

Supplementary Table S1. List of food groups estimated from the Meal-based Diet History Questionnaire

Tier 1 food group	Tier 2 food group
Rice	White rice; brown rice
Bread	White bread; wholegrain bread
Noodles	Wheat noodles; Chinese noodles; instant noodles; spaghetti; buckwheat noodles
Miso soup	---
Potatoes	---
Pulses and nuts	Soy milk; tofu (i.e., soybean curd); natto (i.e., fermented soybeans); tofu products; peanuts and nuts; all other pulses and nuts
Vegetables	Edamame (i.e., immature soybeans) and peas; seaweeds; pumpkins; mushrooms; cabbage; cucumbers; bitter melon; burdock; radishes; onions; Chinese cabbage; tomatoes; eggplants; carrots; green peppers; broccoli; green leafy vegetables; bean sprouts; lettuce; all other vegetables
Pickled vegetables	---
Fruits	Strawberries; persimmons; citrus; kiwi fruit; watermelon; pears; bananas; grapes; melon; peaches; apples; all other fruit
Fish and shellfish	Oily fish; red meat fish; squid and octopus; eel; shrimp and crab; shellfish; small fish with bones; fish eggs; dried fish; salmon; white meat fish; ground fish meat products; canned tuna; all other fish and shellfish
Meat	Liver; processed meat; beef; chicken; pork; all other meat
Eggs	---
Dairy products	Ice cream; cheese; low-fat milk; yogurt; full-fat milk; all other dairy products
Confectioneries	Candies, caramels, and chewing gum; Japanese bread with a sweet filling; snacks made from wheat flour; jellies; rice crackers; chocolates; biscuits and cookies; cakes; Japanese sweets
Fruit and vegetable juice	---
Alcoholic beverages	Beer; sake; shochu (i.e., Japanese distilled beverages); wine; whiskey and other spirits
Soft drinks	---
Green tea	---
Barley tea	---
Oolong tea	---
Black tea	---
Coffee	---
Water	---
Breakfast cereals	---
Seasonings	Sugar added to coffee and tea; salt for cooking; vegetable oils; sugar for cooking; salt for soup; soy sauce; jam for bread; fat spread for bread; mayonnaise and dressing

Supplementary Table S2. Median estimates of the total and component scores of Healthy Eating Index-2015 (HEI-2015) and Nutrient-Rich Food Index 9.3 (NRF9.3), energy intake, and percentage of energy intake derived from the paper version of the Meal-based Diet History Questionnaire (MDHQ) in 111 Japanese women and 111 Japanese men, according to meal type†

	Women										Men									
	Overall diet		Breakfast		Lunch		Dinner		Snacks		Overall diet		Breakfast		Lunch		Dinner		Snacks	
	Median	P25, P75	Median	P25, P75	Median	P25, P75	Median	P25, P75	Median	P25, P75	Median	P25, P75	Median	P25, P75	Median	P25, P75	Median	P25, P75	Median	P25, P75
HEI-2015‡	51.4	45.2, 56.7	50.4 c	42.4, 56.2	47.5	43.3, 52.3	57.4 c	51.5, 61.2	34.1 c	26.7, 41.3	50.3	44.9, 55.8	47.8 a	39, 52.8	46.2 a	40.1, 51.6	55.6 c	51.3, 59.2	36.9	30.2, 43.9
Total fruits	2.0 c	0.8, 3.6	1.9	0.3, 4.1	0.7	0, 2.2	0.7 c	0, 2.4	3.4 c	0.2, 5.0	1.2 c	0.3, 2.9	1.0 a	0, 2.8	0.1 b	0, 1.4	0.4 c	0, 1.4	2.6 c	0.1, 5.0
Whole fruits	3.2 b	1.4, 5.0	2.6 a	0.4, 5.0	1.2	0, 3.5.0	1.2 c	0, 4.7	4.2 c	0.2, 5.0	1.5 c	0.5, 4.3	1.3 a	0, 4.4	0.1 a	0, 1.6	0.8 c	0, 2.6	2.1 c	0, 5.0
Total vegetables	5.0	4.3, 5.0	3.6 c	1, 5.0	4.8	2.1, 5.0	5.0	5.0, 5.0	0.5 a	0.2, 1.2	4.9 a	3.4, 5.0	2.9 a	0.1, 5.0	3.7	1.8, 5.0	5.0 a	4.9, 5.0	0.5 c	0.1, 2.1
Greens and beans	2.5 b	1.2, 4.0	1.6 c	0.2, 3.1	1.5	0.6, 2.8	4.2 c	2.0, 5.0	0.3 c	0.1, 0.5	1.8 a	1.1, 2.9	0.9 b	0, 2.1	1.1	0.3, 2.1	2.7 c	1.5, 5.0	0.1 c	0, 0.3
Whole grains	0.7 c	0.1, 1.5	1.6 c	0, 3.9	0.5 c	0, 1.6	0 c	0, 0.5	0	0, 0	0.2 c	0, 1.3	0.2 c	0, 3.2	0 b	0, 1.5	0 c	0, 0.3	0	0, 0
Dairy	2.6	1.6, 4.4	5.1 c	2.0, 10	0.9	0.2, 2.2	0.5 a	0, 1.8	2.3	0.8, 5.3	1.1	0.4, 2.6	2.3	0.1, 6.7	0.1	0, 1.0	0.3	0, 0.8	0.8	0.3, 2.4
Total protein foods	4.8 c	4.1, 5.0	4.4	2.5, 5.0	4.6	3.1, 5.0	5.0	5.0, 5.0	0.3 b	0.1, 0.6	4.7 c	4, 5.0	4.3	2.2, 5.0	4.6	3.2, 5.0	5.0	5.0, 5.0	0.1 a	0, 0.4
Seafood and plant proteins	5.0	5.0, 5.0	5.0 a	0.3, 5.0	4.6	2.3, 5.0	5.0 a	5.0, 5.0	0.4	0.2, 0.8	5.0	4.7, 5.0	4.3	0, 5.0	5.0	1.8, 5.0	5.0	5.0, 5.0	0.2	0, 0.5
Fatty acids§	5.6	3.5, 8.2	4.1	1.0, 7.9	7.4	5.1, 10	10 c	10, 10	0 c	0, 0	6.4	4.6, 8.8	4.2	2.2, 8.5	7.8	4.6, 10	10 c	9.6, 10	0 a	0, 0
Refined grains	1.0	0, 3.3	0	0, 2.3	0 b	0, 0	2.7 b	0.5, 8.5	5.1 c	1.7, 9.0	0.2	0, 2.8	0	0, 0.9	0	0, 0	2.4 a	0, 8.1	9.2 b	4.6, 10
Sodium	0 c	0, 0.7	1.8 c	0, 6.5	0	0, 2.5	0 c	0, 0	10	10, 10	0 c	0, 2.7	0.5 c	0, 6.3	0	0, 4.1	0 a	0, 2.9	10 b	10, 10
Added sugars	9.5 b	7.9, 10	9.9	8.0, 10	10	9.8, 10	10	10, 10	0 c	0, 2.6	10	8.7, 10	10	8.0, 10	10	10, 10	10	10, 10	1.0 a	0, 6.2
Saturated fats	9.1	7.2, 10	7.9	4.7, 10	10 a	8.6, 10	10 c	9.3, 10	3.9	0, 9.3	10 c	9.5, 10	8.7 a	6.7, 10	10 c	10, 10	10 c	10, 10	9.3	3.6, 10
NRF9.3	581 b	472, 656	596 c	451, 668	558	427, 629	660 c	584, 721	26	-124, 189	614	525, 668	562 a	429, 646	544 b	447, 626	645	575, 701	136 a	-88, 311
Protein	100	100, 100	100 a	100, 100	100 a	100, 100	100	100, 100	72	62, 89	100	100, 100	100	100, 100	100	100, 100	100 b	100, 100	68	51, 79
Dietary fiber	77	65, 87	81	63, 97	74	60, 87	93 a	71, 100	50 b	40, 61	73	57, 82	82	63, 97	69	57, 83	80	55, 99	48 c	26, 67
Vitamin A	69 c	54, 87	67 c	52, 87	60	29, 82	87 c	53, 100	43	30, 59	55 a	39, 72	55 b	33, 78	47	26, 68	65 b	40, 92	34 c	14, 54
Vitamin C	88	64, 100	81 c	38, 100	74	44, 95	100	88, 100	63 b	18, 100	100	74, 100	84 a	33, 100	77	41, 100	100	80, 100	100 c	29, 100
Vitamin D	64	49, 88	60 c	40, 90	49 c	34, 72	82 b	65, 100	19 a	12, 25	84	62, 100	76 c	46, 100	60 c	36, 93	100 b	74, 100	15	5, 25
Calcium	89 c	75, 100	100 c	86, 100	63	47, 84	70 b	56, 89	98	73, 100	74	59, 86	100 a	65, 100	54	44, 67	64	49, 77	98	66, 100
Iron	89	65, 100	86 b	59, 100	76 b	55, 100	100	76, 100	70	51, 97	100 a	97, 100	100	92, 100	100	85, 100	100 a	93, 100	86 c	60, 100
Potassium	100 a	90, 100	100 c	93, 100	82	61, 96	100	89, 100	100	85, 100	99	85, 100	100 a	87, 100	78	65, 92	100 a	81, 100	100 a	91, 100
Magnesium	100 b	87, 100	100 c	96, 100	84 a	69, 97	100 b	94, 100	94 a	74, 100	92 b	79, 100	100 b	82, 100	77 c	65, 89	97	80, 100	100 c	79, 100
Added sugars	52 b	15, 115	35	0, 110	0	0, 40	0	0, 0	445	329, 593	17	0, 83	2	0, 113	0	0, 2	0	0, 0	396	188, 612
Saturated fats	27	13, 50	39	17, 79	5 a	0, 32	10 c	0, 26	88	21, 136	6 c	0, 23	31 a	0, 55	0 c	0, 12	0 c	0, 10	25	0, 98
Sodium	70 c	53, 100	47 c	9, 113	77	42, 119	112 c	74, 141	0	0, 0	81 c	58, 110	70 c	26, 128	88	47, 131	93 b	53, 142	0 b	0, 0
Energy intake (MJ/day)	6.4 c	5.4, 7.2	1.6	1.2, 1.8	1.7 c	1.3, 2.0	2.1 c	1.7, 2.3	0.9 c	0.5, 1.4	7.9 c	6.7, 8.9	1.7 a	1.1, 2.1	2.1 c	1.8, 2.6	2.9 c	2.5, 3.4	1.1 c	0.4, 1.6
Percentage of energy intake	---	---	24.8 b	19.7, 29.6	26.9 c	22.4, 30.9	33.1 c	27.9, 37.2	14.7 c	9.5, 21.9	---	---	21.8 b	14.4, 25.4	27.6 c	23.3, 32	36 c	32.1, 43.3	13.6 c	5.6, 18.2

P25, 25th percentile; P75, 75th percentile.

† The values derived from the MDHQ were compared with those derived from the 4-day weighed dietary record (shown in Table 2 for women and Table 3 for men) using the

Wilcoxon signed-rank test (a: $P < 0.05$, b: $P < 0.01$, and c: $P < 0.001$; shown in bold).

‡ Calculated as the sum of all components scores. A maximum score is 100. A maximum score for each component is as follows: 5 for total fruits, whole fruits, total vegetables, greens and beans, total protein foods, and seafood and plant proteins and 10 for whole grains, dairy products, fatty acids, refined grains, sodium, added sugars, and saturated fats. A higher score indicates a higher diet quality (i.e., a lower intake for refined grains, sodium, added sugars, and saturated fats components and a higher intake for other components).

§ Defined as the ratio of the sum of PUFA and MUFA to SFA.

|| Calculated as the sum of scores for nine nutrients to encourage (i.e., protein, dietary fiber, vitamins A, C and D, calcium, iron, potassium, and magnesium) minus the sum of scores for three nutrients to limit (i.e., added sugars, saturated fats, and sodium). A maximum score is 900. For each component, a maximum score is 100, except for added sugars, saturated fats, and sodium components, for which a maximum score is infinite depending on the intake level. A higher score indicates a higher diet quality, except for added sugars, saturated fats, and sodium components, for which a higher score indicates an unfavorable dietary intake (i.e., higher intakes of added sugars, saturated fats, and sodium).

Supplementary Table S3. Spearman correlation coefficients between estimates of the total and component scores of Healthy Eating Index-2015 (HEI-2015) and Nutrient-Rich Food Index 9.3 (NRF9.3), energy intake, and percentage of energy intake derived from the 4-day weighed dietary record and those derived from the paper version of the Meal-based Diet History Questionnaire (MDHQ) in 111 Japanese women and 111 Japanese men, according to meal type†

	Women					Men				
	Overall diet	Breakfast	Lunch	Dinner	Snacks	Overall diet	Breakfast	Lunch	Dinner	Snacks
HEI-2015‡	0.64 c	0.58 c	0.40 c	0.48 c	0.16	0.55 c	0.71 c	0.46 c	0.46 c	0.22 a
Total fruits	0.69 c	0.62 c	0.51 c	0.50 c	0.31 c	0.57 c	0.55 c	0.37 c	0.24 a	0.32 c
Whole fruits	0.74 c	0.59 c	0.52 c	0.52 c	0.33 c	0.61 c	0.57 c	0.40 c	0.24 a	0.30 c
Total vegetables	0.41 c	0.69 c	0.39 c	0.39 c	0.20 a	0.52 c	0.58 c	0.42 c	0.43 c	0.17
Greens and beans	0.33 c	0.31 b	0.21 a	0.33 c	0.17	0.29 b	0.36 c	0.12	0.20 a	0.10
Whole grains	0.44 c	0.43 c	0.12	0.25 b	Not available	0.45 c	0.32 c	0.34 c	0.47 c	Not available
Dairy	0.62 c	0.74 c	0.17	0.32 c	0.48 c	0.66 c	0.65 c	0.33 c	0.33 c	0.31 c
Total protein foods	0.27 b	0.49 c	0.35 c	-0.05	0.28 b	0.23 a	0.60 c	0.25 b	-0.04	0.27 b
Seafood and plant proteins	0.21 a	0.52 c	0.18	-0.01	0.24 b	0.16	0.50 c	0.27 b	0.02	0.16
Fatty acids§	0.37 c	0.49 c	0.07	0.10	0.10	0.25 b	0.56 c	0.26 b	0.10	0.00
Refined grains	0.56 c	0.39 c	0.37 c	0.66 c	0.34 c	0.64 c	0.54 c	0.36 c	0.74 c	0.39 c
Sodium	0.46 c	0.65 c	0.35 c	0.37 c	-0.05	0.37 c	0.46 c	0.43 c	0.35 c	-0.05
Added sugars	0.39 c	0.34 b	0.39 c	0.10	0.34 c	0.39 c	0.56 c	0.18	-0.05	0.33 c
Saturated fats	0.38 c	0.60 c	0.19 a	0.20 a	0.29 b	0.34 c	0.50 c	0.03	0.26 b	0.53 c
NRF9.3	0.65 c	0.55 c	0.49 c	0.62 c	0.34 c	0.56 c	0.63 c	0.54 c	0.44 c	0.41 c
Protein	-0.02	0.12	-0.06	0.56 c	0.48 c	0.25 b	0.40 c	-0.07	0.30 b	0.42 c
Dietary fiber	0.62 c	0.50 c	0.51 c	0.47 c	0.25 b	0.66 c	0.37 c	0.45 c	0.56 c	0.34 c
Vitamin A	0.59 c	0.32 c	0.40 c	0.52 c	0.24 b	0.52 c	0.55 c	0.39 c	0.40 c	0.33 c
Vitamin C	0.43 c	0.58 c	0.36 c	0.35 c	0.33 c	0.46 c	0.56 c	0.35 c	0.46 c	0.33 c
Vitamin D	0.33 c	0.23 a	0.32 b	0.38 b	0.32 c	0.21 a	0.28 b	0.25 b	0.18	0.35 c
Calcium	0.60 c	0.46 c	0.19	0.54 c	0.40 c	0.46 c	0.47 c	0.17	0.33 c	0.40 c
Iron	0.83 c	0.70 c	0.65 c	0.78 c	0.41 c	0.57 c	0.56 c	0.34 c	0.53 c	0.45 c
Potassium	0.57 c	0.45 c	0.39 c	0.58 c	0.31 c	0.59 c	0.45 c	0.36 c	0.61 c	0.27 b
Magnesium	0.48 c	0.48 c	0.40 c	0.53 c	0.45 c	0.61 c	0.45 c	0.40 c	0.50 c	0.38 c
Added sugars	0.41 c	0.39 c	0.35 c	0.11	0.33 c	0.41 c	0.51 c	0.10	0.16	0.41 c
Saturated fats	0.44 c	0.61 c	0.20 a	0.23 b	0.29 b	0.39 c	0.53 c	0.03	0.33 c	0.51 c
Sodium	0.57 c	0.69 c	0.40 c	0.45 c	-0.02	0.43 c	0.45 c	0.50 c	0.41 c	-0.05
Energy intake (MJ/day)	0.34 c	0.49 c	0.29 b	0.32 c	0.54 c	0.46 c	0.73 c	0.47 c	0.47 c	0.60 c
Percentage of energy intake	---	0.49 c	0.29 b	0.52 c	0.56 c	---	0.69 c	0.54 c	0.56 c	0.57 c

† Values are expressed as Spearman correlation coefficients (a: $P < 0.05$, b: $P < 0.01$, and c: $P < 0.001$; shown in bold). For the whole grains component, Pearson correlation coefficients were not available because all the participants were non-consumers in MDHQ.

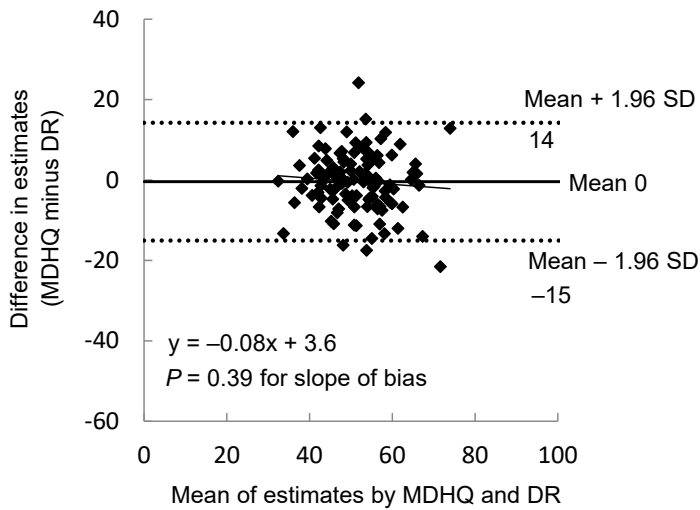
‡ Calculated as the sum of all components scores. A maximum score is 100. A maximum score for each component is as follows: 5 for total fruits, whole fruits, total

vegetables, greens and beans, total protein foods, and seafood and plant proteins and 10 for whole grains, dairy products, fatty acids, refined grains, sodium, added sugars, and saturated fats. A higher score indicates a higher diet quality (i.e., a lower intake for refined grains, sodium, added sugars, and saturated fats components and a higher intake for other components).

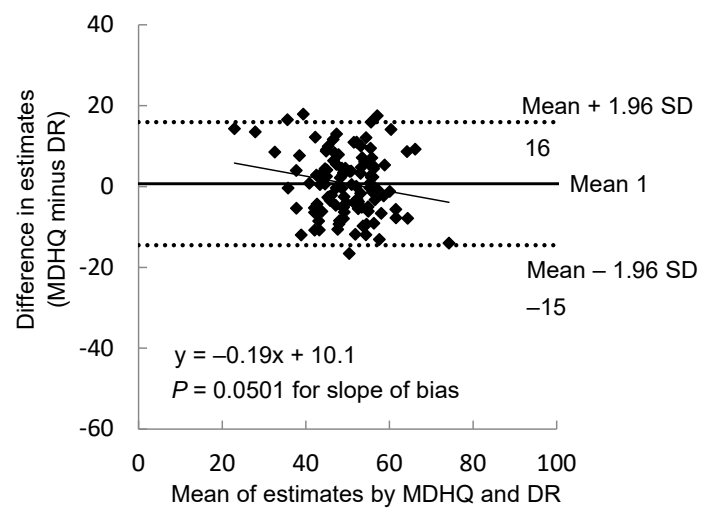
§ Defined as the ratio of the sum of PUFA and MUFA to SFA.

|| Calculated as the sum of scores for nine nutrients to encourage (i.e., protein, dietary fiber, vitamins A, C and D, calcium, iron, potassium, and magnesium) minus the sum of scores for three nutrients to limit (i.e., added sugars, saturated fats, and sodium). A maximum score is 900. For each component, a maximum score is 100, except for added sugars, saturated fats, and sodium components, for which a maximum score is infinite depending on the intake level. A higher score indicates a higher diet quality, except for added sugars, saturated fats, and sodium components, for which a higher score indicates an unfavorable dietary intake (i.e., higher intakes of added sugars, saturated fats, and sodium).

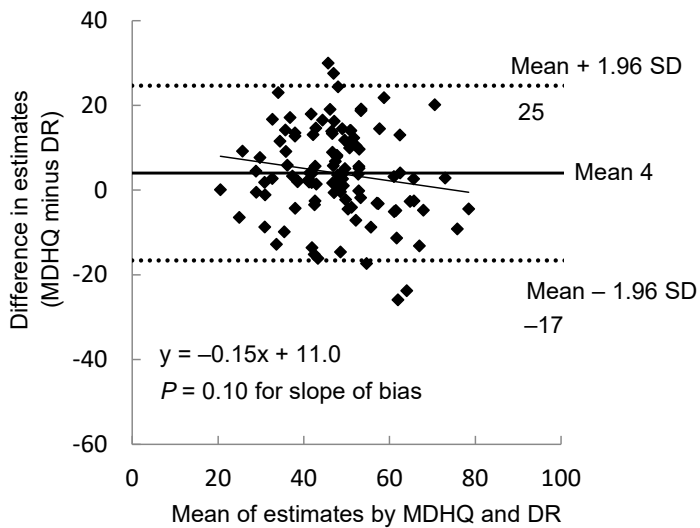
(a) HEI-2015 total score for overall diet in women



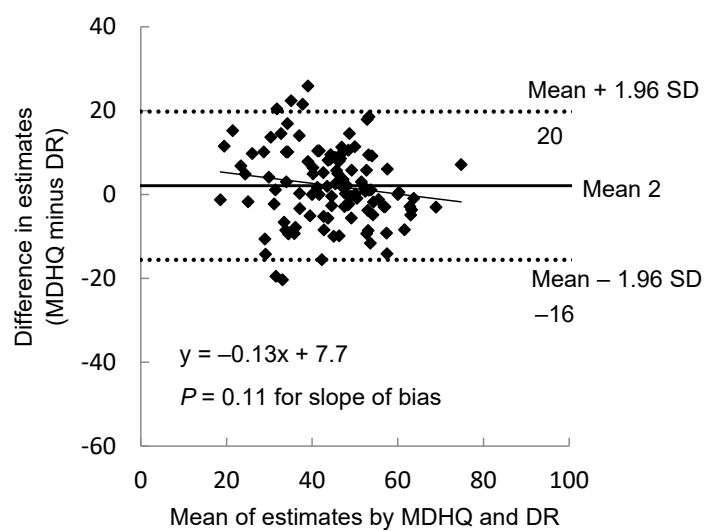
(b) HEI-2015 total score for overall diet in men



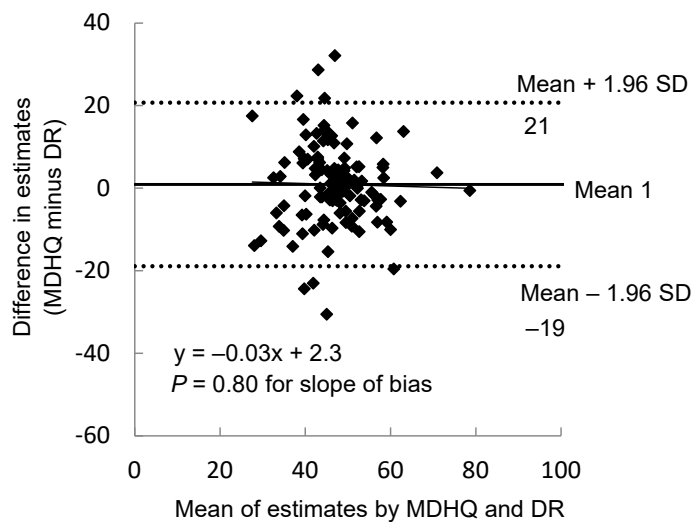
(c) HEI-2015 total score for breakfast in women



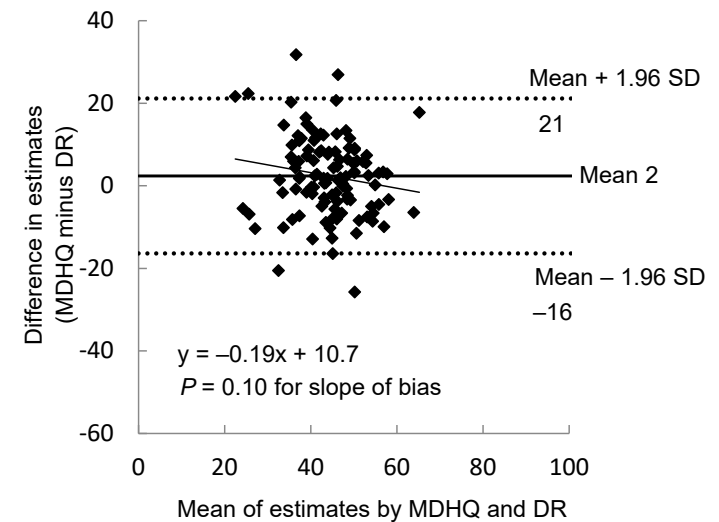
(d) HEI-2015 total score for breakfast in men

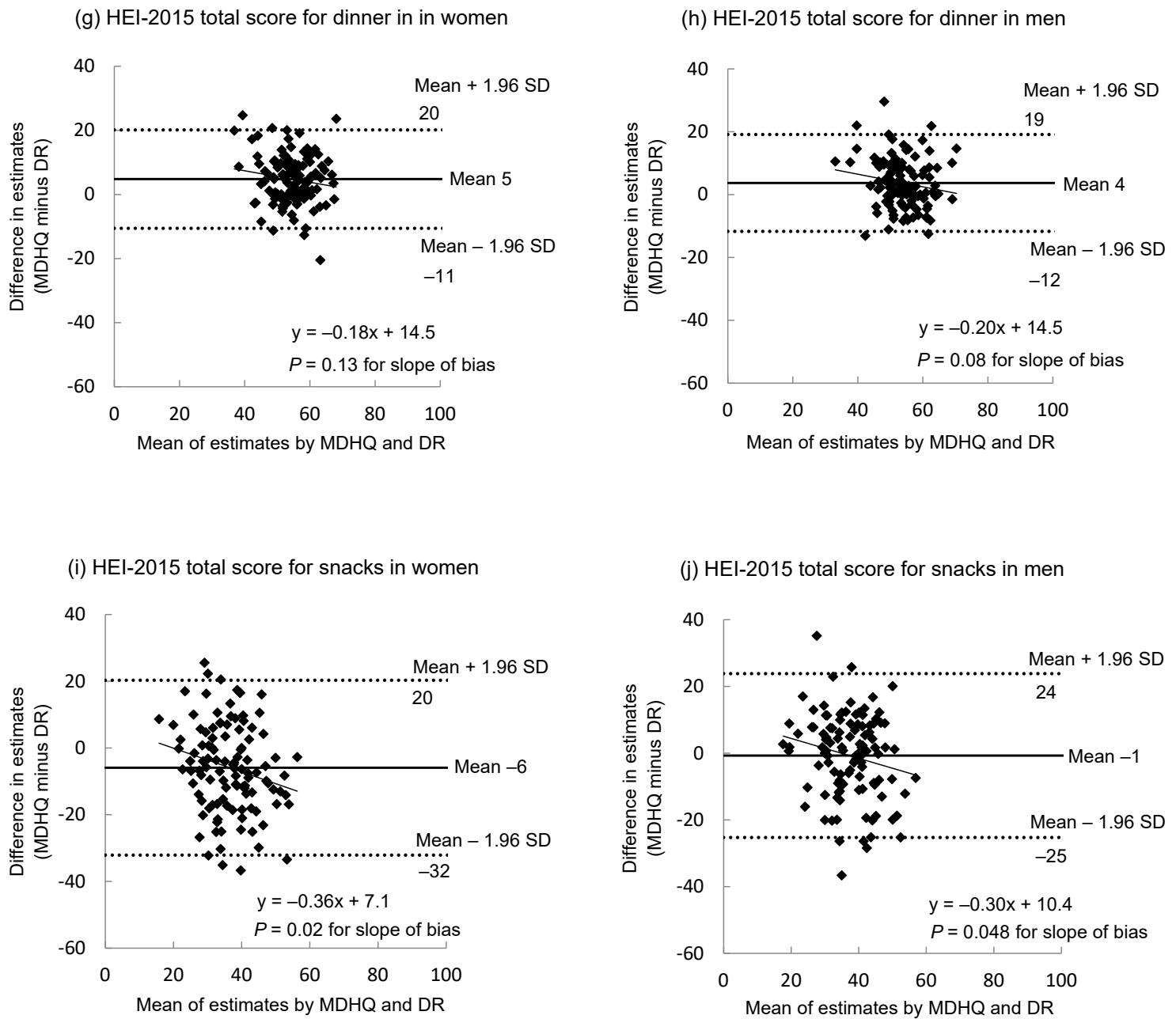


(e) HEI-2015 total score for lunch in women



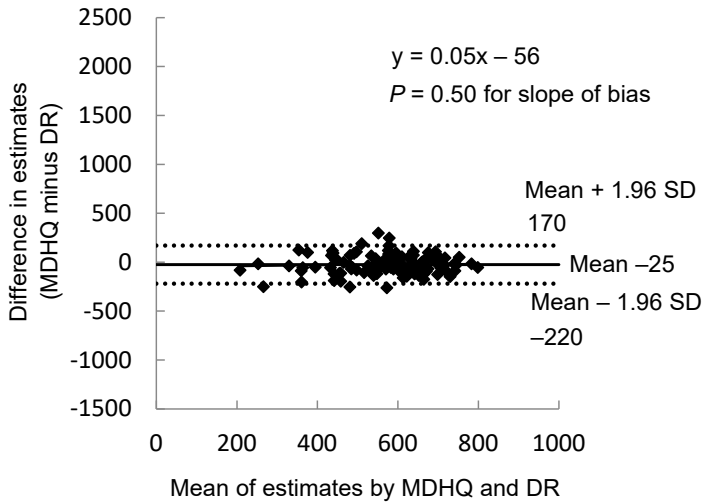
(f) HEI-2015 total score for lunch in men



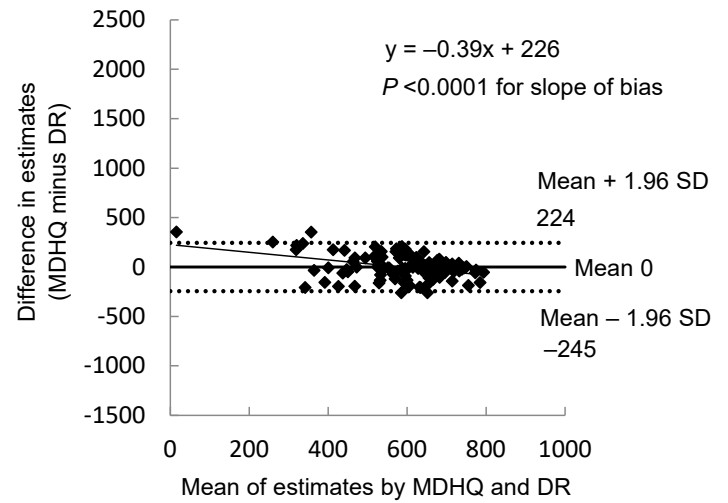


Supplementary Figure S1. Bland–Altman plots assessing the agreement between estimates of the Healthy Eating Index-2015 (HEI-2015) total score derived from the 4-day weighed dietary record (DR) and those derived from the paper version of the Meal-based Diet History Questionnaire (MDHQ) in 111 Japanese women (a: overall diet, c: breakfast, e: lunch, g: dinner, and i: snacks) and 111 Japanese men (b: overall diet, d: breakfast, f: lunch, h: dinner, and j: snacks), according to meal type

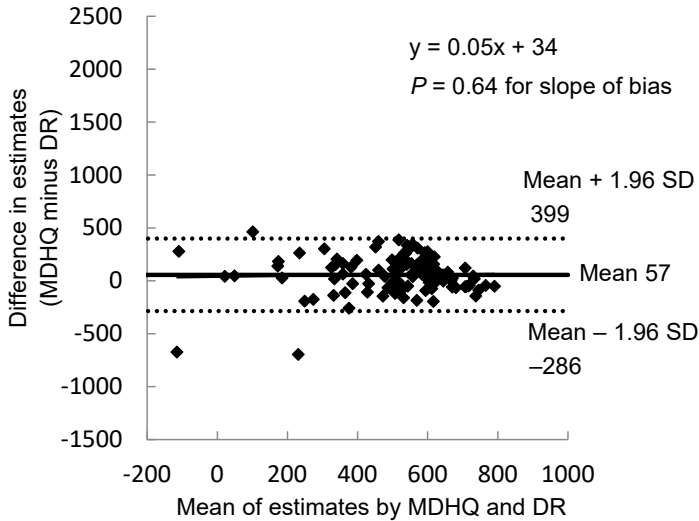
(a) NRF9.3 total score for overall diet in women



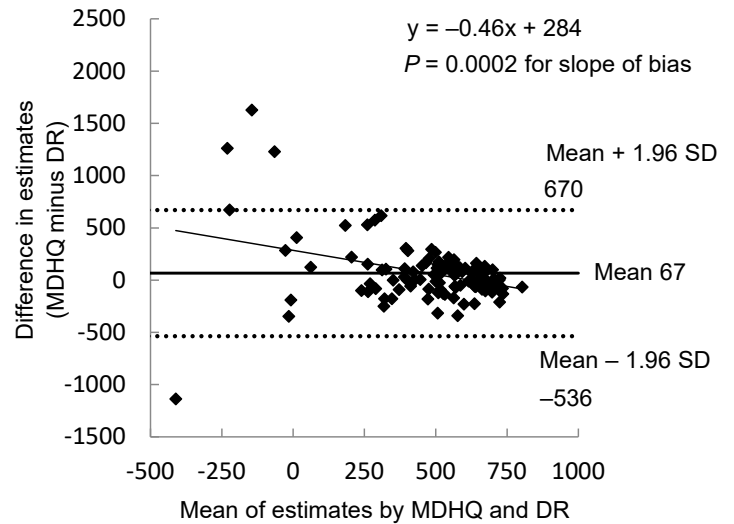
(b) NRF9.3 total score for overall diet in men



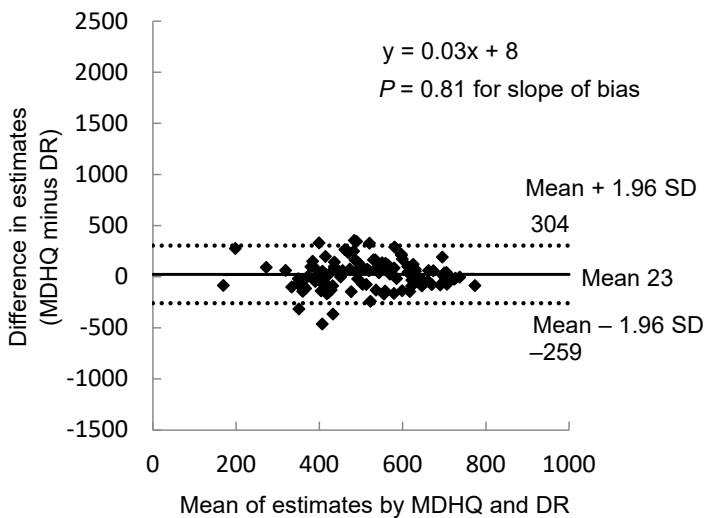
(c) NRF9.3 total score for breakfast in women



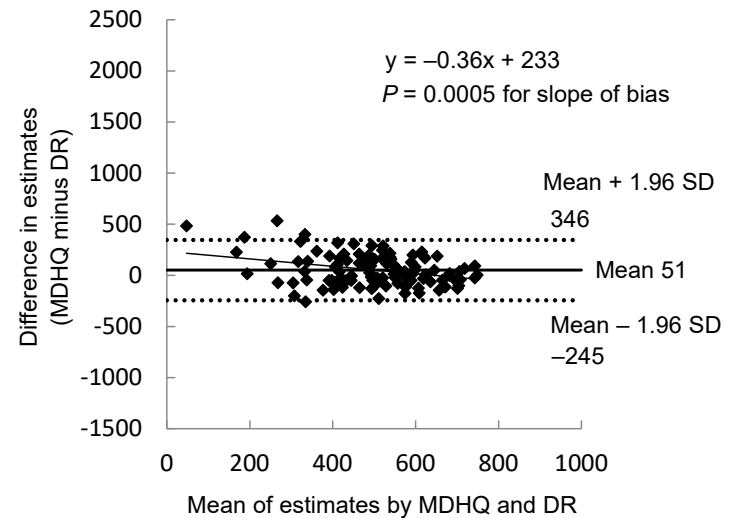
(d) NRF9.3 total score for breakfast in men

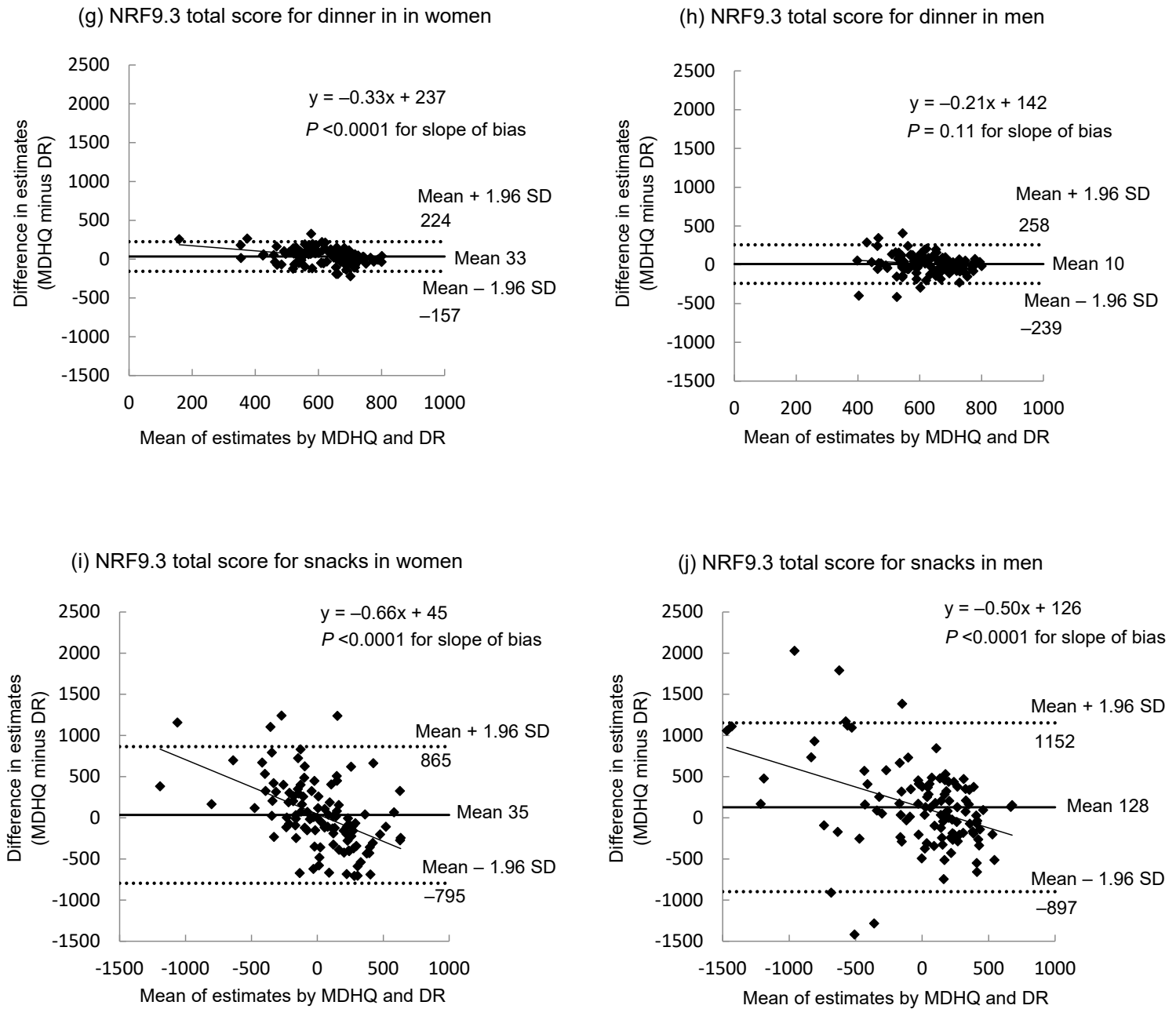


(e) NRF9.3 total score for lunch in women



(f) NRF9.3 total score for lunch in men





Supplementary Figure S2. Bland–Altman plots assessing the agreement between estimates of the Nutrient-Rich Food Index 9.3 (NRF9.3) total score derived from the 4-day weighed dietary record (DR) and those derived from the paper version of the Meal-based Diet History Questionnaire (MDHQ) in 111 Japanese women (a: overall diet, c: breakfast, e: lunch, g: dinner, and i: snacks) and 111 Japanese men (b: overall diet, d: breakfast, f: lunch, h: dinner, and j: snacks), according to meal type