Supplementary Materials

Association between pre- and post-diagnosis Healthy Eating Index 2020 and ovarian cancer survival: evidence from a prospective cohort study

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Supplementary Table S1. Healthy Eating Index (HEI)-2020 components and scoring standards [1]

Components	Maximum points	Standard for maximum score	Standard for minimum score of zero
		HEI-2020 applies to ages 2 and over	
Adequacy Components			
Total Fruits [2]	5	≥ 0.8 cup eq/1000 kcal	No Fruit
Whole Fruits [3]	5	≥ 0.4 cup eq/1000 kcal	No Whole Fruit
Total Vegetables [4]	5	≥ 1.1 cup eq/1000 kcal	No Vegetables
Greens and Beans [4]	5	≥ 0.2 cup eq/1000 kcal	No Dark Green Vegetables or Legumes
Whole Grains	10	≥ 1 .5 oz eq/1000 kcal	No Whole Grains
Dairy [5]	10	≥ 1.3 cup eq/1000 kcal	No Dairy
Total Protein Foods [6]	5	≥ 2.5 oz eq/1000 kcal	No Protein Foods
Seafood and Plant Proteins [6,7]	5	≥ 0.8 oz eq/1000 kcal	No Seafood or Plant Proteins
Fatty Acids [8]	10	(PUFAs + MUFAs)/SFAs ≥ 2.5	(PUFAs + MUFAs)/SFAs ≤ 1.2
Moderation components			
Refined Grains	10	≤ 1.8 oz eq/1000 kcal	≥ 4.3 oz eq/1000 kcal
Sodium	10	≤ 1.1 g eq/1000 kcal	≥ 2.0 g eq/1000 kcal
Added Sugars	10	< 6.5% of energy	≥ 26% of energy
Saturated Fats	10	≤ 8% of energy	≥ 16% of energy

eq, equivalents; g, grams; HEI, healthy eating index; MUFAS, monounsaturated fatty acids; oz, ounce; PUFAs, polyunsaturated fatty acids; SFAs, saturated fatty acids.

[1] The HEI-2020 components and scoring standards are the same as the HEI-2015. Intakes between the minimum and maximum standards are scored proportionately.

[2] Includes 100% fruit juice.

[3] Includes all forms except juice.

[4] Includes legumes (beans and peas).

[5] Includes all milk products, such as fluid milk, yogurt, and cheese, and fortified soy beverages.

[6] Includes legumes (beans and peas).

[7] Includes seafood, nuts, seeds, soy products (other than beverages), and beans, peas, and lentils.

[8] Ratio of poly- and monounsaturated fatty acids to saturated fatty acids.

Supplementary Table S2. Median (IQR) score of healthy eating index-2020 [1] components according to tertiles of pre-diagnosis and post-diagnosis dietary scores (N = 549)

Components	Pre-diagnosis HEI score			*P*-value	Post-diagnosis HEI score			*P*-value
	Tertile 1	Tertile 2	Tertile 3		Tertile 1	Tertile 2	Tertile 3	
Total	48.02 (44.39-49.69)	53.42 (52.58-54.76)	58.62 (57.27-60.45)		50.43 (47.55-52.07)	55.07 (54.35-56.18)	59.00 (57.66-61.48)	
Total Fruits [2]	2.37 (1.40-3.95)	4.91 (3.23-5.00)	5.00 (4.63-5.00)	< 0.01	3.84 (2.26-5.00)	5.00 (4.25-5.00)	5.00 (5.00-5.00)	< 0.01
Whole Fruits [3]	4.18 (2.34-5.00)	5.00 (5.00-5.00)	5.00 (5.00-5.00)	< 0.01	5.00 (3.93-5.00)	5.00 (5.00-5.00)	5.00 (5.00-5.00)	< 0.01
Total Vegetables [4]	4.18 (3.33-5.00)	5.00 (4.60-5.00)	5.00 (5.00-5.00)	< 0.01	5.00 (3.64-5.00)	5.00 (5.00-5.00)	5.00 (5.00-5.00)	< 0.01
Greens and Beans [4]	3.60 (2.57-5.00)	4.87 (3.74-5.00)	5.00 (5.00-5.00)	< 0.01	3.58 (2.15-5.00)	5.00 (3.69-5.00)	5.00 (4.97-5.00)	< 0.01
Whole Grains	0.16 (0.07-0.37)	0.22 (0.12-0.44)	0.36 (0.11-0.82)	< 0.01	0.24 (0.14-0.45)	0.37 (0.17-0.64)	0.44 (0.22-0.89)	< 0.01
Dairy [5]	0.76 (0.31-2.39)	1.13 (0.30-2.84)	0.86 (0.00-2.89)	0.34	1.50 (0.39-3.47)	2.41 (0.86-4.26)	2.55 (0.75-4.42)	< 0.01
Total Protein Foods [6]	5.00 (4.37-5.00)	5.00 (5.00-5.00)	5.00 (5.00-5.00)	< 0.01	5.00 (5.00-5.00)	5.00 (5.00-5.00)	5.00 (5.00-5.00)	< 0.01
Seafood and Plant Proteins [6,7]	5.00 (5.00-5.00)	5.00 (5.00-5.00)	5.00 (5.00-5.00)	< 0.01	5.00 (5.00-5.00)	5.00 (5.00-5.00)	5.00 (5.00-5.00)	< 0.01
Fatty Acids [8]	1.75 (0.18-3.27)	3.16 (1.84-4.58)	6.32 (3.98-9.37)	< 0.01	1.76 (0.26-3.30)	2.79 (1.15-4.50)	5.45 (2.76-7.48)	< 0.01
Refined Grains	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.99)	< 0.01	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.25 (0.00-2.88)	< 0.01
Sodium	10.00 (10.00-10.00)	10.00 (10.00-10.00)	10.00 (10.00-10.00)	0.12	10.00 (10.00-10.00)	10.00 (10.00-10.00)	10.00 (10.00-10.00)	0.90
Added Sugars	10.00 (10.00-10.00)	10.00 (10.00-10.00)	10.00 (10.00-10.00)	< 0.01	10.00 (10.00-10.00)	10.00 (10.00-10.00)	10.00 (10.00-10.00)	< 0.01
Saturated Fats	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.13	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.00 (0.00-0.00)	0.25

HEI, healthy eating index; IQR, interquartile.

[1] Intakes between the minimum and maximum standards are scored proportionately.

[2] Includes 100% fruit juice.

[3] Includes all forms except juice.

[4] Includes legumes (beans and peas).

[5] Includes all milk products, such as fluid milk, yogurt, and cheese, and fortified soy beverages.

[6] Includes legumes (beans and peas).

[7] Includes seafood, nuts, seeds, soy products (other than beverages), and legumes (beans and peas).

[8] Ratio of poly- and monounsaturated fatty acids (PUFAs and MUFAs) to saturated fatty acids (SFAs).

Supplementary Table S3. Median (IQR) intake of healthy eating index-2020 components according to tertiles of pre-diagnosis and post-diagnosis dietary scores (N = 549)

Components	Pre-diagnosis HEI score			P-value	Post-diagnosis HEI score			P-value
	Tertile 1	Tertile 2	Tertile 3		Tertile 1	Tertile 2	Tertile 3	
Total Fruits, cup eq/1000 kcal	0.38 (0.22-0.63)	0.79 (0.52-1.17)	0.99 (0.74-1.45)	< 0.01	0.61 (0.36-0.97)	0.97 (0.68-1.35)	1.30 (0.97-1.72)	< 0.01
Whole Fruits, cup eq/1000 kcal	0.33 (0.19-0.57)	0.72 (0.46-1.07)	0.90 (0.65-1.39)	< 0.01	0.52 (0.31-0.85)	0.86 (0.59-1.22)	1.21 (0.79-1.62)	< 0.01
Total Vegetables, cup eq/1000 kcal	0.92 (0.73-1.35)	1.27 (1.01-1.62)	1.66 (1.21-2.17)	< 0.01	1.12 (0.80-1.51)	1.45 (1.19-1.76)	1.71 (1.39-2.03)	< 0.01
Greens and Beans, cup eq/1000 kcal	0.14 (0.10-0.21)	0.19 (0.15-0.27)	0.29 (0.20-0.40)	< 0.01	0.14 (0.09-0.21)	0.20 (0.15-0.28)	0.25 (0.20-0.31)	< 0.01
Whole Grains, oz eq/1000 kcal	0.02 (0.01-0.06)	0.03 (0.02-0.07)	0.05 (0.02-0.12)	< 0.01	0.04 (0.02-0.07)	0.06 (0.03-0.10)	0.07 (0.03-0.13)	< 0.01
Dairy, cup eq/1000 kcal	0.10 (0.04-0.31)	0.15 (0.04-0.37)	0.11 (0.00-0.38)	0.34	0.19 (0.05-0.45)	0.31 (0.11-0.55)	0.33 (0.10-0.57)	< 0.01
Total Protein Foods, oz eq/1000 kcal	3.19 (2.19-4.52)	3.87 (2.95-5.00)	4.44 (3.25-5.48)	< 0.01	3.69 (2.63-4.52)	4.70 (3.89-5.63)	4.74 (3.49-6.19)	< 0.01
Seafood and Plant Proteins, cup eq/1000 kcal	1.53 (0.93-2.47)	2.13 (1.49-3.00)	3.01 (1.96-4.34)	< 0.01	1.81 (1.08-2.63)	2.70 (1.82-3.72)	3.18 (2.14-4.31)	< 0.01
Fatty Acids, (PUFAs + MUFAs)/SFAs	1.43 (1.22-1.63)	1.61 (1.44-1.80)	2.02 (1.72-2.42)	< 0.01	1.43 (1.23-1.63)	1.56 (1.35-1.78)	1.91 (1.56-2.17)	< 0.01
Refined Grains, oz eq/1000 kcal	6.33 (5.27-7.21)	5.94 (5.03-6.95)	5.12 (4.05-6.26)	< 0.01	6.19 (5.10-7.32)	5.28 (4.66-6.22)	4.24 (3.58-5.32)	< 0.01
Sodium, g eq/1000 kcal	0.60 (0.50-0.76)	0.64 (0.51-0.74)	0.66 (0.53-0.79)	0.07	0.63 (0.52-0.74)	0.69 (0.56-0.83)	0.70 (0.61-0.82)	< 0.01
Added Sugars, % of energy	3.14 (1.25-6.13)	2.35 (1.03-4.19)	1.60 (0.38-3.57)	< 0.01	3.13 (1.20-5.61)	3.04 (1.87-4.44)	2.97 (1.18-4.76)	0.36
Saturated Fats, % of energy	21.25 (18.13-24.55)	21.69 (18.75-25.58)	22.37 (17.99-26.72)	0.15	22.77 (18.87-26.17)	25.85 (22.04-28.31)	25.67 (21.71-28.93)	< 0.01

eq, equivalents; g, grams; HEI, healthy eating index; IQR, interquartile; MUFAS, monounsaturated fatty acids; oz, ounce; PUFAs, polyunsaturated fatty acids; SFAs, saturated fatty acids.

Supplementary Table S4. Association between selected clinical characteristics and total mortality among women diagnosed with ovarian cancer (N = 549)

Characteristic	No. of deaths/patients	HR (95% CI) *
Age at diagnosis (years)		
≤ 50	77/205	1.00 (Ref)
> 50	129/344	0.89 (0.66, 1.19)
Histological type		
HGSC	165/397	1.00 (Ref)
Non-HGSC	41/152	1.01 (0.70-1.47)
FIGO stage		
I-II	45/221	1.00 (Ref)
III-IV	161/328	2.85 (1.98-4.11)
Residual lesions		
No	133/435	1.00 (Ref)
Yes	73/114	1.93 (1.43-2.61)
Comorbidities		
No	117/322	1.00 (Ref)
Yes	89/227	1.18 (0.88-1.56)

CI, confidence interval; FIGO, International Federation of Gynecology and Obstetrics stage; HR, hazard ratio; HGSC, high-grade serous carcinoma; Ref, reference.

* Mutually adjusted for all other variables listed in the table.

Supplementary Table S5. Hazard Ratios (95% CI) for overall survival among patients with ovarian cancer by categories of healthy eating index-2020 score change groups (N = 549)

HEI score	Total cases, n	Deaths, n	HR (95% CI) *
High-High	166	48	1.00 (Ref)
Low-Low	166	67	1.38 (0.78, 2.45)
Low-High	108	44	1.31 (0.72, 2.40)
High-Low	109	47	1.42 (0.91, 2.23)

CI, confidence interval; HEI, healthy eating index; HR, hazard ratio; Ref, reference.

* Adjusted for age at diagnosis, education, income, initial smoking status, initial diet quality score, initial total energy intake, initial physical activity, initial body mass index, change in smoking status, change in physical activity, change in body mass index, change in total energy intake, FIGO stage, histological type, and residual lesions.

Supplementary Table S6. Hazard Ratios (95% CI) for ovarian cancer patients according to healthy eating index-2020 score stratified by age at diagnosis, BMI, FIGO stage, histological type, menopausal status and residual lesions (N = 549)

Characteristics	Deaths/ Total	Pre-diagnosis HEI score		*P* for interaction [c]	*P* for interaction [d]	Deaths/ Total	Post-diagnosis HEI score		*P* for interaction [c]	*P* for interaction [d]
		HR (95% CI) [a]	HR (95% CI) [b]				HR (95% CI) [a]	HR (95% CI) [b]		
Age at diagnosis (years)				0.09	0.01				0.21	0.07
≤ 50	77/205	0.83 (0.48-1.42)	0.45 (0.24-0.83)			77/205	0.53 (0.30, 0.93)	0.50 (0.27, 0.92)		
> 50	129/344	1.15 (0.74, 1.79)	0.95 (0.60, 1.50)			129/344	0.71 (0.45, 1.13)	0.78 (0.51, 1.19)		
Body mass index [e]				0.87	0.53				0.99	0.05
Normal	131/353	1.22 (0.79, 1.87)	0.62 (0.39, 0.99)			172/332	0.76 (0.52, 1.11)	0.72 (0.50, 1.05)		
Overweight	75/196	0.56 (0.32, 0.98)	0.70 (0.39, 1.26)			34/217	0.59 (0.24, 1.48)	0.42 (0.17, 1.02)		
FIGO stage				0.18	0.49				0.67	0.88
I-II	45/221	0.35 (0.16, 0.79)	0.41 (0.20, 0.85)			45/221	0.42 (0.20, 0.91)	0.56 (0.26, 1.21)		
III-IV	161/328	1.28 (0.88, 1.85)	0.76 (0.50, 1.15)			161/328	0.67 (0.44, 1.00)	0.68 (0.46, 1.00)		
Histological type				0.79	0.60				0.80	0.60
HGSC	165/397	1.03 (0.71, 1.50)	0.69 (0.47, 1.03)			171/419	0.76 (0.52, 1.12)	0.69 (0.48, 1.01)		
Non-HGSC	41/152	0.65 (0.28, 1.50)	0.48 (0.20, 1.15)			35/130	0.30 (0.11, 0.78)	0.61 (0.27, 1.40)		
Menopausal status				0.91	0.61				0.90	0.59
Yes	141/383	1.04 (0.69, 1.57)	0.69 (0.45, 1.06)			141/383	0.66 (0.42, 1.03)	0.69 (0.46, 1.03)		
No	65/166	0.92 (0.50, 1.68)	0.73 (0.36, 1.47)			65/166	0.61 (0.32, 1.17)	0.94 (0.46, 1.90)		
Residual lesions				0.24	0.95				0.70	0.83
Yes	73/114	1.07 (0.59, 1.93)	0.65 (0.36, 1.19)			73/114	0.60 (0.32, 1.10)	0.71 (0.40, 1.27)		

| No | 133/435 | 0.86 (0.57, 1.31) | 0.71 (0.45, 1.10) | | 133/435 | 0.68 (0.44, 1.05) | 0.66 (0.43, 1.01) |

CI, confidence interval; FIGO, International Federation of Gynecology and Obstetrics stage; HEI, healthy eating index; HGSC, high-grade serous carcinoma; HR, hazard ratio.

The Cox model stratified by age at diagnosis, body mass index, the FIGO stage, histological type, and residual lesions, with additional adjustments for age at diagnosis, body mass index (pre- and post-diagnosis), total energy intake (pre- and post-diagnosis), physical activity (pre- and post-diagnosis), cigarette smoking (pre- and post-diagnosis), education, income, histological type, FIGO stage, and residual lesions.

[a] Hazard ratio and 95% confidence interval (tertile 2 vs. tertile 1).

[b] Hazard ratio and 95% confidence interval (tertile 3 vs. tertile 1).

[c] *P*-value of the multiplicative interaction.

[d] *P*-value of the additive interaction.

[e] Normal, body mass index $\leq 23.9 \text{kg/m}^2$; overweight, body mass index $> 23.9 \text{kg/m}^2$

Supplementary Table S7. Hazard Ratios (95%CI) for overall survival among patients with ovarian cancer according to the 13 components of the healthy eating index-2020 (N = 549) *

| Components	Pre-diagnosis HR (95%CI) [1]	Post-diagnosis HR (95%CI) [1]
Adequacy Components [2]		
Total Fruits	1.01 (0.78-1.31)	0.86 (0.67-1.10)
Whole Fruits	0.84 (0.64-1.09)	0.99 (0.78-1.25)
Total Vegetables	0.99 (0.82-1.19)	0.94 (0.80-1.11)
Greens and Beans	1.04 (0.88-1.24)	0.77 (0.65-0.90)
Whole Grains	0.97 (0.83-1.12)	1.04 (0.89-1.20)
Dairy	1.00 (0.85-1.18)	0.95 (0.79-1.14)
Total Protein Foods	0.92 (0.75-1.12)	0.92 (0.78-1.09)
Seafood and Plant Proteins	1.15 (0.94-1.42)	1.07 (0.94-1.21)
Fatty Acids	0.78 (0.65-0.94)	1.01 (0.83-1.22)
Moderation components [3]		
Refined Grains	0.92 (0.77-1.12)	1.07 (0.92-1.24)
Sodium	1.07 (0.89-1.28)	1.07 (0.89-1.29)
Added Sugars	1.04 (0.89-1.21)	0.93 (0.81-1.07)
Saturated Fats	0.89 (0.75-1.07)	0.92 (0.80-1.06)

CI, confidence interval; HR, hazard ratio.

* Multivariable models are mutually adjusted for the 13 HEI components and are also adjusted for age at diagnosis, body mass index, total energy intake, physical activity, cigarette smoking, education, income, FIGO stage, histological type, and residual lesions.

[1] The hazard ratio is based on a one-unit change in the score for the component of interest.

[2] Constitutes food groupings with recommended minimum intakes (regarded as healthful foods).

[3] Constitutes food groupings with recommended maximum intakes (regarded as unhealthful

foods); this component is reverse scored, with lower consumption levels awarded higher scores.
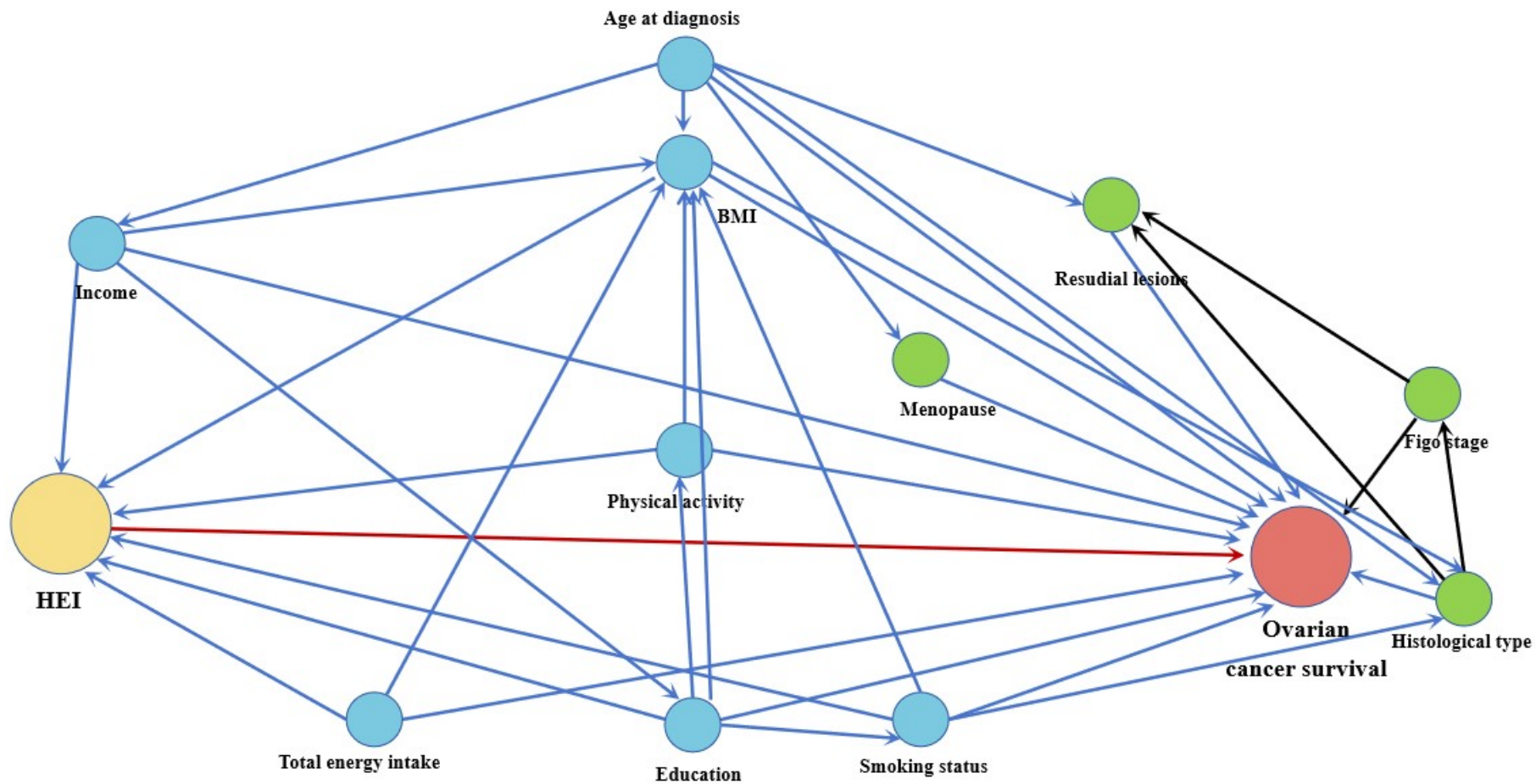
Supplementary Figure S1. Directed Acyclic Graph of the associations between Healthy Eating Index-2020 and ovarian cancer survival

The directed acyclic graph represents associations between covariates and primary exposure and outcome. Blue circles represent ancestorss of exposure and outcome (ie, confounders), green circles represent ancestors of the outcome (ie, causal determinants of the outcome). Red lines represent causal paths, blue lines represent biasing paths. The minimally sufficient adjustment set represents covariates such that the adjustment for this set of variables will minimize confounding bias when estimating the association between the exposure and the outcome. The final minimally sufficient adjustment set comprised age at diagnosis, body mass index, education, income,

physical activity, smoking status, total energy intake[1-17].

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