

Supplementary data

Supplemental Table 1 Changes in food group intakes among quintiles of changes in plant-based diet indices in the Nurses' Health study II¹

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	<i>P</i>
Overall plant-based diet index (PDI)						
<i>n</i>	161	162	197	131	180	
Median (range)	-6 (-18, -4)	-1.5 (-3, 0)	3 (1, 4)	6 (5, 7)	10 (8, 27)	
<i>Healthy plant foods, servings/day</i>						
Whole grains	-0.7 ± 1.4	-0.2 ± 1.2	-0.1 ± 1.4	0.0 ± 1.1	0.2 ± 1.2	<0.001
Fruits	0.0 ± 1.2	0.3 ± 1.2	0.4 ± 1.1	0.3 ± 0.9	0.5 ± 0.9	<0.001
Vegetables	-0.3 ± 2.1	0.4 ± 1.8	0.5 ± 2.2	0.6 ± 1.9	0.9 ± 1.7	<0.001
Nuts	0.5 ± 0.9	0.6 ± 1.0	0.7 ± 1.2	0.5 ± 0.8	0.7 ± 1.0	0.08
Legumes	-0.1 ± 0.6	0.0 ± 0.5	0.1 ± 0.5	0.2 ± 0.7	0.2 ± 0.4	<0.001
Vegetable oil	0.3 ± 0.6	0.4 ± 0.6	0.3 ± 0.7	0.4 ± 0.7	0.5 ± 0.6	0.007
Tea and coffee	-0.2 ± 1.9	-0.3 ± 1.8	0.1 ± 1.8	0.1 ± 1.6	0.3 ± 1.7	0.001
<i>Less healthy plant foods, servings/day</i>						
Fruit juices	-0.6 ± 0.8	-0.4 ± 0.6	-0.3 ± 0.6	-0.2 ± 0.6	-0.1 ± 0.9	<0.001
Refined grains	-1.1 ± 1.3	-1.1 ± 1.3	-0.8 ± 1.3	-0.7 ± 1.2	-0.5 ± 1.1	<0.001
Potatoes	-0.2 ± 0.4	-0.2 ± 0.3	-0.1 ± 0.3	-0.1 ± 0.3	0.0 ± 0.3	<0.001
Sugar-sweetened beverages	-0.4 ± 1.0	-0.2 ± 0.6	-0.2 ± 0.6	-0.2 ± 0.7	-0.1 ± 0.7	<0.001
Sweets and desserts	-0.8 ± 1.2	-0.5 ± 1.0	-0.7 ± 1.2	-0.4 ± 1.1	-0.1 ± 1.0	<0.001
<i>Animal foods, servings/day</i>						
Animal fat	0.4 ± 0.8	0.4 ± 0.6	0.2 ± 0.5	0.2 ± 0.6	0.1 ± 0.5	<0.001
Daily	0.5 ± 1.7	0.5 ± 1.7	0.0 ± 1.4	-0.1 ± 1.8	-0.2 ± 1.8	<0.001
Eggs	0.2 ± 0.3	0.1 ± 0.3	0.1 ± 0.3	0.1 ± 0.5	0.0 ± 0.3	<0.001
Fish and seafood	0.0 ± 0.2	0.0 ± 0.2	0.0 ± 0.2	0.0 ± 0.2	0.0 ± 0.2	0.17
Meat	0.0 ± 0.6	-0.1 ± 0.7	0.0 ± 0.6	-0.1 ± 0.7	-0.1 ± 0.7	0.032
Miscellaneous animal-based foods	-0.2 ± 1.3	-0.2 ± 1.9	-0.1 ± 0.8	-0.3 ± 1.5	-0.4 ± 1.3	0.10
<i>Food groups, servings/day</i>						
Healthy plant foods	-0.5 ± 4.4	1.2 ± 3.9	2.0 ± 4.6	2.1 ± 3.4	3.3 ± 3.6	<0.001
Less healthy plant foods	-3.3 ± 2.5	-2.4 ± 2.0	-2.2 ± 2.1	-1.6 ± 2.1	-0.9 ± 2.0	<0.001

Supplementary data

Animal foods	0.9 ± 2.5	0.7 ± 2.6	0.2 ± 1.9	-0.2 ± 2.8	-0.6 ± 2.7	<0.001
Healthful plant-based diet index (hPDI)						
<i>n</i>	174	174	146	181	156	
Median (range)	-9 (-20, -6)	-3 (-5, -2)	0 (-1, 1)	4 (2, 6)	10 (7, 24)	
<i>Healthy plant foods, servings/day</i>						
Whole grains	-0.5 ± 1.2	-0.3 ± 1.2	-0.2 ± 1.2	0.1 ± 1.3	0.1 ± 1.4	<0.001
Fruits	0.0 ± 1.0	0.2 ± 1.1	0.2 ± 0.9	0.4 ± 1.2	0.6 ± 1.1	<0.001
Vegetables	-0.2 ± 2.1	0.5 ± 1.8	0.6 ± 2.0	0.4 ± 1.6	1.0 ± 2.3	<0.001
Nuts	0.5 ± 0.8	0.6 ± 0.8	0.5 ± 0.8	0.7 ± 1.2	0.9 ± 1.2	<0.001
Legumes	-0.1 ± 0.4	0.1 ± 0.6	0.1 ± 0.5	0.1 ± 0.5	0.2 ± 0.7	<0.001
Vegetable oil	0.2 ± 0.8	0.3 ± 0.5	0.4 ± 0.7	0.3 ± 0.5	0.5 ± 0.7	<0.001
Tea and coffee	-0.1 ± 1.8	-0.1 ± 1.7	-0.1 ± 1.7	0.1 ± 1.8	0.3 ± 1.6	0.010
<i>Less healthy plant foods, servings/day</i>						
Fruit juices	-0.1 ± 0.7	-0.2 ± 0.7	-0.4 ± 0.7	-0.5 ± 0.8	-0.4 ± 0.6	<0.001
Refined grains	-0.3 ± 1.1	-0.6 ± 1.2	-0.6 ± 1.0	-1.1 ± 1.3	-1.5 ± 1.2	<0.001
Potatoes	0.0 ± 0.3	-0.1 ± 0.3	-0.2 ± 0.3	-0.2 ± 0.4	-0.3 ± 0.3	<0.001
Sugar-sweetened beverages	-0.1 ± 0.7	-0.2 ± 0.6	-0.2 ± 0.7	-0.3 ± 0.6	-0.4 ± 0.9	<0.001
Sweets and desserts	-0.2 ± 1.0	-0.5 ± 1.2	-0.5 ± 1.0	-0.6 ± 1.1	-0.9 ± 1.2	<0.001
<i>Animal foods, servings/day</i>						
Animal fat	0.4 ± 0.5	0.3 ± 0.5	0.2 ± 0.7	0.2 ± 0.7	0.1 ± 0.5	<0.001
Daily	0.5 ± 1.5	0.2 ± 1.7	0.2 ± 1.7	0.0 ± 1.7	-0.3 ± 1.8	<0.001
Eggs	0.1 ± 0.4	0.2 ± 0.3	0.1 ± 0.3	0.1 ± 0.3	0.0 ± 0.4	0.002
Fish and seafood	0.0 ± 0.2	0.0 ± 0.2	0.0 ± 0.2	0.0 ± 0.2	0.0 ± 0.3	0.41
Meat	0.1 ± 0.7	0.0 ± 0.7	-0.2 ± 0.6	-0.1 ± 0.6	-0.3 ± 0.7	<0.001
Miscellaneous animal-based foods	-0.3 ± 2.0	-0.1 ± 0.7	-0.1 ± 0.9	-0.3 ± 1.7	-0.3 ± 1.2	0.21
<i>Food groups, servings/day</i>						
Healthy plant foods	-0.2 ± 4.3	1.3 ± 3.9	1.5 ± 4.0	2.2 ± 4.0	3.6 ± 4.2	<0.001
Less healthy plant foods	-0.7 ± 2.1	-1.5 ± 2.0	-1.9 ± 1.9	-2.6 ± 2.0	-3.6 ± 2.4	<0.001
Animal foods	1.0 ± 2.6	0.5 ± 2.1	0.4 ± 2.2	-0.1 ± 2.7	-0.8 ± 2.7	<0.001

Supplementary data

Unhealthful plant-based diet index (uPDI)						
<i>n</i>	157	174	148	192	160	
Median (range)	-17 (-31, -14)	-11 (-13, -9)	-7 (-8, -6)	-3 (-5, -1)	3 (0, 20)	
<i>Healthy plant foods, servings/day</i>						
Whole grains	0.4 ± 1.4	0.1 ± 1.1	-0.3 ± 1.3	-0.3 ± 1.3	-0.6 ± 1.1	<0.001
Fruits	0.8 ± 1.0	0.5 ± 1.1	0.3 ± 1.1	0.2 ± 1.0	-0.2 ± 1.0	<0.001
Vegetables	1.3 ± 1.9	0.6 ± 1.9	0.3 ± 1.9	0.5 ± 2.0	-0.5 ± 2.0	<0.001
Nuts	1.0 ± 1.4	0.7 ± 0.7	0.5 ± 0.8	0.6 ± 0.9	0.3 ± 0.9	<0.001
Legumes	0.2 ± 0.6	0.1 ± 0.4	0.1 ± 0.6	0.1 ± 0.6	-0.1 ± 0.4	<0.001
Vegetable oil	0.5 ± 0.6	0.5 ± 0.6	0.4 ± 0.6	0.3 ± 0.6	0.1 ± 0.7	<0.001
Tea and coffee	0.5 ± 2.0	0.1 ± 1.8	0.1 ± 1.6	-0.1 ± 1.6	-0.5 ± 1.6	<0.001
<i>Less healthy plant foods, servings/day</i>						
Fruit juices	-0.4 ± 0.6	-0.4 ± 0.8	-0.3 ± 0.7	-0.3 ± 0.7	-0.2 ± 0.8	0.004
Refined grains	-1.2 ± 1.4	-1.0 ± 1.3	-0.9 ± 1.2	-0.7 ± 1.2	-0.3 ± 1.0	<0.001
Potatoes	-0.2 ± 0.4	-0.2 ± 0.4	-0.2 ± 0.3	-0.1 ± 0.3	-0.1 ± 0.3	<0.001
Sugar-sweetened beverages	-0.4 ± 1.0	-0.3 ± 0.8	-0.2 ± 0.6	-0.2 ± 0.6	-0.1 ± 0.5	<0.001
Sweets and desserts	-0.8 ± 1.4	-0.5 ± 0.9	-0.5 ± 1.1	-0.5 ± 1.0	-0.4 ± 1.1	<0.001
<i>Animal foods, servings/day</i>						
Animal fat	0.3 ± 0.5	0.4 ± 0.8	0.3 ± 0.6	0.1 ± 0.5	0.2 ± 0.5	<0.001
Daily	0.6 ± 1.6	0.4 ± 1.7	0.1 ± 1.6	-0.1 ± 1.6	-0.3 ± 1.9	<0.001
Eggs	0.2 ± 0.4	0.1 ± 0.3	0.1 ± 0.2	0.1 ± 0.3	0.0 ± 0.4	<0.001
Fish and seafood	0.1 ± 0.2	0.1 ± 0.3	0.0 ± 0.2	0.0 ± 0.2	-0.1 ± 0.2	<0.001
Meat	0.1 ± 0.6	-0.1 ± 0.6	-0.1 ± 0.7	-0.2 ± 0.6	-0.2 ± 0.8	<0.001
Miscellaneous animal-based foods	-0.2 ± 1.2	-0.1 ± 0.7	-0.1 ± 1.0	-0.3 ± 1.4	-0.4 ± 2.3	0.035
<i>Food groups, servings/day</i>						
Healthy plant foods	4.6 ± 3.9	2.6 ± 3.6	1.3 ± 3.6	1.3 ± 3.7	-1.5 ± 3.9	<0.001
Less healthy plant foods	-3.0 ± 2.7	-2.5 ± 2.1	-2.0 ± 2.1	-1.7 ± 2.0	-1.1 ± 2.2	<0.001
Animal foods	1.2 ± 2.4	0.8 ± 2.2	0.2 ± 2.2	-0.4 ± 2.4	-0.8 ± 3.0	<0.001

Supplementary data

¹Values are means \pm SDs changes from baseline (1995) to follow-up (2011). Food group intakes are expressed as servings/day. P is calculated based on the univariate general linear regression model using each index score change as a continuous variable. *n*, the number of observations.

Supplementary data

Supplemental Table 2 Cross-sectional associations of plasma adiposity-associated biomarker concentrations with quintiles of overall plant-based diet index (PDI) in 1995 and 2011 in the Nurses' Health study II ¹

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	% difference/10-point changes (95% CIs)	P-trend
Baseline, <i>n</i>	212	206	135	155	123		
Follow-up, <i>n</i>	112	173	147	215	184		
PDI, median (range)	49 (30-51)	54 (52-55)	57 (56-58)	61 (59-62)	65 (63-78)		
Adiponectin, ng/mL							
Multivariable ²	7.1 (6.7, 7.5)	7.1 (6.7, 7.6)	7.3 (6.9, 7.7)	7.3 (6.9, 7.7)	7.3 (6.8, 7.7)	1.8 (-1.2, 4.9)	0.25
Multivariable+ BMI	7.0 (6.7, 7.4)	7.0 (6.7, 7.4)	7.1 (6.7, 7.6)	7.2 (6.8, 7.6)	7.1 (6.7, 7.5)	1.1 (-1.8, 4.1)	0.47
Leptin, ng/mL							
Multivariable	18.8 (16.9, 20.9)	18.3 (16.5, 20.3)	17.0 (15.2, 18.9)	17.8 (16.1, 19.8)	18.0 (16.1, 20.1)	-3.1 (-8.5, 2.7)	0.29
Multivariable+ BMI	18.2 (16.7, 19.8)	18.1 (16.6, 19.6)	17.3 (15.9, 18.8)	17.6 (16.2, 19.2)	17.8 (16.3, 19.4)	-1.7 (-6.4, 3.3)	0.50
sOB-R, ng/mL							
Multivariable	23.8 (22.9, 24.7)	24.2 (23.3, 25.1)	24.8 (23.9, 25.7)	24.2 (23.3, 25.1)	24.6 (23.7, 25.5)	1.8 (-0.2, 3.8)	0.08
Multivariable+ BMI	23.8 (23.0, 24.6)	24.1 (23.3, 24.9)	24.5 (23.6, 25.3)	24.0 (23.2, 24.9)	24.2 (23.4, 25.1)	0.9 (-1.0, 2.9)	0.34
Free leptin index³							
Multivariable	0.8 (0.7, 0.9)	0.8 (0.7, 0.9)	0.7 (0.6, 0.8)	0.7 (0.6, 0.8)	0.7 (0.6, 0.8)	-5.6 (-12.0, 1.2)	0.11
Multivariable+ BMI	0.8 (0.7, 0.8)	0.8 (0.7, 0.8)	0.7 (0.6, 0.8)	0.7 (0.7, 0.8)	0.7 (0.7, 0.8)	-3.2 (-8.8, 2.8)	0.29
Insulin, uU/mL							
Multivariable	6.1 (5.5, 6.7)	5.4 (4.9, 6.0)	5.4 (4.9, 6.0)	5.3 (4.8, 5.9)	5.2 (4.7, 5.8)	-8.1 (-13.6, -2.3)	0.007
Multivariable+ BMI	6.0 (5.4, 6.6)	5.4 (4.9, 5.9)	5.6 (5.0, 6.1)	5.4 (4.9, 6.0)	5.5 (5.0, 6.1)	-4.1 (-9.4, 1.5)	0.15
RBP-4, µg/mL							
Multivariable	36.7 (35.5, 37.8)	36.7 (35.6, 37.9)	35.5 (34.4, 36.6)	35.6 (34.5, 36.8)	36.0 (34.8, 37.1)	-1.8 (-3.6, 0.0)	0.05
Multivariable+ BMI	36.5 (35.4, 37.7)	36.6 (35.5, 37.8)	35.5 (34.4, 36.6)	35.6 (34.5, 36.7)	36.0 (34.9, 37.2)	-1.5 (-3.3, 0.3)	0.11
hsCRP, mg/L							
Multivariable	1.11 (0.92, 1.33)	1.08 (0.90, 1.28)	1.02 (0.85, 1.22)	0.98 (0.82, 1.17)	0.90 (0.75, 1.09)	-11.8 (-20.5, -2.2)	0.018
Multivariable+ BMI	1.08 (0.91, 1.28)	1.08 (0.92, 1.28)	1.06 (0.90, 1.26)	1.00 (0.84, 1.18)	0.96 (0.81, 1.14)	-7.5 (-16.1, 2.0)	0.12
IL-6, pg/mL							
Multivariable	0.86 (0.78, 0.94)	0.89 (0.81, 0.97)	0.92 (0.84, 1.01)	0.92 (0.84, 1.01)	0.88 (0.80, 0.96)	2.4 (-3.1, 8.2)	0.40
Multivariable+ BMI	0.84 (0.76, 0.91)	0.88 (0.80, 0.96)	0.93 (0.85, 1.02)	0.92 (0.85, 1.01)	0.90 (0.82, 0.99)	5.5 (0.0, 11.3)	0.05

¹Values are least squares geometric means (95% CIs) from linear mixed model to account for within-person correlation between the two blood measurement time points.

²Adjusted for age, time period, total energy intake, alcohol intake, smoking status, physical activity, menopausal status, postmenopausal hormone use, hypertension, and hypercholesterolemia.

³Free leptin index is defined as the ratio of leptin to soluble leptin receptor.

BMI, body mass index; hsCRP, high-sensitivity C-reactive protein; IL-6, interleukin-6; *n*, the number of observations; PDI, overall plant-based diet index; RBP-4, retinol-binding protein-4; sOB-R, soluble leptin receptor.

Supplementary data

Supplemental Table 3 Percentage changes in plasma adiposity-associated biomarker concentrations across quintiles of overall plant-based diet index (PDI) change between 1995 and 2011 in the Nurses' Health study II¹

	Quintile1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P-trend
<i>n</i>	161	162	197	131	180	
Median (range)	-6 (-18, -4)	-1.5 (-3, 0)	3 (1, 4)	6 (5, 7)	10 (8, 27)	
Adiponectin						
Multivariable ²	0.5 (-7.7, 9.5)	5.9 (-2.7, 15.3)	1.0 (-6.9, 9.6)	1.0 (-7.3, 10.0)	0.5 (-8.0, 9.8)	0.55
Multivariable+ Wt change	3.2 (-4.9, 12.0)	8.6 (0.1, 17.7)	2.3 (-5.4, 10.5)	4.1 (-4.0, 13.0)	3.1 (-5.2, 12.1)	0.52
Leptin						
Multivariable	39.2 (18.2, 64.0)	24.8 (6.1, 46.8)	38.9 (18.8, 62.3)	43.7 (22.0, 69.2)	34.0 (13.2, 58.7)	0.71
Multivariable+ Wt change	29.0 (12.5, 48.0)	17.1 (2.2, 34.1)	32.8 (16.6, 51.4)	30.8 (14.0, 50.1)	22.7 (6.5, 41.3)	0.88
sOB-R						
Multivariable	-3.4 (-8.6, 2.2)	-1.4 (-6.7, 4.2)	-2.3 (-7.4, 3.0)	-4.3 (-9.5, 1.2)	-2.5 (-8.0, 3.2)	0.91
Multivariable+ Wt change	-2.0 (-7.1, 3.4)	-0.1 (-5.3, 5.3)	-1.7 (-6.5, 3.5)	-2.5 (-7.6, 2.8)	-0.9 (-6.2, 4.7)	0.99
Free leptin index³						
Multivariable	43.3 (17.2, 75.2)	29.5 (6.2, 58.0)	40.7 (16.2, 70.4)	50.9 (23.5, 84.5)	38.5 (12.7, 70.3)	0.73
Multivariable+ Wt change	32.0 (11.0, 56.9)	21.4 (2.3, 44.0)	34.9 (14.4, 58.9)	37.0 (15.2, 62.9)	26.4 (5.9, 51.0)	0.83
Insulin						
Multivariable	23.1 (2.0, 48.5)	28.6 (6.9, 54.6)	29.0 (8.0, 54.1)	23.1 (2.1, 48.4)	18.6 (-2.0, 43.5)	0.57
Multivariable+ Wt change	18.7 (-0.7, 41.9)	24.8 (4.7, 48.7)	26.4 (6.8, 49.7)	17.3 (-1.9, 40.2)	13.3 (-5.5, 35.9)	0.45
RBP-4						
Multivariable	12.6 (6.6, 18.9)	11.0 (5.1, 17.1)	14.1 (8.3, 20.3)	9.4 (3.6, 15.6)	9.3 (3.4, 15.7)	0.29
Multivariable+ Wt change	12.1 (6.1, 18.4)	10.6 (4.8, 16.7)	13.9 (8.1, 19.9)	8.9 (3.0, 15.0)	8.8 (2.8, 15.1)	0.27
hsCRP						
Multivariable	9.0 (-17.6, 44.3)	3.9 (-21.2, 37.0)	0.6 (-23.0, 31.5)	-3.4 (-27.1, 27.9)	12.7 (-15.5, 50.4)	0.98
Multivariable+ Wt change	2.6 (-21.5, 34.1)	-2.0 (-24.8, 27.7)	-2.2 (-24.2, 26.2)	-10.7 (-31.7, 16.8)	4.6 (-20.6, 37.7)	0.92
IL-6						
Multivariable	12.7 (-4.5, 33.1)	9.0 (-7.5, 28.5)	10.6 (-5.5, 29.6)	19.7 (1.3, 41.4)	19.3 (0.6, 41.6)	0.27
Multivariable+ Wt change	11.4 (-5.6, 31.5)	7.7 (-8.7, 27.0)	10.3 (-5.8, 29.1)	17.8 (-0.4, 39.2)	17.8 (-0.7, 39.8)	0.27

¹Values are adjusted least squares percent changes (95% CIs) in plasma biomarker concentrations from general linear model.

²Adjusted for age at the first blood measurement, changes in total energy intake, alcohol intake, smoking status, physical activity, menopausal status, postmenopausal hormone use, hypertension, hypercholesterolemia, baseline BMI, baseline overall plant-based diet index, and baseline corresponding biomarker concentrations.

³Free leptin index is defined as the ratio of leptin to soluble leptin receptor.

hsCRP, high-sensitivity C-reactive protein; IL-6, interleukin-6; *n*, the number of observations; PDI, overall plant-based diet index; RBP-4, retinol-binding protein-4; sOB-R, soluble leptin receptor; Wt, weight.