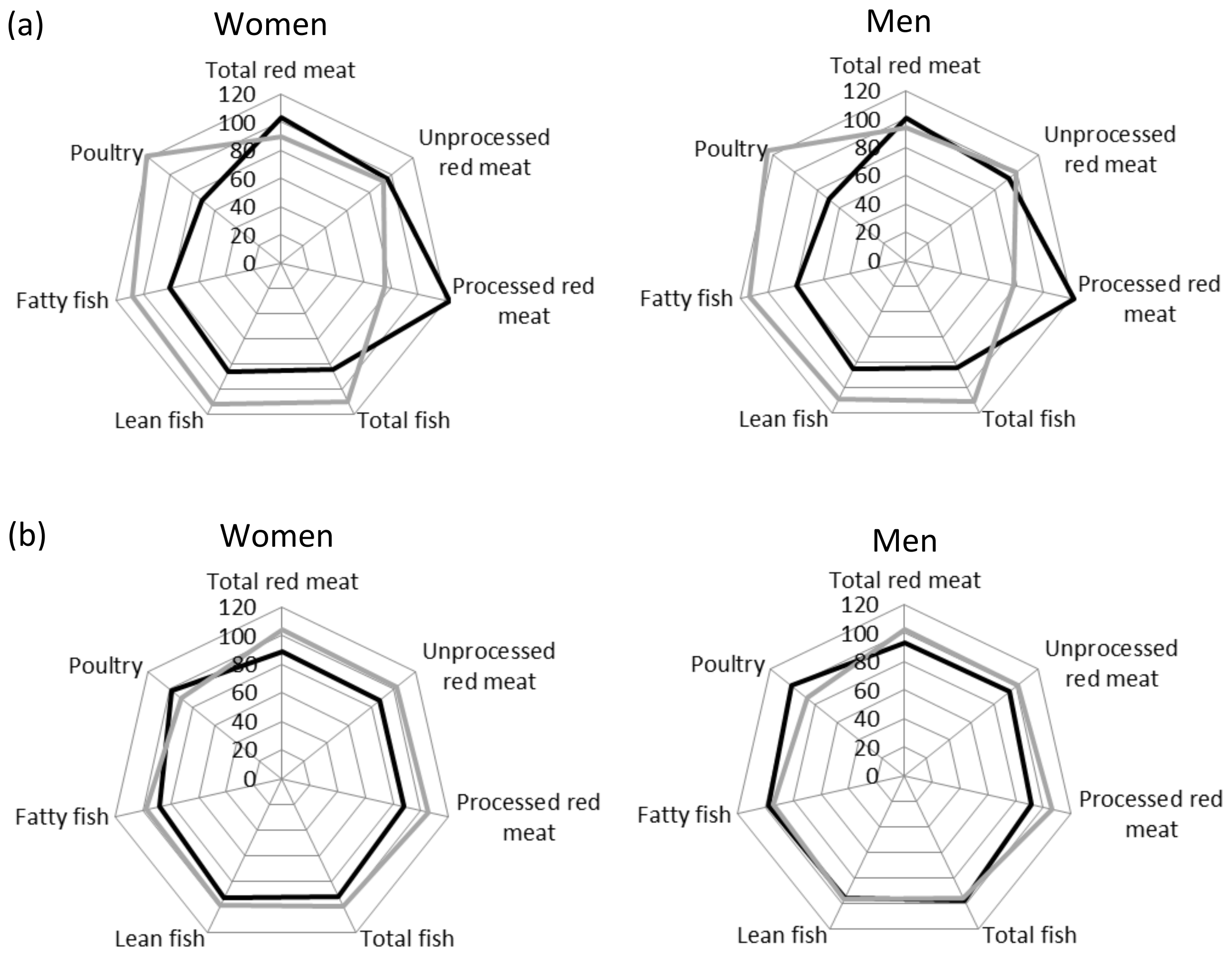
Supplemental material



S1 Figure. Radar charts illustrating the percentage-wise differences in median intakes of meat and fish items among women and men with the lowest (first quintile) and highest (fifth quintile) intakes of (a) total vegetables and (b) potatoes relative to the median intake (equivalent to 100%) of the particular meat or fish item among the entire study population of similar sex. All food variables were energy-adjusted using the residual method. Black line: first quintile. Grey line: fifth quintile.

S2 Table. HR (95% CI) for myocardial infarction per 250 kcal/week higher intake of meat, fish, vegetables or potatoes in the Diet, Cancer and Health study

HR (95% CI) per 250 kcal/week	Women (n=29,142/656)		
	Model 1a[1]	Model 1b[2]	Model 2[3]
Total red meat	1.08 (1.05-1.11)	1.03 (1.00-1.06)	1.01 (0.97-1.05)
Unprocessed red meat	1.10 (1.05-1.14)	1.05 (1.01-1.10)	1.03 (0.97-1.08)
Processed red meat	1.12 (1.07-1.18)	1.02 (0.97-1.08)	0.98 (0.91-1.05)
Total fish	0.91 (0.85-0.98)	0.93 (0.86-1.00)	0.92 (0.85-0.99)
Lean fish	1.02 (0.87-1.20)	1.00 (0.86-1.17)	1.05 (0.89-1.25)
Fatty fish	0.84 (0.76-0.93)	0.88 (0.80-0.97)	0.86 (0.77-0.96)
Poultry	0.97 (0.89-1.06)	0.98 (0.90-1.06)	0.98 (0.90-1.07)
Total vegetables	0.85 (0.79-0.91)	0.96 (0.89-1.03)	0.97 (0.89-1.05)
Potatoes	1.00 (0.96-1.04)	0.97 (0.93-1.02)	0.95 (0.90-1.00)

[1] Adjusted for age and total energy

[2] Model 1a further adjusted for alcohol abstain, alcohol intake, BMI, waist circumference, smoking, physical activity, duration of schooling, menopausal status and use of hormone replacement therapy

[3] Model 1b further adjusted mutually for the investigated food items and for fruits, sweets, soft drinks, lean dairy products, fatty dairy products, potato chips, refined cereals, wholegrain cereals and nuts

S3 Table. HR (95% CI) for myocardial infarction per 250 kcal/week higher intake of meat, fish, vegetables or potatoes in the Diet, Cancer and Health study

HR (95% CI) per 250 kcal/week	Men (n=26,029/1,694)		
	Model 1a[1]	Model 1b[2]	Model 2[3]
Total red meat	1.03 (1.02-1.05)	1.01 (1.00-1.03)	1.02 (0.99-1.04)
Unprocessed red meat	1.02 (1.00-1.04)	1.01 (0.99-1.03)	1.00 (0.98-1.03)
Processed red meat	1.06 (1.04-1.08)	1.02 (1.00-1.05)	1.03 (1.00-1.06)
Total fish	0.97 (0.94-1.01)	0.99 (0.95-1.02)	1.00 (0.96-1.04)
Lean fish	1.00 (0.92-1.09)	1.00 (0.92-1.09)	1.03 (0.94-1.13)
Fatty fish	0.95 (0.90-1.00)	0.98 (0.93-1.02)	0.99 (0.93-1.04)
Poultry	1.00 (0.96-1.05)	1.03 (0.98-1.07)	1.04 (0.99-1.09)
Total vegetables	0.90 (0.86-0.95)	0.99 (0.94-1.04)	1.02 (0.97-1.07)
Potatoes	1.02 (1.00-1.04)	1.00 (0.98-1.02)	1.01 (0.98-1.03)

[1] Adjusted for age and total energy

[2] Model 1a further adjusted for alcohol abstain, alcohol intake, BMI, waist circumference, smoking, physical activity and duration of schooling

[3] Model 1b further adjusted mutually for the investigated food items and for fruits, sweets, soft drinks, lean dairy products, fatty dairy products, potato chips, refined cereals, wholegrain cereals and nuts

S4 Table. HR (95% CI) for myocardial infarction associated with substitution of 250 kcal/week from red meat, poultry or fish with vegetables or potatoes in the Diet, Cancer and Health study

HR (95% CI) per 250 kcal/week	**Women (n=29,142/656)**		
	Model 1a[1]	Model 1b[2]	Model 2[3]
Vegetables			
Total vegetables for red meat	0.81 (0.75-0.88)	0.95 (0.88-1.02)	0.97 (0.89-1.05)
Total vegetables for unprocessed red meat	0.81 (0.74-0.88)	0.91 (0.84-1.00)	0.94 (0.86-1.03)
Total vegetables for processed red meat	0.82 (0.75-0.90)	0.97 (0.89-1.06)	0.99 (0.91-1.09)
Total vegetables for fish	0.94 (0.84-1.05)	1.05 (0.94-1.17)	1.06 (0.95-1.19)
Total vegetables for lean fish	0.73 (0.60-0.89)	0.88 (0.73-1.07)	0.92 (0.75-1.11)
Total vegetables for fatty fish	1.04 (0.91-1.18)	1.12 (0.98-1.27)	1.13 (0.99-1.29)
Total vegetables for poultry	0.85 (0.75-0.96)	0.98 (0.87-1.11)	0.99 (0.87-1.12)
Potatoes			
Potatoes for red meat	0.92 (0.87-0.98)	0.94 (0.89-0.99)	0.94 (0.89-1.00)
Potatoes for unprocessed red meat	0.92 (0.86-0.98)	0.91 (0.86-0.98)	0.92 (0.86-0.99)
Potatoes for processed red meat	0.93 (0.87-1.01)	0.97 (0.90-1.05)	0.97 (0.90-1.05)
Potatoes for fish	1.07 (0.98-1.16)	1.04 (0.95-1.13)	1.03 (0.95-1.13)
Potatoes for lean fish	0.84 (0.70-1.00)	0.88 (0.74-1.05)	0.90 (0.75-1.07)
Potatoes for fatty fish	1.19 (1.06-1.33)	1.12 (1.00-1.25)	1.10 (0.99-1.24)
Potatoes for poultry	0.96 (0.88-1.06)	0.97 (0.89-1.07)	0.96 (0.88-1.06)

[1] Adjusted for age and total energy

[2] Model 1a further adjusted for alcohol abstain, alcohol intake, BMI, waist circumference, smoking, physical activity, duration of schooling, menopausal status and use of hormone replacement therapy

[3] Model 1b further adjusted for fruits, sweets, soft drinks, lean dairy products, fatty dairy products, potato chips, refined cereals, wholegrain cereals and nuts

S5 Table. HR (95% CI) for myocardial infarction associated with substitution of 250 kcal/week from red meat, poultry or fish with vegetables or potatoes in the Diet, Cancer and Health study

HR (95% CI) per 250 kcal/week	**Men (n=26,029/1,694)**		
	Model 1a[1]	Model 1b[2]	Model 2[3]
Vegetables			
Total vegetables for red meat	0.89 (0.84-0.93)	0.97 (0.93-1.02)	0.99 (0.94-1.05)
Total vegetables for unprocessed red meat	0.91 (0.86-0.96)	0.99 (0.93-1.04)	1.01 (0.96-1.07)
Total vegetables for processed red meat	0.88 (0.84-0.92)	0.97 (0.92-1.02)	0.99 (0.94-1.04)
Total vegetables for fish	0.93 (0.87-0.99)	1.00 (0.94-1.07)	1.01 (0.95-1.08)
Total vegetables for lean fish	0.87 (0.78-0.96)	0.97 (0.87-1.08)	0.99 (0.89-1.10)
Total vegetables for fatty fish	0.95 (0.88-1.03)	1.01 (0.94-1.09)	1.02 (0.95-1.10)
Total vegetables for poultry	0.88 (0.82-0.95)	0.96 (0.89-1.03)	0.97 (0.90-1.05)
Potatoes			
Potatoes for red meat	0.98 (0.96-1.01)	0.99 (0.96-1.01)	0.99 (0.96-1.02)
Potatoes for unprocessed red meat	1.00 (0.97-1.03)	1.00 (0.97-1.03)	1.00 (0.97-1.03)
Potatoes for processed red meat	0.96 (0.94-0.99)	0.98 (0.95-1.01)	0.98 (0.95-1.01)
Potatoes for fish	1.03 (0.99-1.07)	1.01 (0.97-1.06)	1.01 (0.97-1.05)
Potatoes for lean fish	0.96 (0.88-1.06)	0.99 (0.90-1.08)	0.98 (0.90-1.08)
Potatoes for fatty fish	1.06 (1.00-1.12)	1.03 (0.97-1.09)	1.02 (0.96-1.08)
Potatoes for poultry	0.98 (0.93-1.03)	0.97 (0.92-1.02)	0.97 (0.92-1.02)

[1] Adjusted for age and total energy

[2] Model 1a further adjusted for alcohol abstain, alcohol intake, BMI, waist circumference, smoking, physical activity and duration of schooling

[3] Model 1b further adjusted for fruits, sweets, soft drinks, lean dairy products, fatty dairy products, potato chips, refined cereals, wholegrain cereals and nuts

S6 Text. Model equivalence of substitution models

In a model with three food groups (for simplicity), described by the variables x_1, x_2 and x_3, we want to estimate the association of "more x_2 (e.g. vegetables) at the expense of x_3 (e.g. red meat) in relation to the outcome", i.e. substituting x_2 for x_3.

The model used in this study (model A) can be written like this, where x_{total} = x_1+ x_2+x_3:

$$\ln(h(t;x)) = \ln(h_0(t)) + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_{total} \quad \text{(model A)}$$

The model used by for example Bernstein et al in the Harvard cohorts (model B) can be written like this:

$$\ln(h(t;x)) = \ln(h_0(t)) + \gamma_1 x_1 + \gamma_2 x_2 + \gamma_3 x_3 \quad \text{(model B)}$$

Model B can then be re-parametrised:

$$\begin{aligned}\ln(h(t;x)) &= \ln(h_0(t)) + \gamma_1 x_1 + \gamma_2 x_2 + \gamma_3 x_3 \\ &= \ln(h_0(t)) + \gamma_1 x_1 + \gamma_2 x_2 + \gamma_3 (x_1 + x_2 + x_3) - \gamma_3 x_1 - \gamma_3 x_2 \\ &= \ln(h_0(t)) + (\gamma_1 - \gamma_3) x_1 + (\gamma_2 - \gamma_3) x_2 + \gamma_3 x_{total}\end{aligned}$$

In model B, the parameters can be renamed and written like this:

$$\ln(h(t;x)) = \ln(h_0(t)) + \tilde{\beta}_1 x_1 + \tilde{\beta}_2 x_2 + \tilde{\beta}_3 x_{total},$$

in which $\tilde{\beta}_1 = \gamma_1 - \gamma_3$,

$\tilde{\beta}_2 = \gamma_2 - \gamma_3$ and

$\tilde{\beta}_3 = \gamma_3$.

Therefore, the two models are equivalent, and the parameter β_2 in model A is equivalent to $\gamma_2 - \gamma_3$ in model B.