

## **Supplementary Materials**

### **Associations of dietary diversity and inflammatory diet with sarcopenia and its components: findings from a nationwide cross-sectional study**

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### **The definition of sarcopenia's components**

An equation calculated RALM:  $\text{RALM (kg/m}^2\text{)} = [(0.958 \times [\text{appendicular fat-free mass (kg)}] - (0.166 \times G) - 0.308)]/\text{height}^2$  [1]. In this formula, appendicular fat-free mass was measured using a Tanita BC-418MA body composition bioimpedance analyzer, with a G value of 0 in the case of females and 1 in the case of males, and height referred to standing height. Following the EWGSOP2 cut-off points, low RALM was defined as 5.5 kg/m<sup>2</sup> for females and less than 7.0 kg/m<sup>2</sup> for males.

Jamar hydraulic hand dynamometers were used as hand grip strength measurements. Both the left and right hands were measured (in kg), and the larger grip strength value was used to define low hand grip strength. The thresholds of low hand grip strength for different genders are as follows: <27 kg among males and <16 kg among females. Participants who could not complete grip strength measurement (mainly because of disease reasons: stroke, arthritis, or other health issues) in either hand were also considered to have low hand grip strength.

In the EWGSOP2, low physical performance was defined by a walking pace <0.8 meters per second. In the UK Biobank, walking pace was self-reported and classified into slow (<3 miles per hour), steady/average (3 to 4 miles per hour), and fast (>4 miles per hour). Therefore, we used a walking pace of <3 miles per hour as the criterion for low physical performance (equivalent to <1.3 meters per second) [2].

## **Assessment of dietary diversity score (DDS) based on food frequency questionnaires (FFQ) in UK Biobank**

In UK Biobank, 502,461 participants completed a brief touchscreen food frequency questionnaire (FFQ) with 33 dietary information about beverages, main foods, and food consumed over the previous year at baseline. Among the 502,461 participants, those meeting the following criteria were excluded in this study: whose dietary information was missing or unbelievable, who had withdrawn consent for linkage, who had missing data on key covariates, or who had been diagnosed or taken diabetes related medicines or self-reported diabetes. The remaining 304,723 participants were included in the analysis.

DDS was assessed based on FFQ, related to 15 major food groups: processed meat, beef, mutton, pork, poultry, oily fish, non-oily fish, cheese, milk, cereal, bread, cooked vegetables, raw vegetables, fresh fruits, and dried fruits. Participants were asked how often processed meat, beef, mutton, pork, poultry, oily fish, non-oily fish, and cheese were consumed with eight choices: “never eaten”, “<1 time a week”, “1 time a week”, “2-4 times a week”, “5-6 times a week”, “ $\geq 1$  time daily”, “do not know”, and “prefer not to answer”. For cereal, bread, cooked vegetables, raw vegetables, fresh fruit, and dried fruit, participants answered the integer number of bowls/slices/heaped tablespoons/pieces of each item. The participants also had three other options to select: “less than one”, “do not know”, or “prefer not to answer”. Responses of “do not know”

or “prefer not to answer” for a specific dietary item were converted into missing values. Consumption of any food group without considering a minimum amount was categorized as one point. We consider that a person's normal diet is impossible to eat nothing for a day, the DDS ranges from 1 – 15. A higher DDS score reflects a richer diet and vice versa. We divided DDS score into three categories: low DDS (ranges 1 – 5), medium DDS (ranges 6 – 10), and high DDS (ranges 11 – 15) and the reference group was set as the participants with the low DDS category.

### **Assessment of alcohol consumption and physical activity**

**Alcohol consumption:** In the current analysis, alcohol intake (g/week) was calculated by the quantity of each type of drink (red wine, white wine, beer/cider, fortified wine, and spirits) multiplied by its standard drink size and reference alcohol content [1 drink-equivalent described as containing 8 g of pure alcohol; 125 mL wine (red or white) = 1.6 unit-equivalents, 1 pint of beer (586 mL) = 2.6 unit-equivalents, 25mL spirits = 1 unit-equivalent, 62.5 mL fortified wine = 1 unit-equivalent] [3].

**Physical activity:** Physical activity (PA) was ascertained with the International Physical Activity Questionnaire (IPAQ) [4], which includes six questions about duration and frequency of walking, moderate-intensity and vigorous-intensity exercise undergone in the last 4 weeks [4]. Each intensity was assigned a corresponding metabolic equivalent of task (METs): 3.3 for walking, 4.0 for moderate PA, and 8.0 for vigorous PA. MET is an objective measurement of the ratio of energy expenditure rate

to an individual's mass (1 MET = 1kilocalorie per hour per kilogram of bodyweight) [5]. We then quantified PA of each participant by calculating hours of MET each week (MET-hour/week) based on the reported intensity, duration, and frequency of PA in 1 week [6].

**Table S1** Distribution of baseline characteristics of participants before and after excluding from analyses <sup>a</sup>

| Characteristics                           | Before excluding<br>(n = 211,025) | After excluding<br>(n = 155,669) |
|---|-----------------------------------|----------------------------------|
| Age, years, mean (SD)                     | 56.1 (8.0)                        | 55.9 (7.9)                       |
| Sex, female                               | 115,867 (55.2)                    | 80,014 (51.4)                    |
| Race, nonwhite                            | 9597 (4.6)                        | 6227 (4.0)                       |
| Residence, rural                          | 33,499 (16.0)                     | 25,063 (16.1)                    |
| Household income                          |                                   |                                  |
| High                                      | 59,483 (28.4)                     | 51,215 (32.9)                    |
| Medium                                    | 99,275 (47.3)                     | 81,726 (52.5)                    |
| Low                                       | 29,165 (13.9)                     | 22,572 (14.5)                    |
| Smoking status                            |                                   |                                  |
| Never                                     | 118,559 (56.5)                    | 87,486 (56.2)                    |
| Previous                                  | 74,242 (35.4)                     | 56,197 (36.1)                    |
| Current                                   | 16,425 (7.8)                      | 11,987 (7.7)                     |
| Alcohol consumption,<br>g/week, mean (SD) | 110.5 (97.6)                      | 115.6 (99.9)                     |
| PA, MET (hours/week),<br>mean (SD)        | 41.6 (37.8)                       | 40.9 (40.2)                      |
| BMI (kg/m <sup>2</sup> ), mean (SD)       | 26.1 (4.7)                        | 26.9 (4.5)                       |
| Energy intake, kcal/day,                  | 2119.3 (739.5)                    | 2089.2 (617.4)                   |

mean (SD)

|                          |                |               |
|--------------------------|----------------|---------------|
| Dietary supplement       | 100,308 (47.8) | 73,456 (47.2) |
| Diabetes                 | 9074 (4.3)     | 6345 (4.1)    |
| CVD                      | 8675 (4.1)     | 6694 (4.3)    |
| Cancer                   | 18,311 (8.7)   | 13,232 (8.5)  |
| Hypertension             | 90,380 (43.1)  | 39,540 (25.4) |
| Hyperlipidemia           | 34,188 (16.3)  | 19,147 (12.3) |
| Low muscle strength      | 8543 (4.0)     | 5760 (3.7)    |
| Low muscle mass          | 12,377 (5.9)   | 8717 (5.6)    |
| Low physical performance | 11,135 (5.3)   | 7316 (4.7)    |

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<sup>a</sup> Values are numbers (percentages) unless stated otherwise. Abbreviations: BMI, body mass index; CVD, cardiovascular disease; MET, metabolic equivalent; PA, physical activity; SD, standard deviation.

**Table S2 The Data-Field for the key variables in this analysis**

| Variables                | Data-Field                                 |
|--------------------------|--|
| Age                      | 21022                                      |
| Sex                      | 31   |
| Race                     | 21000                                      |
| Residential area         | 20118                                      |
| Household income         | 738  |
| Smoking status           | 20116                                      |
| Physical activity        | 22032                                      |
| Alcohol consumption      | 100022                                     |
| BMI                      | 21001                                      |
| Energy intake            | 26002                                      |
| Dietary supplement       | 104670, 20084                              |
| Diabetes                 | 130708, 130709, 30750, 2976, 20003         |
| CVD                      | 6150, 3894, 4056, 131368, 42008, 42006     |
| Cancer                   | 2453, 20001-0.0~0.5, 40006-0.0~16.0        |
| Hypertension             | 93-0.0~0.1, 94-0.0~0.1, 6177-0.0~0.2       |
| High cholesterol         | 20002-0.0~0.33, 6153-0.0~0.3, 6177-0.0~0.3 |
| Low muscle strength      | 46, 47                                     |
| Low muscle mass          | 23113, 23117, 23121, 23125, 50             |
| Low physical performance | 924  |

Abbreviations: BMI, body mass index; CVD, cardiovascular disease.

**Table S3** Food items and mixed dishes involved in calculating DDS using 24-h dietary recalls information in UK Biobank

| <b>Major food groups</b> | <b>Subgroups</b> | <b>Representative food items and mixed dishes on the 24-h dietary recalls</b>  |
|--------------------------|------------------|--|
| <b>Grain products</b>    | Whole grains     | Porridge, oat crunch, bran cereal, whole-wheat cereal, whole meal sliced bread, whole meal baguette, whole meal bap, whole meal bread roll, crispbread, oat cakes, whole meal pasta, brown rice, couscous, other whole grains  |
|                          | Non-whole grains | Muesli, plain cereal, dried fruit cereal, plain sliced bread, plain baguette, plain bap, plain bread roll, naan bread, garlic bread, other non-whole grain bread, white pasta, white rice, sushi, snack pot, pizza, pancakes, scotch pancakes, Danish pastry, cake, other non-whole grains |
| <b>Vegetables</b>        | Dark green leafy | Spinach, broccoli, watercress, beetroot  |
|                          | Vitamin A-rich   | Carrots, sweet peppers   |

|                                      |                  |   |
|--------------------------------------|------------------|---|
|                                      | Starchy tubers   | Potatoes, boiled potatoes, mashed potatoes, sweet potatoes, butternut squash, sweet corn  |
|                                      | Other            | Vegetable pieces, (mixed) salad, cabbage, cauliflower, celery, courgetti, cucumber, garlic, leeks, lettuce, mushrooms, onions, parsnip, fresh tomatoes, tinned tomatoes, turnip, other vegetables |
| <b>Fruits</b>                        | Citrus           | Grape, oranges, satsuma   |
|                                      | Vitamin A-rich   | Melon, peach  |
|                                      | other            | Mixed fruits, bananas, berry, cherry, grape, mango, pear, pineapple, plum, olives, avocados, other fruits   |
| <b>Meat and protein alternatives</b> | Red meat         | Beef, pork, mutton, burger, bacon, ham, corned beef, sausages, lasagna, meat soup, quiche, savory pies  |
|                                      | Poultry          | Deep fried chicken, chicken, other poultry  |
|                                      | Fish and seafood | Tinned tuna, oily fish, breaded fish, battered fish, white fish, prawns, lobster, shellfish, other fish   |

|                       |                          |  |
|-----------------------|--------------------------|--|
|                       | Organ meat               | Liver, kidney  |
|                       | Eggs                     | Whole eggs, scrambled eggs, eggs in sandwiches, scotch eggs, other eggs  |
|                       | Legumes, nuts, and seeds | Soya dessert, salted peanuts, unsalted peanuts, salted nuts, unsalted nuts, seeds, tofu, baked beans, broad beans, green beans, other beans, peas          |
| <b>Dairy products</b> | Milk                     | Milk (fortified, goat's, sheep's, etc.), added milk to coffee, added milk to tea, ice cream, lasagna, quiche   |
|                       | Yoghurt                  | Yogurt smoothie, flavored milk, ice cream, yogurt (whole milk, low fat)  |
|                       | Cheese                   | Cheese, low fat (spreadable) cheese, hard cheese, soft cheese, blue cheese, spreadable cheese, cottage cheese, feta, mozzarella, goat cheese, other cheese |

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Abbreviation: DDS, dietary diversity score.

**Table S4** Sensitivity analysis of associations of E-DII and DDS with sarcopenia while redefining sarcopenia following the EWGSOP1's recommendations <sup>a</sup>

|                               | Total n/events | Model 1 (ORs, 95% CIs) | Model 2 (ORs, 95% CIs) | Model 3 (ORs, 95% CIs) |
|-------------------------------|----------------|------------------------|------------------------|------------------------|
| <b>E-DII <sup>d</sup></b>     |                |                        |                        |                        |
| Tertile 3 <sup>b</sup>        | 51,890/4436    | 1.00 (Ref)             | 1.00 (Ref)             | 1.00 (Ref)             |
| Tertile 2 <sup>b</sup>        | 51,889/4731    | 0.68 (0.55, 0.85)      | 0.72 (0.69, 0.77)      | 0.73 (0.63, 0.97)      |
| Tertile 1 <sup>b</sup>        | 51,890/5036    | 0.70 (0.58, 0.85)      | 0.70 (0.66, 0.74)      | 0.75 (0.62, 0.90)      |
| Continuous (per SD reduction) | 155,669/14,203 | 0.92 (0.90, 0.93)      | 0.94 (0.93, 0.96)      | 0.96 (0.94, 0.98)      |
| <b>DDS <sup>e</sup></b>       |                |                        |                        |                        |
| Low <sup>c</sup>              | 18,838/1634    | 1.00 (Ref)             | 1.00 (Ref)             | 1.00 (Ref)             |
| Medium <sup>c</sup>           | 95,428/8543    | 0.74 (0.58, 0.95)      | 0.74 (0.70, 0.80)      | 0.85 (0.68, 0.98)      |
| High <sup>c</sup>             | 41,403/4026    | 0.66 (0.50, 0.87)      | 0.73 (0.68, 0.79)      | 0.78 (0.61, 0.89)      |
| Continuous (per SD increment) | 155,669/14,203 | 0.94 (0.92, 0.95)      | 0.95 (0.94, 0.97)      | 0.97 (0.96, 0.99)      |

<sup>a</sup> We defined sarcopenia as having low muscle mass and either low muscle strength or low physical performance following the EWGSOP1's recommendations.

<sup>b</sup> Tertile 1 of E-DII ranged from -5.45 to -0.49, tertile 2 of E-DII ranged from -0.50 to 1.12, and tertile 3 of E-DII ranged from 1.13 to 4.65.

<sup>c</sup> DDS categories [low (1-6), medium (7-12), and high (13-18)] were defined according to practical implications for public health.

<sup>d</sup> ORs (95% CIs) of E-DII with sarcopenia were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 was further adjusted for race, household income, residence, smoking status, alcohol consumption, physical activity, and dietary supplement; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

<sup>e</sup> ORs (95% CIs) of DDS with sarcopenia were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 was further adjusted for race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement, and total calorie intake from diet; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; DDS, dietary diversity score; E-DII, dietary inflammatory index; ORs: odds ratios; Ref, reference; SD, standard deviation.

**Table S5** Sensitivity analysis of associations of E-DII with sarcopenia and its components while excluding 6,336 participants with extreme BMI

(*n* = 149,333) <sup>a</sup>

| Models               | E-DII (ORs, 95% CIs)               |                                   |                                  |                               |
|----------------------|------------------------------------|-----------------------------------|----------------------------------|-------------------------------|
|                      | Tertile 1<br><b>(-5.45, -0.50)</b> | Tertile 2<br><b>(-0.51, 1.13)</b> | Tertile 3<br><b>(1.14, 4.65)</b> | Continuous (per SD reduction) |
| No. of participants  | 49,901                             | 49,953                            | 49,479                           | 149,333                       |
| Sarcopenia           |                                    |                                   |                                  |                               |
| Cases                | 156                                | 146                               | 194                              | 496                           |
| Model 1 <sup>b</sup> | 0.71 (0.56, 0.89)                  | 0.71 (0.57, 0.88)                 | 1.00 (Ref)                       | 0.85 (0.78, 0.93)             |
| Model 2 <sup>b</sup> | 0.71 (0.53, 0.93)                  | 0.75 (0.59, 0.94)                 | 1.00 (Ref)                       | 0.83 (0.75, 0.91)             |
| Model 3 <sup>b</sup> | 0.76 (0.56, 0.99)                  | 0.80 (0.64, 1.01)                 | 1.00 (Ref)                       | 0.89 (0.81, 0.97)             |
| Low muscle strength  |                                    |                                   |                                  |                               |
| Cases                | 1690                               | 1766                              | 1987                             | 5443                          |

|                          |                   |                   |            |                   |
|--------------------------|-------------------|-------------------|------------|-------------------|
| Model 1 <sup>c</sup>     | 0.78 (0.73, 0.84) | 0.84 (0.78, 0.89) | 1.00 (Ref) | 0.89 (0.87, 0.92) |
| Model 2 <sup>c</sup>     | 0.83 (0.77, 0.90) | 0.88 (0.82, 0.94) | 1.00 (Ref) | 0.92 (0.89, 0.94) |
| Model 3 <sup>c</sup>     | 0.82 (0.76, 0.89) | 0.88 (0.82, 0.94) | 1.00 (Ref) | 0.92 (0.89, 0.94) |
| Low muscle mass          |                   |                   |            |                   |
| Cases                    | 2793              | 3022              | 3112       | 8927              |
| Model 1 <sup>c</sup>     | 0.80 (0.74, 0.87) | 0.93 (0.87, 1.00) | 1.00 (Ref) | 0.86 (0.83, 0.88) |
| Model 2 <sup>c</sup>     | 0.82 (0.77, 0.87) | 0.88 (0.83, 0.94) | 1.00 (Ref) | 0.87 (0.85, 0.90) |
| Model 3 <sup>c</sup>     | 0.89 (0.83, 0.96) | 0.92 (0.87, 0.98) | 1.00 (Ref) | 0.88 (0.86, 0.91) |
| Low physical performance |                   |                   |            |                   |
| Cases                    | 1625              | 1682              | 2379       | 5686              |
| Model 1 <sup>c</sup>     | 0.63 (0.59, 0.67) | 0.66 (0.62, 0.71) | 1.00 (Ref) | 0.79 (0.77, 0.82) |
| Model 2 <sup>c</sup>     | 0.73 (0.68, 0.79) | 0.74 (0.69, 0.79) | 1.00 (Ref) | 0.87 (0.85, 0.90) |
| Model 3 <sup>c</sup>     | 0.75 (0.70, 0.81) | 0.76 (0.71, 0.82) | 1.00 (Ref) | 0.88 (0.86, 0.91) |

<sup>a</sup> Extreme BMI was defined as low ( $<14 \text{ kg/m}^2$ ) or high ( $\geq 36 \text{ kg/m}^2$ ) BMI.

<sup>b</sup> ORs (95% CIs) of E-DII with sarcopenia were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 was further adjusted for race, household income, residence, smoking status, alcohol consumption, physical activity, and dietary supplement; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

<sup>c</sup> ORs (95% CIs) of E-DII with sarcopenia's components were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 was further adjusted for race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement and three components (low muscle strength, low muscle mass, and low physical performance) were mutually adjusted; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; E-DII, dietary inflammatory index; ORs: odds ratios; Ref, reference; SD, standard deviation.

**Table S6** Sensitivity analysis of associations of E-DII with sarcopenia and its components while restricting the analysis to individuals who participated in at least two 24-h dietary surveys ( $n = 96,133$ )

| Models               | E-DII (ORs, 95% CIs)               |                                   |                                  |                               |
|----------------------|------------------------------------|-----------------------------------|----------------------------------|-------------------------------|
|                      | Tertile 1<br><b>(-5.21, -0.50)</b> | Tertile 2<br><b>(-0.51, 1.13)</b> | Tertile 3<br><b>(1.14, 4.52)</b> | Continuous (per SD reduction) |
| No. of participants  | 32,599                             | 34,537                            | 28,997                           | 96,133                        |
| Sarcopenia           |                                    |                                   |                                  |                               |
| Cases                | 93                                 | 95                                | 115                              | 303                           |
| Model 1 <sup>a</sup> | 0.63 (0.47, 0.84)                  | 0.68 (0.51, 0.90)                 | 1.00 (Ref)                       | 0.77 (0.69, 0.87)             |
| Model 2 <sup>a</sup> | 0.66 (0.49, 0.88)                  | 0.70 (0.54, 0.91)                 | 1.00 (Ref)                       | 0.80 (0.71, 0.90)             |
| Model 3 <sup>a</sup> | 0.70 (0.52, 0.94)                  | 0.74 (0.57, 0.96)                 | 1.00 (Ref)                       | 0.83 (0.74, 0.93)             |
| Low muscle strength  |                                    |                                   |                                  |                               |
| Cases                | 1027                               | 1186                              | 1075                             | 3288                          |

|                          |                   |                   |            |                   |
|--------------------------|-------------------|-------------------|------------|-------------------|
| Model 1 <sup>b</sup>     | 0.79 (0.73, 0.87) | 0.88 (0.81, 0.96) | 1.00 (Ref) | 0.90 (0.87, 0.93) |
| Model 2 <sup>b</sup>     | 0.83 (0.76, 0.91) | 0.92 (0.84, 1.00) | 1.00 (Ref) | 0.92 (0.89, 0.95) |
| Model 3 <sup>b</sup>     | 0.83 (0.76, 0.91) | 0.92 (0.84, 1.00) | 1.00 (Ref) | 0.92 (0.89, 0.95) |
| Low muscle mass          |                   |                   |            |                   |
| Cases                    | 1876              | 2139              | 1940       | 5955              |
| Model 1 <sup>b</sup>     | 0.65 (0.60, 0.72) | 0.82 (0.75, 0.90) | 1.00 (Ref) | 0.79 (0.76, 0.82) |
| Model 2 <sup>b</sup>     | 0.90 (0.83, 0.96) | 0.90 (0.84, 0.96) | 1.00 (Ref) | 0.92 (0.89, 0.94) |
| Model 3 <sup>b</sup>     | 0.90 (0.84, 0.97) | 0.90 (0.84, 0.97) | 1.00 (Ref) | 0.92 (0.90, 0.95) |
| Low physical performance |                   |                   |            |                   |
| Cases                    | 1167              | 1268              | 1558       | 3993              |
| Model 1 <sup>b</sup>     | 0.63 (0.58, 0.68) | 0.65 (0.60, 0.70) | 1.00 (Ref) | 0.80 (0.77, 0.83) |
| Model 2 <sup>b</sup>     | 0.73 (0.67, 0.80) | 0.77 (0.63, 0.75) | 1.00 (Ref) | 0.88 (0.85, 0.91) |
| Model 3 <sup>b</sup>     | 0.76 (0.70, 0.83) | 0.78 (0.72, 0.84) | 1.00 (Ref) | 0.88 (0.85, 0.92) |

<sup>a</sup> ORs (95% CIs) of E-DII with sarcopenia were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 was further adjusted for race, household income, residence, smoking status, alcohol consumption, physical activity, and dietary supplement; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

<sup>b</sup> ORs (95% CIs) of E-DII with sarcopenia's components were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 was further adjusted for race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement and three components (low muscle strength, low muscle mass, and low physical performance) were mutually adjusted; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; E-DII, dietary inflammatory index; ORs: odds ratios; Ref, reference; SD, standard deviation.

**Table S7** Sensitivity analysis of associations of E-DII with sarcopenia and its components when all missing covariates were imputed using multiple imputations ( $n = 202,708$ )

| Models               | E-DII (ORs, 95% CIs)               |                                   |                                  |                               |
|----------------------|------------------------------------|-----------------------------------|----------------------------------|-------------------------------|
|                      | Tertile 1<br><b>(-5.44, -0.46)</b> | Tertile 2<br><b>(-0.47, 1.17)</b> | Tertile 3<br><b>(1.18, 4.72)</b> | Continuous (per SD reduction) |
| No. of participants  | 67,569                             | 67,569                            | 67,570                           | 202,708                       |
| Sarcopenia           |                                    |                                   |                                  |                               |
| Cases                | 229                                | 223                               | 278                              | 730                           |
| Model 1 <sup>a</sup> | 0.75 (0.62, 0.90)                  | 0.77 (0.65, 0.92)                 | 1.00 (Ref)                       | 0.85 (0.78, 0.91)             |
| Model 2 <sup>a</sup> | 0.78 (0.65, 0.94)                  | 0.81 (0.68, 0.97)                 | 1.00 (Ref)                       | 0.86 (0.80, 0.93)             |
| Model 3 <sup>a</sup> | 0.80 (0.67, 0.97)                  | 0.84 (0.70, 1.00)                 | 1.00 (Ref)                       | 0.89 (0.82, 0.96)             |
| Low muscle strength  |                                    |                                   |                                  |                               |

|                          |                   |                   |            |                   |
|--------------------------|-------------------|-------------------|------------|-------------------|
| Cases                    | 2514              | 2678              | 3074       | 8266              |
| Model 1 <sup>b</sup>     | 0.77 (0.73, 0.81) | 0.83 (0.79, 0.88) | 1.00 (Ref) | 0.88 (0.86, 0.90) |
| Model 2 <sup>b</sup>     | 0.79 (0.75, 0.84) | 0.87 (0.82, 0.92) | 1.00 (Ref) | 0.90 (0.88, 0.92) |
| Model 3 <sup>b</sup>     | 0.83 (0.78, 0.87) | 0.88 (0.84, 0.93) | 1.00 (Ref) | 0.91 (0.89, 0.93) |
| Low muscle mass          |                   |                   |            |                   |
| Cases                    | 3833              | 4082              | 4180       | 12,095            |
| Model 1 <sup>b</sup>     | 0.90 (0.85, 0.94) | 0.90 (0.85, 0.94) | 1.00 (Ref) | 0.94 (0.92, 0.96) |
| Model 2 <sup>b</sup>     | 0.90 (0.85, 0.95) | 0.90 (0.86, 0.95) | 1.00 (Ref) | 0.94 (0.92, 0.96) |
| Model 3 <sup>b</sup>     | 0.91 (0.87, 0.96) | 0.91 (0.87, 0.96) | 1.00 (Ref) | 0.95 (0.93, 0.97) |
| Low physical performance |                   |                   |            |                   |
| Cases                    | 3009              | 3126              | 4522       | 10,657            |
| Model 1 <sup>b</sup>     | 0.62 (0.60, 0.66) | 0.66 (0.63, 0.69) | 1.00 (Ref) | 0.79 (0.78, 0.81) |
| Model 2 <sup>b</sup>     | 0.65 (0.62, 0.68) | 0.69 (0.66, 0.73) | 1.00 (Ref) | 0.81 (0.80, 0.83) |

|                      |                   |                   |            |                   |
|----------------------|-------------------|-------------------|------------|-------------------|
| Model 3 <sup>b</sup> | 0.73 (0.69, 0.77) | 0.74 (0.70, 0.77) | 1.00 (Ref) | 0.87 (0.85, 0.88) |
|----------------------|-------------------|-------------------|------------|-------------------|

<sup>a</sup> ORs (95% CIs) of E-DII with sarcopenia were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 was further adjusted for race, household income, residence, smoking status, alcohol consumption, physical activity, and dietary supplement; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

<sup>b</sup> ORs (95% CIs) of E-DII with sarcopenia's components were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 was further adjusted for race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement and three components (low muscle strength, low muscle mass, and low physical performance) were mutually adjusted; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; E-DII, dietary inflammatory index; ORs: odds ratios; Ref, reference; SD, standard deviation.

**Table S8** Sensitivity analysis of ORs (95% CIs) of DDS and sarcopenia and its components while using FFQ information to calculate DDS in UK Biobank ( $n = 304,723$ )

|                      | DDS categories (ORs, 95% CIs) |                     |                   |                               |
|----------------------|-------------------------------|---------------------|-------------------|-------------------------------|
|                      | Low <sup>a</sup>              | Medium <sup>a</sup> | High <sup>a</sup> | Continuous (per SD increment) |
|                      | ( $n = 30,523$ )              | ( $n = 259,863$ )   | ( $n = 14,337$ )  |                               |
| Sarcopenia           |                               |                     |                   |                               |
| Cases                | 174                           | 825                 | 43                | 1042                          |
| Model 1 <sup>b</sup> | 1.00 (Ref)                    | 0.49 (0.41, 0.57)   | 0.42 (0.30, 0.59) | 0.76 (0.71, 0.80)             |
| Model 2 <sup>b</sup> | 1.00 (Ref)                    | 0.60 (0.51, 0.71)   | 0.56 (0.40, 0.78) | 0.80 (0.75, 0.85)             |
| Model 3 <sup>b</sup> | 1.00 (Ref)                    | 0.89 (0.67, 0.99)   | 0.78 (0.65, 0.93) | 0.82 (0.77, 0.87)             |
| Low muscle strength  |                               |                     |                   |                               |
| Cases                | 1502                          | 10,007              | 594               | 12,103                        |
| Model 1 <sup>c</sup> | 1.00 (Ref)                    | 0.69 (0.66, 0.74)   | 0.69 (0.63, 0.76) | 0.88 (0.87, 0.90)             |

|                          |            |                   |                   |                   |
|--------------------------|------------|-------------------|-------------------|-------------------|
| Model 2 <sup>c</sup>     | 1.00 (Ref) | 0.88 (0.80, 0.97) | 0.83 (0.78, 0.87) | 0.92 (0.91, 0.94) |
| Model 3 <sup>c</sup>     | 1.00 (Ref) | 0.87 (0.79, 0.97) | 0.82 (0.78, 0.87) | 0.94 (0.92, 0.96) |
| Low muscle               |            |                   |                   |                   |
| Cases                    | 2247       | 14,023            | 616               | 16,886            |
| Model 1 <sup>c</sup>     | 1.00 (Ref) | 0.72 (0.69, 0.76) | 0.60 (0.55, 0.66) | 0.88 (0.86, 0.89) |
| Model 2 <sup>c</sup>     | 1.00 (Ref) | 0.74 (0.71, 0.78) | 0.63 (0.57, 0.69) | 0.88 (0.87, 0.89) |
| Model 3 <sup>c</sup>     | 1.00 (Ref) | 1.00 (0.88, 1.12) | 0.92 (0.86, 0.98) | 0.89 (0.87, 0.90) |
| Low physical performance |            |                   |                   |                   |
| Cases                    | 2502       | 13,696            | 758               | 16,956            |
| Model 1 <sup>c</sup>     | 1.00 (Ref) | 0.72 (0.69, 0.76) | 0.60 (0.55, 0.66) | 0.83 (0.82, 0.84) |
| Model 2 <sup>c</sup>     | 1.00 (Ref) | 0.88 (0.81, 0.96) | 0.80 (0.76, 0.84) | 0.88(0.87, 0.90)  |
| Model 3 <sup>c</sup>     | 1.00 (Ref) | 0.76 (0.69, 0.83) | 0.74 (0.70, 0.78) | 0.95 (0.93, 0.96) |

<sup>a</sup> DDS category (based on FFQ) [low (1-5), medium (6-10), and high (11-15)] were defined according to practical implications for public health.

<sup>b</sup> ORs (95% CIs) of DDS with sarcopenia were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 additionally included race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement, and total calorie intake from diet; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

<sup>c</sup> ORs (95% CIs) of DDS with sarcopenia's components were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 additionally included race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement, total calorie intake from diet, and three components (low muscle strength, low muscle mass, and low physical performance) were mutually adjusted; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; DDS, dietary diversity score; FFQ, Food Frequency Questionnaire; ORs: odds ratios; Ref, reference; SD, standard deviation.

**Table S9** Sensitivity analysis of associations of DDS with sarcopenia and its components while excluding 6336 participants with extreme BMI

(*n* = 149,333) <sup>a</sup>

| Model                | DDS, ORs (95% CIs) |                   |                   | Continuous (per SD increment) |
|----------------------|--------------------|-------------------|-------------------|-------------------------------|
|                      | Low (1-6)          | Medium (7-12)     | High (13-18)      |                               |
| No. of participants  | 17,772             | 9,1511            | 40,050            | 149,333                       |
| Sarcopenia           |                    |                   |                   |                               |
| Cases                | 57                 | 308               | 131               | 496                           |
| Model 1 <sup>b</sup> | 1.00 (Ref)         | 0.79 (0.57, 1.09) | 0.67 (0.46, 0.93) | 0.83 (0.75, 0.91)             |
| Model 2 <sup>b</sup> | 1.00 (Ref)         | 0.79 (0.59, 1.08) | 0.65 (0.77, 0.92) | 0.85 (0.77, 0.93)             |
| Model 3 <sup>b</sup> | 1.00 (Ref)         | 0.80 (0.56, 1.15) | 0.72 (0.47, 0.94) | 0.90 (0.82, 0.99)             |
| Low muscle strength  |                    |                   |                   |                               |
| Cases                | 771                | 3291              | 1381              | 5443                          |
| Model 1 <sup>c</sup> | 1.00 (Ref)         | 0.71 (0.65, 0.77) | 0.61 (0.56, 0.67) | 0.86 (0.84, 0.88)             |

|                          |            |                   |                   |                   |
|--------------------------|------------|-------------------|-------------------|-------------------|
| Model 2 <sup>c</sup>     | 1.00 (Ref) | 0.76 (0.70, 0.82) | 0.69 (0.63, 0.76) | 0.89 (0.87, 0.92) |
| Model 3 <sup>c</sup>     | 1.00 (Ref) | 0.77 (0.71, 0.83) | 0.70 (0.64, 0.77) | 0.89 (0.87, 0.92) |
| Low muscle mass          |            |                   |                   |                   |
| Cases                    | 851        | 5367              | 2709              | 8927              |
| Model 1 <sup>c</sup>     | 1.00 (Ref) | 0.88 (0.80, 0.96) | 0.77 (0.69, 0.87) | 0.95 (0.93, 0.98) |
| Model 2 <sup>c</sup>     | 1.00 (Ref) | 0.83 (0.75, 0.93) | 0.76 (0.68, 0.86) | 0.96 (0.93, 0.98) |
| Model 3 <sup>c</sup>     | 1.00 (Ref) | 0.88 (0.80, 0.97) | 0.79 (0.71, 0.89) | 0.94 (0.91, 0.96) |
| Low physical performance |            |                   |                   |                   |
| Cases                    | 1051       | 3441              | 1194              | 5686              |
| Model 1 <sup>c</sup>     | 1.00 (Ref) | 0.56 (0.52, 0.60) | 0.41 (0.38, 0.45) | 0.74 (0.72, 0.76) |
| Model 2 <sup>c</sup>     | 1.00 (Ref) | 0.67 (0.63, 0.72) | 0.55 (0.51, 0.60) | 0.82 (0.80, 0.84) |
| Model 3 <sup>c</sup>     | 1.00 (Ref) | 0.74 (0.69, 0.79) | 0.63 (0.58, 0.68) | 0.85 (0.83, 0.87) |

<sup>a</sup> Extreme BMI was defined as low (<14 kg/m<sup>2</sup>) or high (≥36 kg/m<sup>2</sup>) BMI.

<sup>b</sup> ORs (95% CIs) of DDS with sarcopenia were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 additionally included race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement, and total calorie intake from diet; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

<sup>c</sup> ORs (95% CIs) of DDS with sarcopenia's components were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 additionally included race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement, total calorie intake from diet, and three components (low muscle strength, low muscle mass, and low physical performance) were mutually adjusted; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; DDS, dietary diversity score; ORs: odds ratios;

Ref, reference; SD, standard deviation.

**Table S10** Sensitivity analysis of associations of DDS with sarcopenia and its components while restricting the analysis to individuals who participated in at least two 24-h dietary surveys ( $n = 96,133$ )

| Model                | DDS, ORs (95% CIs) |                   |                   | Continuous (per SD increment) |
|----------------------|--------------------|-------------------|-------------------|-------------------------------|
|                      | Low (1-6)          | Medium (7-12)     | High (13-18)      |                               |
| No. of participants  | 1781               | 53,747            | 40,505            | 96,133                        |
| Sarcopenia           |                    |                   |                   |                               |
| Cases                | 16                 | 163               | 124               | 303                           |
| Model 1 <sup>a</sup> | 1.00 (Ref)         | 0.63 (0.30, 1.31) | 0.49 (0.23, 0.95) | 0.81 (0.72, 0.92)             |
| Model 2 <sup>a</sup> | 1.00 (Ref)         | 0.76 (0.36, 1.34) | 0.63 (0.30, 0.92) | 0.80 (0.70, 0.91)             |
| Model 3 <sup>a</sup> | 1.00 (Ref)         | 0.80 (0.36, 1.36) | 0.67 (0.30, 0.94) | 0.85 (0.75, 0.92)             |
| Low muscle strength  |                    |                   |                   |                               |
| Cases                | 69                 | 1813              | 1406              | 3288                          |

|                          |            |                   |                   |                   |
|--------------------------|------------|-------------------|-------------------|-------------------|
| Model 1 <sup>b</sup>     | 1.00 (Ref) | 0.67 (0.53, 0.87) | 0.61 (0.48, 0.78) | 0.91 (0.88, 0.94) |
| Model 2 <sup>b</sup>     | 1.00 (Ref) | 0.74 (0.58, 0.95) | 0.70 (0.54, 0.90) | 0.94 (0.90, 0.97) |
| Model 3 <sup>b</sup>     | 1.00 (Ref) | 0.75 (0.59, 0.97) | 0.71 (0.55, 0.92) | 0.94 (0.91, 0.97) |
| Low muscle mass          |            |                   |                   |                   |
| Cases                    | 87         | 3212              | 2656              | 5955              |
| Model 1 <sup>b</sup>     | 1.00 (Ref) | 0.57 (0.40, 0.86) | 0.53 (0.37, 0.80) | 0.75 (0.71, 0.78) |
| Model 2 <sup>b</sup>     | 1.00 (Ref) | 0.73 (0.56, 0.98) | 0.69 (0.51, 0.92) | 0.79 (0.76, 0.81) |
| Model 3 <sup>b</sup>     | 1.00 (Ref) | 0.78 (0.57, 1.03) | 0.73 (0.54, 0.99) | 0.78 (0.76, 0.81) |
| Low physical performance |            |                   |                   |                   |
| Cases                    | 145        | 2392              | 1456              | 3993              |
| Model 1 <sup>b</sup>     | 1.00 (Ref) | 0.44 (0.37, 0.53) | 0.33 (0.27, 0.39) | 0.77 (0.75, 0.80) |
| Model 2 <sup>b</sup>     | 1.00 (Ref) | 0.56 (0.47, 0.67) | 0.47 (0.39, 0.57) | 0.85 (0.82, 0.88) |
| Model 3 <sup>b</sup>     | 1.00 (Ref) | 0.63 (0.52, 0.77) | 0.55 (0.45, 0.67) | 0.88 (0.85, 0.91) |

<sup>a</sup> ORs (95% CIs) of DDS with sarcopenia were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 additionally included race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement, and total calorie intake from diet; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

<sup>b</sup> ORs (95% CIs) of DDS with sarcopenia's components were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 additionally included race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement, total calorie intake from diet, and three components (low muscle strength, low muscle mass, and low physical performance) were mutually adjusted; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; DDS, dietary diversity score; ORs: odds ratios; Ref, reference; SD, standard deviation.

**Table S11** Sensitivity analysis of associations of DDS with sarcopenia and its components when all missing covariates were imputed using multiple imputations ( $n = 202,708$ )

| Model                | DDS, ORs (95% CIs) |                   |                   | Continuous (per SD increment) |
|----------------------|--------------------|-------------------|-------------------|-------------------------------|
|                      | Low (1-6)          | Medium (7-12)     | High (13-18)      |                               |
| No. of participants  | 25,855             | 123,961           | 52,892            | 202,708                       |
| Sarcopenia           |                    |                   |                   |                               |
| Cases                | 90                 | 449               | 191               | 730                           |
| Model 1 <sup>a</sup> | 1.00 (Ref)         | 0.74 (0.57, 0.96) | 0.64 (0.48, 0.86) | 0.85 (0.79, 0.92)             |
| Model 2 <sup>a</sup> | 1.00 (Ref)         | 0.83 (0.64, 1.07) | 0.67 (0.47, 0.92) | 0.85 (0.78, 0.92)             |
| Model 3 <sup>a</sup> | 1.00 (Ref)         | 0.70 (0.50, 0.97) | 0.67 (0.45, 0.95) | 0.86 (0.79, 0.94)             |
| Low muscle strength  |                    |                   |                   |                               |
| Cases                | 1278               | 5053              | 1935              | 8266                          |
| Model 1 <sup>b</sup> | 1.00 (Ref)         | 0.69 (0.65, 0.74) | 0.57 (0.53, 0.61) | 0.83 (0.81, 0.85)             |

|                          |            |                   |                   |                   |
|--------------------------|------------|-------------------|-------------------|-------------------|
| Model 2 <sup>b</sup>     | 1.00 (Ref) | 0.75 (0.70, 0.80) | 0.65 (0.60, 0.70) | 0.87 (0.85, 0.89) |
| Model 3 <sup>b</sup>     | 1.00 (Ref) | 0.77 (0.72, 0.82) | 0.67 (0.62, 0.72) | 0.87 (0.85, 0.89) |
| Low muscle mass          |            |                   |                   |                   |
| Cases                    | 1230       | 7283              | 3582              | 12,095            |
| Model 1 <sup>b</sup>     | 1.00 (Ref) | 0.88 (0.82, 0.95) | 0.85 (0.78, 0.93) | 0.96 (0.94, 0.98) |
| Model 2 <sup>b</sup>     | 1.00 (Ref) | 0.89 (0.83, 0.96) | 0.87 (0.79, 0.95) | 0.96 (0.94, 0.98) |
| Model 3 <sup>b</sup>     | 1.00 (Ref) | 0.92 (0.85, 0.99) | 0.91 (0.83, 0.99) | 0.97 (0.95, 0.99) |
| Low physical performance |            |                   |                   |                   |
| Cases                    | 2076       | 6488              | 2093              | 10,657            |
| Model 1 <sup>b</sup>     | 1.00 (Ref) | 0.56 (0.53, 0.59) | 0.39 (0.37, 0.42) | 0.73 (0.71, 0.74) |
| Model 2 <sup>b</sup>     | 1.00 (Ref) | 0.62 (0.59, 0.66) | 0.47 (0.44, 0.50) | 0.77 (0.75, 0.78) |
| Model 3 <sup>b</sup>     | 1.00 (Ref) | 0.67 (0.63, 0.71) | 0.53 (0.50, 0.57) | 0.80 (0.79, 0.82) |

<sup>a</sup> ORs (95% CIs) of DDS with sarcopenia were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2

additionally included race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement, and total calorie intake from diet; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

<sup>b</sup> ORs (95% CIs) of DDS with sarcopenia's components were examined using Logistic regression models; model 1 was adjusted for age and sex; model 2 additionally included race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement, total calorie intake from diet, and three components (low muscle strength, low muscle mass, and low physical performance) were mutually adjusted; model 3 additionally included BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia.

Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; DDS, dietary diversity score; ORs: odds ratios; Ref, reference; SD, standard deviation.

**Table S12** Sensitivity analysis of combined associations of E-DII and DDS with sarcopenia while redefining sarcopenia following the EWGSOP1's recommendations <sup>a</sup>

| DDS levels                    | E-DII (ORs, 95% CIs) <sup>b</sup> |                        |                        | RERI (95% CI) <sup>d</sup> |                     | P-interaction <sup>e</sup> |
|-------------------------------|-----------------------------------|------------------------|------------------------|----------------------------|---------------------|----------------------------|
|                               | Tertile 3 <sup>c</sup>            | Tertile 2 <sup>c</sup> | Tertile 1 <sup>c</sup> | Tertile 2 of E-DII         | Tertile 1 of E-DII  |                            |
|                               |                                   |                        |                        |                            |                     | < 0.001                    |
| Low-level DDS <sup>c</sup>    | 1.00                              | 0.91 (0.83, 1.00)      | 0.98 (0.84, 1.13)      |                            |                     |                            |
| Medium-level DDS <sup>c</sup> | 0.84 (0.80, 0.88)                 | 0.77 (0.73, 0.81)      | 0.76 (0.72, 0.81)      | 0.05 (-0.04, 0.12)         | 0.00 (-0.10, 0.09)  |                            |
| High-level DDS <sup>c</sup>   | 0.81 (0.75, 0.87)                 | 0.71 (0.67, 0.75)      | 0.67 (0.63, 0.72)      | -0.09 (-0.37, 0.22)        | -0.08 (-0.41, 0.17) |                            |

<sup>a</sup> We defined sarcopenia as having low muscle mass and either low muscle strength or low physical performance following the EWGSOP1's recommendations.

<sup>b</sup> Combined associations of E-DII and DDS with sarcopenia were assessed based on covariates in model 3: age, sex, race, household income, residence, smoking status, alcohol consumption, physical activity, BMI, dietary supplement, diabetes, CVD, cancer, hypertension, and hyperlipidemia; three components (low muscle strength, low muscle mass, and low physical performance) were additionally mutually adjusted in

model 3 while assessing the combined associations of E-DII and DDS with sarcopenia' components.

<sup>c</sup> Tertile 1 of E-DII ranged from -5.44 to -0.49, tertile 2 of E-DII ranged from -0.50 to 1.12, and from 1.13 to 4.65 in UK Biobank. DDS categories [low (1-6), medium (7-12), and high (13-18)] were defined according to practical implications for public health.

<sup>d</sup> The estimates of RERI were calculated based on the reference group with tertile 3 of E-DII and low DDS.

<sup>e</sup> Likelihood tests were applied to test the significance of interaction term by comparing the model with and without the interaction term.

Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; DDS, dietary diversity score; E-DII, dietary inflammatory index; ORs: odds ratios; Ref, reference; RERI, the relative excess risk due to interaction.

**Table S13** Sensitivity analysis of combined associations of E-DII and DDS with sarcopenia and its components while excluding participants with extreme BMI <sup>a</sup>

| DDS levels <sup>b</sup> | E-DII (ORs, 95% CIs) <sup>b, c</sup> |                   |                   | RERI (95% CI) <sup>d</sup> |                     | P-interaction <sup>e</sup> |
|-------------------------|--------------------------------------|-------------------|-------------------|----------------------------|---------------------|----------------------------|
|                         | Tertile 3                            | Tertile 2         | Tertile 1         | Tertile 2 of E-DII         | Tertile 1 of E-DII  |                            |
| Sarcopenia              |                                      |                   |                   |                            |                     | < 0.001                    |
| Low-level DDS           | 1.00                                 | 0.53 (0.20, 1.20) | 1.19 (0.40, 2.91) |                            |                     |                            |
| Medium-level DDS        | 0.88 (0.62, 1.27)                    | 0.69 (0.48, 1.02) | 0.71 (0.48, 1.07) | 0.28 (-0.26, 0.82)         | -0.36 (-1.55, 0.84) |                            |
| High-level DDS          | 0.80 (0.48, 1.31)                    | 0.63 (0.41, 0.99) | 0.60 (0.39, 0.92) | 0.30 (-0.31, 0.91)         | -0.40 (-1.63, 0.83) |                            |
| Low muscle strength     |                                      |                   |                   |                            |                     | 0.871                      |
| Low-level DDS           | 1.00                                 | 0.82 (0.67, 1.00) | 1.07 (0.80, 1.41) |                            |                     |                            |
| Medium-level DDS        | 0.79 (0.71, 0.87)                    | 0.72 (0.65, 0.81) | 0.71 (0.63, 0.80) | 0.12 (-0.06, 0.29)         | -0.15 (-0.45, 0.16) |                            |
| High-level DDS          | 0.74 (0.64, 0.87)                    | 0.71 (0.63, 0.81) | 0.62 (0.55, 0.70) | 0.15 (-0.05, 0.35)         | -0.20 (-0.52, 0.12) |                            |
| Low muscle mass         |                                      |                   |                   |                            |                     | 0.885                      |

|                          |                   |                   |                   |                     |                     |
|--------------------------|-------------------|-------------------|-------------------|---------------------|---------------------|
| Low-level DDS            | 1.00              | 1.02 (0.80, 1.28) | 0.81 (0.55, 1.18) |                     |                     |
| Medium-level DDS         | 0.92 (0.82, 1.04) | 0.88 (0.78, 1.00) | 0.75 (0.66, 0.86) | -0.07 (-0.35, 0.21) | 0.02 (-0.30, 0.34)  |
| High-level DDS           | 0.92 (0.78, 1.08) | 0.85 (0.74, 0.97) | 0.74 (0.65, 0.85) | -0.09 (-0.36, 0.18) | 0.01 (-0.32, 0.35)  |
| Low physical performance |                   |                   |                   |                     | 0.007               |
| Low-level DDS            | 1.00              | 0.87 (0.73, 1.03) | 0.89 (0.67, 1.15) |                     |                     |
| Medium-level DDS         | 0.79 (0.71, 0.87) | 0.64 (0.58, 0.71) | 0.64 (0.60, 0.71) | -0.01 (-0.17, 0.16) | -0.04 (-0.28, 0.21) |
| High-level DDS           | 0.70 (0.60, 0.81) | 0.59 (0.52, 0.67) | 0.54 (0.47, 0.62) | -0.02 (-0.21, 0.17) | 0.01 (-0.25, 0.27)  |

<sup>a</sup> Extreme BMI was defined as low (<14 kg/m<sup>2</sup>) or high (≥36 kg/m<sup>2</sup>) BMI.

<sup>b</sup> Tertile 1 of E-DII ranged from -5.45 to -0.50, tertile 2 of E-DII ranged from -0.51 to 1.13, and from 1.14 to 4.65 in UK Biobank. DDS categories [low (1-6), medium (7-12), and high (13-18)] were defined according to practical implications for public health.

<sup>c</sup> Combined associations of E-DII and DDS with sarcopenia were assessed based on covariates in model 3: age, sex, race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement, BMI, diabetes, CVD, cancer, hypertension, and

hyperlipidemia; three components (low muscle strength, low muscle mass, and low physical performance) were additionally mutually adjusted in model 3 while assessing the combined associations of E-DII and DDS with sarcopenia' components.

<sup>d</sup> The estimates of RERI were calculated based on the reference group with tertile 3 of E-DII and low DDS.

<sup>e</sup> Likelihood tests were applied to test the significance of interaction term by comparing the model with and without the interaction term.

Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; DDS, dietary diversity score; E-DII, dietary inflammatory index; ORs: odds ratios; Ref, reference; RERI, the relative excess risk due to interaction.

**Table S14** Sensitivity analysis of combined associations of E-DII and DDS with sarcopenia and its components while restricting the analysis to individuals who participated in at least two 24-h dietary surveys ( $n = 96,133$ )

| DDS levels <sup>a</sup> | E-DII (ORs, 95% CIs) <sup>a, b</sup> |                   |                   | RERI (95% CI) <sup>c</sup> |                     | <i>P</i> -interaction <sup>d</sup> |
|-------------------------|--------------------------------------|-------------------|-------------------|----------------------------|---------------------|------------------------------------|
|                         | Tertile 3                            | Tertile 2         | Tertile 1         | Tertile 2 of E-DII         | Tertile 1 of E-DII  |                                    |
| Sarcopenia              |                                      |                   |                   |                            |                     | < 0.001                            |
| Low-level DDS           | 1.00 (Ref)                           | 0.89 (0.72, 0.98) | 0.75 (0.95, 1.15) |                            |                     |                                    |
| Medium-level DDS        | 1.00 (0.61, 1.33)                    | 0.76 (0.72, 0.84) | 0.63 (0.49, 0.89) | -0.12 (-0.37, 0.23)        | 0.03 (-0.30, 0.36)  |                                    |
| High-level DDS          | 0.86 (0.53, 1.14)                    | 0.67 (0.57, 1.10) | 0.59 (0.44, 0.76) | -0.08 (-0.47, 0.52)        | -0.03 (-0.47, 0.29) |                                    |
| Low muscle strength     |                                      |                   |                   |                            |                     | 0.111                              |
| Low-level DDS           | 1.00 (Ref)                           | 1.12 (0.53, 1.65) | 1.03 (0.63, 1.52) |                            |                     |                                    |
| Medium-level DDS        | 0.79 (0.60, 0.95)                    | 0.72 (0.55, 0.96) | 0.69 (0.52, 0.93) | -0.27 (-0.54, 0.40)        | 0.07 (-0.29, 0.44)  |                                    |
| High-level DDS          | 0.78 (0.58, 0.97)                    | 0.74 (0.56, 0.99) | 0.63 (0.48, 0.85) | -0.16 (-0.45, 0.33)        | 0.33 (-0.24, 0.70)  |                                    |
| Low muscle mass         |                                      |                   |                   |                            |                     | 0.058                              |

|                          |                   |                   |                   |                    |                    |
|--------------------------|-------------------|-------------------|-------------------|--------------------|--------------------|
| Low-level DDS            | 1.00 (Ref)        | 0.93 (0.75, 1.07) | 0.70 (0.59, 0.94) |                    |                    |
| Medium-level DDS         | 0.78 (0.57, 0.97) | 0.71 (0.52, 0.93) | 0.57 (0.42, 0.80) | 0.00 (-0.27, 0.33) | 0.19 (-0.19, 0.50) |
| High-level DDS           | 0.75 (0.54, 0.95) | 0.70 (0.51, 0.91) | 0.55 (0.40, 0.79) | 0.11 (-0.27, 0.45) | 0.15 (-0.23, 0.56) |
| Low physical performance |                   |                   |                   |                    | 0.024              |
| Low-level DDS            | 1.00 (Ref)        | 0.78 (0.45, 1.07) | 0.76 (0.42, 1.03) |                    |                    |
| Medium-level DDS         | 0.69 (0.56, 0.86) | 0.55 (0.44, 0.68) | 0.52 (0.42, 0.66) | 0.07 (-0.40, 0.55) | 0.07 (-0.88, 1.02) |
| High-level DDS           | 0.58 (0.46, 0.74) | 0.53 (0.42, 0.64) | 0.47 (0.37, 0.62) | 0.11 (-0.37, 0.59) | 0.19 (-0.56, 0.84) |

<sup>a</sup> Tertile 1 of E-DII ranged from -5.21 to -0.50, tertile 2 of E-DII ranged from -0.51 to 1.13, and from 1.14 to 4.52 in UK Biobank. DDS categories [low (1-6), medium (7-12), and high (13-18)] were defined according to practical implications for public health.

<sup>b</sup> Combined associations of E-DII and DDS with sarcopenia were assessed based on covariates in model 3: age, sex, race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement, BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia; three components (low muscle strength, low muscle mass, and low physical performance) were additionally mutually adjusted in

model 3 while assessing the combined associations of E-DII and DDS with sarcopenia' components.

<sup>c</sup> The estimates of RERI were calculated based on the reference group with tertile 3 of E-DII and low DDS.

<sup>d</sup> Likelihood tests were applied to test the significance of interaction term by comparing the model with and without the interaction term.

Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; DDS, dietary diversity score; E-DII, dietary inflammatory index; ORs: odds ratios; Ref, reference; RERI, the relative excess risk due to interaction.

**Table S15** Sensitivity analysis of combined associations of E-DII and DDS with sarcopenia and its components when all missing covariates were imputed using multiple imputations ( $n = 202,708$ )

| DDS levels <sup>a</sup> | E-DII (ORs, 95% CIs) <sup>a, b</sup> |                   |                   | RERI (95% CI) <sup>c</sup> |                     | <i>P</i> -interaction <sup>d</sup> |
|-------------------------|--------------------------------------|-------------------|-------------------|----------------------------|---------------------|------------------------------------|
|                         | Tertile 3                            | Tertile 2         | Tertile 1         | Tertile 2 of E-DII         | Tertile 1 of E-DII  |                                    |
| Sarcopenia              |                                      |                   |                   |                            |                     | 0.003                              |
| Low-level DDS           | 1.00 (Ref)                           | 0.67 (0.35, 1.19) | 0.85 (0.30, 0.92) |                            |                     |                                    |
| Medium-level DDS        | 0.95 (0.73, 1.27)                    | 0.84 (0.63, 1.12) | 0.80 (0.61, 1.10) | 0.21 (-0.25, 0.68)         | 0.06 (-0.75, 0.87)  |                                    |
| High-level DDS          | 1.02 (0.68, 1.51)                    | 0.80 (0.57, 1.12) | 0.62 (0.40, 0.93) | 0.10 (-0.48, 0.68)         | -0.06 (-0.93, 0.82) |                                    |
| Low muscle strength     |                                      |                   |                   |                            |                     | 0.147                              |
| Low-level DDS           | 1.00 (Ref)                           | 0.94 (0.82, 1.08) | 0.83 (0.63, 1.07) |                            |                     |                                    |
| Medium-level DDS        | 0.76 (0.70, 0.82)                    | 0.73 (0.67, 0.79) | 0.71 (0.65, 0.77) | 0.12 (-0.01, 0.26)         | 0.02 (-0.21, 0.24)  |                                    |
| High-level DDS          | 0.69 (0.61, 0.79)                    | 0.66 (0.59, 0.73) | 0.60 (0.54, 0.66) | 0.12 (-0.04, 0.28)         | -0.03 (-0.26, 0.21) |                                    |
| Low muscle mass         |                                      |                   |                   |                            |                     | 0.071                              |

|                          |                   |                   |                   |                     |                     |
|--------------------------|-------------------|-------------------|-------------------|---------------------|---------------------|
| Low-level DDS            | 1.00 (Ref)        | 0.92 (0.79, 1.07) | 0.80 (0.58, 1.06) |                     |                     |
| Medium-level DDS         | 0.89 (0.81, 0.98) | 0.89 (0.81, 0.98) | 0.87 (0.78, 0.96) | 0.08 (-0.07, 0.24)  | -0.03 (-0.28, 0.23) |
| High-level DDS           | 0.91 (0.79, 1.05) | 0.85 (0.76, 0.95) | 0.85 (0.76, 0.95) | 0.02 (-0.16, 0.21)  | -0.07 (-0.34, 0.21) |
| Low physical performance |                   |                   |                   |                     | <0.001              |
| Low-level DDS            | 1.00 (Ref)        | 0.90 (0.79, 1.01) | 0.88 (0.72, 1.06) |                     |                     |
| Medium-level DDS         | 0.73 (0.69, 0.79) | 0.64 (0.60, 0.69) | 0.62 (0.57, 0.66) | -0.03 (-0.15, 0.08) | 0.00 (-0.18, 0.18)  |
| High-level DDS           | 0.60 (0.53, 0.67) | 0.56 (0.52, 0.60) | 0.53 (0.49, 0.58) | -0.04 (-0.17, 0.10) | 0.05 (-0.13, 0.24)  |

<sup>a</sup> Tertile 1 of E-DII ranged from -5.44 to -0.46, tertile 2 of E-DII ranged from -0.47 to 1.17, and from 1.18 to 4.72 in UK Biobank. DDS categories [low (1-6), medium (7-12), and high (13-18)] were defined according to practical implications for public health.

<sup>b</sup> Combined associations of E-DII and DDS with sarcopenia were assessed based on covariates in model 3: age, sex, race, household income, residence, smoking status, alcohol consumption, physical activity, dietary supplement, BMI, diabetes, CVD, cancer, hypertension, and hyperlipidemia; three components (low muscle strength, low muscle mass, and low physical performance) were additionally mutually adjusted in

model 3 while assessing the combined associations of E-DII and DDS with sarcopenia' components.

<sup>c</sup> The estimates of RERI were calculated based on the reference group with tertile 3 of E-DII and low DDS.

<sup>d</sup> Likelihood tests were applied to test the significance of interaction term by comparing the model with and without the interaction term.

Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; DDS, dietary diversity score; E-DII, dietary inflammatory index; ORs: odds ratios; Ref, reference; RERI, the relative excess risk due to interaction.

**Table S16** Subgroup analyses of associations of E-DII with sarcopenia and its components <sup>a</sup>

| Subgroups                          | Sarcopenia        | Low muscle strength | Low muscle mass   | Low physical performance |
|------------------------------------|-------------------|---------------------|-------------------|--------------------------|
| Age groups                         |                   |                     |                   |                          |
| ≥55 years                          | 1.13 (0.96, 1.32) | 1.06 (1.02, 1.10)   | 1.05 (1.02, 1.08) | 1.09 (1.06, 1.13)        |
| <55 years                          | 1.09 (1.01, 1.17) | 1.04 (1.02, 1.07)   | 1.08 (1.05, 1.10) | 1.08 (1.06, 1.11)        |
| <i>P</i> -interaction <sup>b</sup> | 0.284             | 0.330               | 0.640             | 0.388                    |
| Sex                                |                   |                     |                   |                          |
| Females                            | 1.02 (1.03, 1.21) | 1.06 (1.04, 1.09)   | 1.07 (1.05, 1.09) | 1.09 (1.07, 1.12)        |
| Males                              | 1.04 (0.93, 1.16) | 1.05 (1.02, 1.08)   | 1.09 (1.04, 1.14) | 1.09 (1.06, 1.12)        |
| <i>P</i> -interaction <sup>c</sup> | 0.078             | 0.274               | 0.438             | 0.887                    |
| BMI groups                         |                   |                     |                   |                          |
| ≥25 kg/m <sup>2</sup>              | 0.83 (0.42, 1.62) | 1.05 (1.03, 1.08)   | 1.18 (1.02, 1.36) | 1.08 (1.06, 1.10)        |
| <25 kg/m <sup>2</sup>              | 1.09 (1.02, 1.16) | 1.06 (1.03, 1.10)   | 1.03 (1.01, 1.04) | 1.16 (1.11, 1.21)        |

|                                    |       |       |       |       |
|------------------------------------|-------|-------|-------|-------|
| <i>P</i> -interaction <sup>d</sup> | 0.384 | 0.351 | 0.081 | 0.052 |
|------------------------------------|-------|-------|-------|-------|

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<sup>a</sup> Associations of E-DII with sarcopenia were assessed based on covariates in model 3: age, sex, race, household income, residence, smoking status, alcohol consumption, physical activity, BMI, dietary supplement, diabetes, CVD, cancer, hypertension, and hyperlipidemia; three components (low muscle strength, low muscle mass, and low physical performance) were additionally mutually adjusted in model 3 while assessing the associations of E-DII with sarcopenia' components.

<sup>b</sup> The interactions were tested by comparing the -2 log-likelihood values in the models with and without the cross-product interaction term of age and E-DII.

<sup>c</sup> The interactions were tested by comparing the -2 log-likelihood values in the models with and without the cross-product interaction term of sex and E-DII.

<sup>d</sup> The interactions were tested by comparing the -2 log-likelihood values in the models with and without the cross-product interaction term of BMI and E-DII.

Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; E-DII, dietary inflammatory index; ORs: odds ratios.

**Table S17** Subgroup analyses of associations of DDS with sarcopenia and its components <sup>a</sup>

| Subgroups                          | Sarcopenia        | Low muscle strength | Low muscle mass   | Low physical performance |
|------------------------------------|-------------------|---------------------|-------------------|--------------------------|
| Age groups                         |                   |                     |                   |                          |
| ≥55 years                          | 1.04 (0.96, 1.12) | 0.98 (0.96, 1.00)   | 1.00 (0.99, 1.02) | 0.97 (0.95, 0.98)        |
| <55 years                          | 0.96 (0.93, 0.99) | 0.97 (0.96, 0.98)   | 0.99 (0.97, 1.00) | 0.94 (0.93, 0.95)        |
| <i>P</i> -interaction <sup>b</sup> | 0.268             | 0.421               | 0.062             | 0.087                    |
| Sex                                |                   |                     |                   |                          |
| Females                            | 0.98 (0.94, 1.02) | 0.97 (0.95, 0.98)   | 0.99 (0.98, 1.00) | 0.95 (0.94, 0.96)        |
| Males                              | 0.94 (0.89, 1.00) | 0.96 (0.95, 0.98)   | 0.98 (0.96, 1.00) | 0.95 (0.94, 0.96)        |
| <i>P</i> -interaction <sup>c</sup> | 0.293             | 0.406               | 0.173             | 0.343                    |
| BMI groups                         |                   |                     |                   |                          |
| ≥25 kg/m <sup>2</sup>              | 1.01 (0.72, 1.43) | 0.97 (0.96, 0.98)   | 1.00 (0.93, 1.07) | 0.95 (0.94, 0.96)        |
| <25 kg/m <sup>2</sup>              | 0.97 (0.94, 1.00) | 0.96 (0.94, 0.97)   | 1.00 (0.99, 1.01) | 0.92 (0.90, 0.94)        |

|                                    |       |       |       |       |
|------------------------------------|-------|-------|-------|-------|
| <i>P</i> -interaction <sup>d</sup> | 0.737 | 0.803 | 0.670 | 0.057 |
|------------------------------------|-------|-------|-------|-------|

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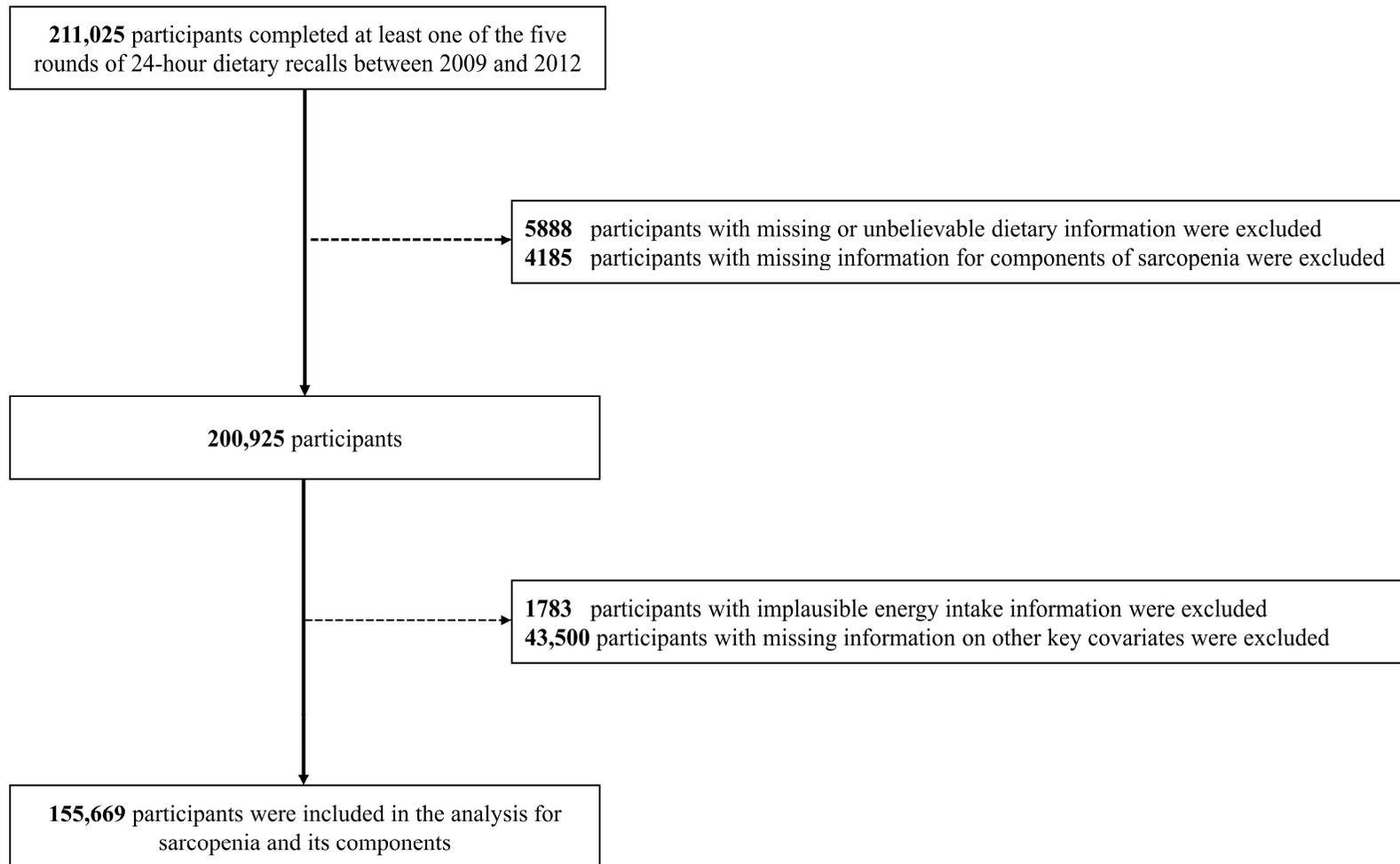
<sup>a</sup> Associations of DDS with sarcopenia were assessed based on covariates in model 3: age, sex, race, household income, residence, smoking status, alcohol consumption, physical activity, BMI, total calorie intake from diet, dietary supplement, diabetes, CVD, cancer, hypertension, and hyperlipidemia; three components (low muscle strength, low muscle mass, and low physical performance) were additionally mutually adjusted in model 3 while assessing the associations of DDS with sarcopenia' components.

<sup>b</sup> The interactions were tested by comparing the -2 log-likelihood values in the models with and without the cross-product interaction term of age and DDS.

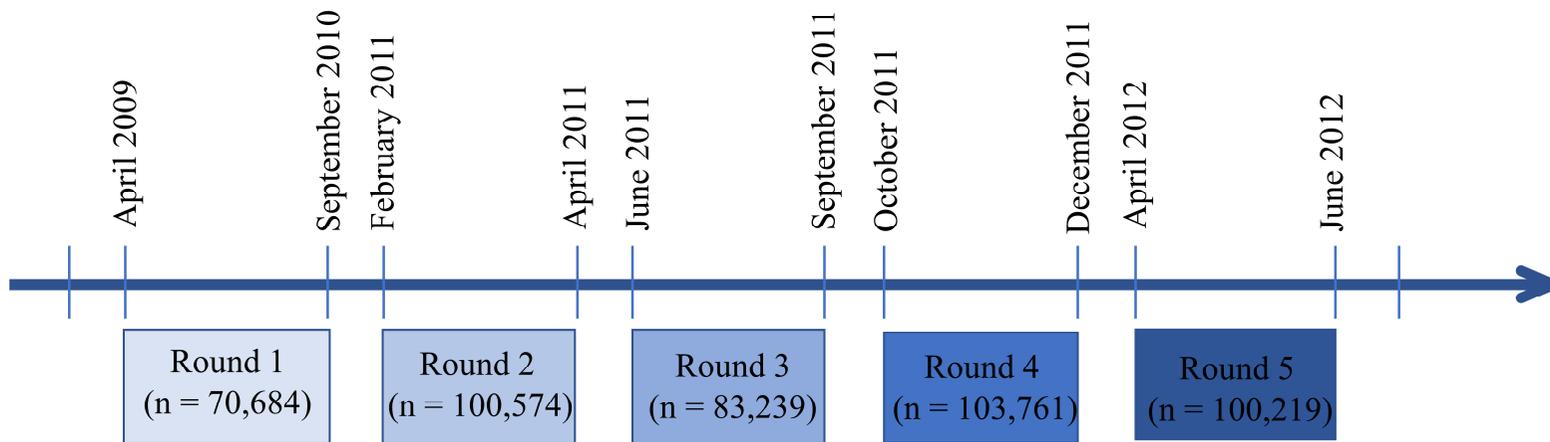
<sup>c</sup> The interactions were tested by comparing the -2 log-likelihood values in the models with and without the cross-product interaction term of sex and DDS.

<sup>d</sup> The interactions were tested by comparing the -2 log-likelihood values in the models with and without the cross-product interaction term of BMI and DDS.

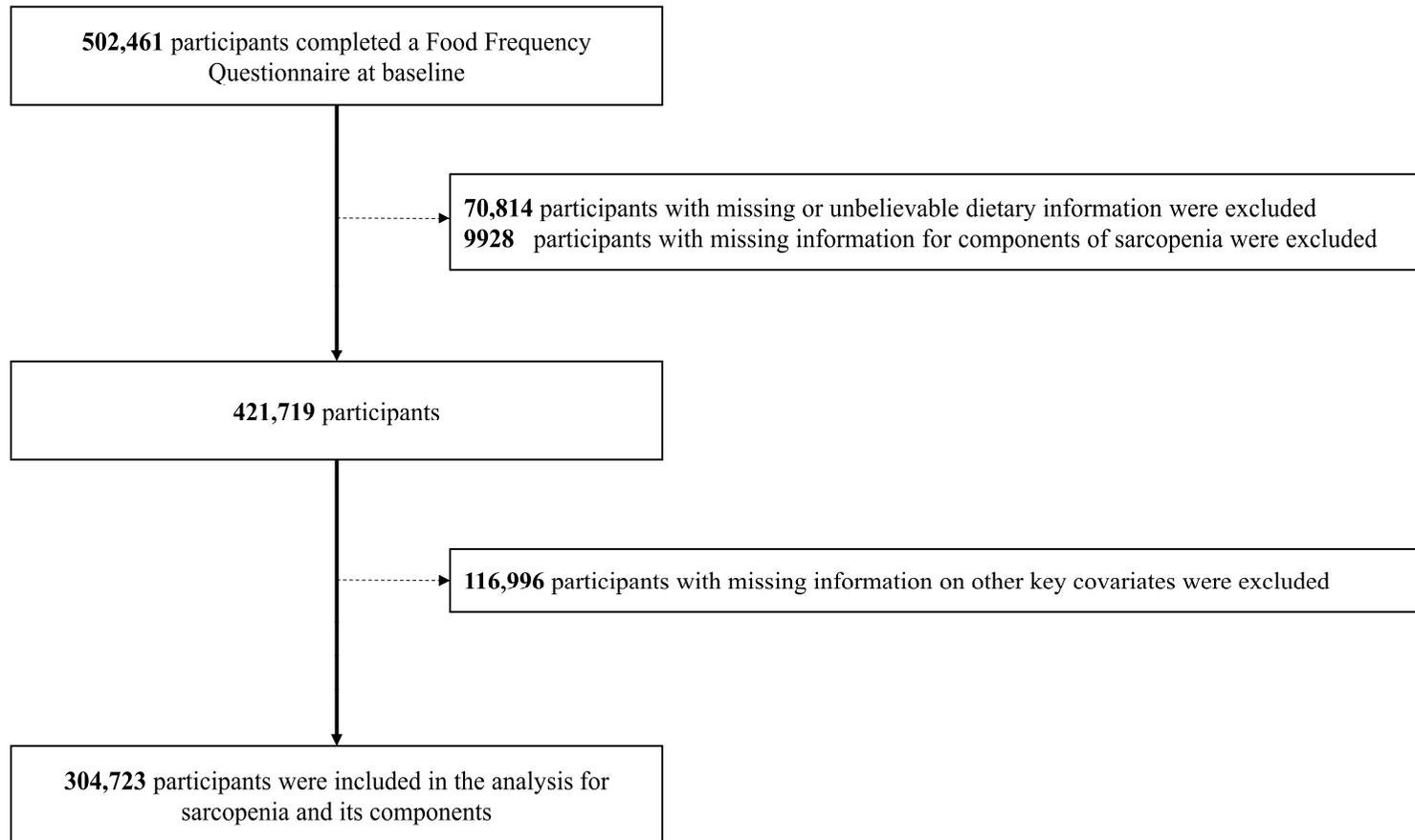
Abbreviations: BMI, body mass index; CIs: confidence intervals; CVD, cardiovascular disease; DDS, dietary diversity score; ORs: odds ratios.



**Figure S1** Flow chart for UK Biobank using 24-h dietary assessment data.



**Figure S2** Timeline of five rounds of 24-hour dietary recall surveys in UK Biobank.



**Figure S3** Flow chart for UK Biobank using Food Frequency Questionnaire data.

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