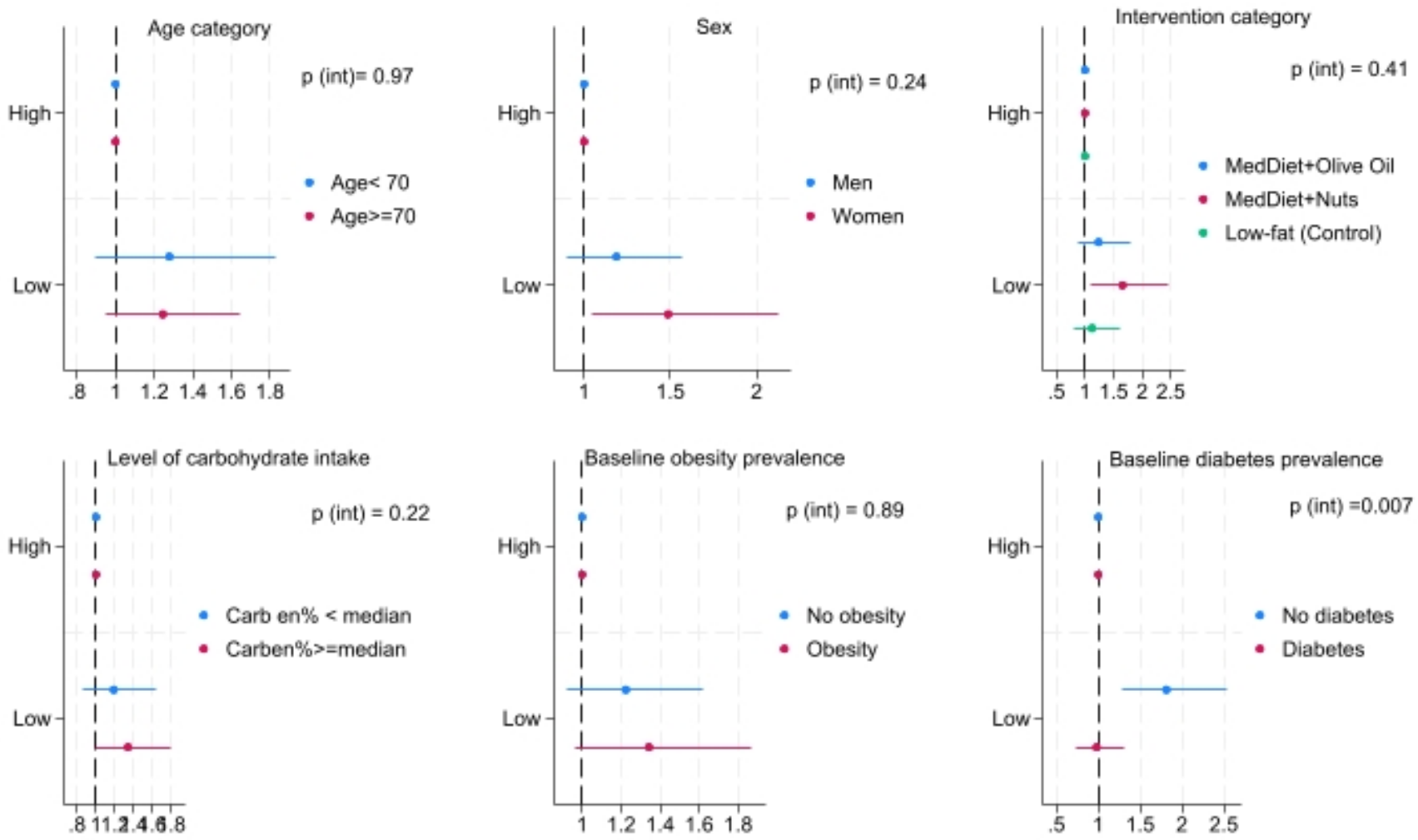


**Figure S1.-** Interaction for carbohydrate quality index and baseline the variables of the study.