

SUPPLEMENTAL MATERIAL

**Dietary Minerals and Incident Cardiovascular Outcomes
among Never-Smokers in a Danish Case–Cohort Study**

Table S1. Spearman correlation coefficient matrix for correlations between dietary and creatinine-adjusted urinary measures of minerals^a

	Dietary K	Dietary Mg	Dietary Ca	Urinary K	Urinary Mg	Urinary Ca
Heart Failure						
Dietary K	1.000					
Dietary Mg	0.93	1.000				
Dietary Ca	0.71	0.71	1.000			
Urinary K	0.01	-0.02	-0.04	1.000		
Urinary Mg	-0.01	-0.02	-0.03	0.44	1.000	
Urinary Ca	-0.03	-0.05	-0.03	0.32	0.57	1.000
AMI						
Dietary K	1.000					
Dietary Mg	0.91	1.000				
Dietary Ca	0.68	0.68	1.000			
Urinary K	0.07	0.04	0.09	1.000		
Urinary Mg	-0.03	-0.03	0.05	0.33	1.000	
Urinary Ca	-0.02	-0.02	0.07	0.29	0.63	1.000
Stroke						
Dietary K	1.000					
Dietary Mg	0.93	1.000				
Dietary Ca	0.71	0.71	1.000			
Urinary K	0.04	0.01	-0.01	1.000		
Urinary Mg	0.001	-0.002	-0.03	0.45	1.000	
Urinary Ca	-0.02	-0.03	-0.02	0.32	0.61	1.000

^aK=potassium; Mg = magnesium; Ca = calcium;

Table S2. Including Dietary Supplements: Adjusted hazard ratio (HR) for CVD outcomes per quartile of combined total intake (CTI) score (dietary intake and supplement intake dose) and per total individual intake level^a

	aHR (95% CI)			
	Heart Failure (n=1969)	AMI (n=1855)	Stroke (n=1594)	Composite AMI-Stroke Outcome (n=2276)
Combined total intake score (CTI) (points)				
Quartile 1	ref	ref	ref	ref
Quartile 2	0.86 (0.65, 1.13)	0.89 (0.68, 1.17)	0.88 (0.63, 1.22)	0.85 (0.68, 1.07)
Quartile 3	0.64 (0.47, 0.88)	0.84 (0.64, 1.11)	0.74 (0.52, 1.04)	0.80 (0.63, 1.01)
Quartile 4	0.75 (0.53, 1.05)	0.95 (0.72, 1.25)	0.83 (0.60, 1.16)	0.90 (0.71, 1.13)
Ca^a (mg/d)				
Quartile 1	ref	ref	ref	ref
Quartile 2	0.96 (0.73, 1.25)	0.85 (0.65, 1.12)	1.06 (0.77, 1.44)	0.95 (0.76, 1.20)
Quartile 3	0.93 (0.71, 1.23)	0.86 (0.66, 1.13)	0.85 (0.62, 1.18)	0.90 (0.71, 1.13)
Quartile 4	1.02 (0.78, 1.34)	0.88 (0.67, 1.16)	0.84 (0.60, 1.16)	0.91 (0.72, 1.14)
Mg^a (mg/d)				
Quartile 1	ref	ref	ref	ref
Quartile 2	1.01 (0.77, 1.33)	0.98 (0.75, 1.29)	0.85 (0.62, 1.17)	0.94 (0.75, 1.18)
Quartile 3	0.87 (0.66, 1.15)	0.87 (0.66, 1.15)	0.79 (0.57, 1.10)	0.90 (0.71, 1.15)
Quartile 4	1.03 (0.78, 1.36)	0.96 (0.73, 1.26)	0.78 (0.56, 1.09)	0.92 (0.73, 1.17)
K^a (mg/d)				
Quartile 1	ref	ref	ref	ref
Quartile 2	0.78 (0.66, 1.15)	0.89 (0.68, 1.17)	0.75 (0.55, 1.03)	0.92 (0.73, 1.15)
Quartile 3	0.93 (0.70, 1.22)	0.83 (0.63, 1.09)	0.66 (0.47, 0.91)	0.88 (0.70, 1.10)
Quartile 4	1.06 (0.80, 1.41)	1.01 (0.77, 1.33)	0.86 (0.62, 1.19)	0.99 (0.78, 1.26)

Note: Models adjusted for gender, education level, passive smoking, lifestyle factor index.

^aTotal individual intake (mg/d): summing dietary intake mg/d and supplemental intake (mg/d) for each mineral

Table S3A: Adjusted hazard ratio (aHR) for CVD outcomes per quartile of the combined dietary score and per quartile of creatinine adjusted urinary mineral concentrations (sex-stratified)

	WOMEN			MEN		
	aHR (95% CI)			aHR (95% CI)		
	Heart Failure (n=982)	AMI (n=857)	Stroke (n=790)	Heart Failure (n=987)	AMI (n=998)	Stroke (n=804)
Combined dietary intake score (points)^a						
Quartile 1	ref	ref	ref	ref	ref	ref
Quartile 2	0.73 (0.50, 1.07)	0.96 (0.66, 1.40)	0.82 (0.54, 1.25)	0.93 (0.60, 1.46)	0.76 (0.50, 1.15)	0.79 (0.48, 1.32)
Quartile 3	0.72 (0.48, 1.06)	0.68 (0.46, 1.00)	0.60 (0.39, 0.94)	0.85 (0.54, 1.34)	0.82 (0.54, 1.24)	0.66 (0.39, 1.09)
Quartile 4	0.94 (0.64, 1.39)	0.95 (0.62, 1.45)	0.72 (0.45, 1.16)	0.91 (0.59, 1.41)	0.85 (0.57, 1.27)	0.90 (0.56, 1.46)
Urinary Measures^b						
Ca (µg/ml)						
Quartile 1	ref	ref	ref	ref	ref	ref
Quartile 2	0.85 (0.58, 1.24)	1.07 (0.72, 1.60)	0.90 (0.58, 1.39)	0.90 (0.59, 1.38)	0.74 (0.51, 1.07)	0.82 (0.52, 1.28)
Quartile 3	0.70 (0.67, 1.05)	0.65 (0.43, 0.97)	0.53 (0.34, 0.84)	0.75 (0.48, 1.16)	0.75 (0.52, 1.08)	0.69 (0.44, 1.10)
Quartile 4	0.80 (0.51, 1.26)	0.79 (0.53, 1.20)	0.75 (0.48, 1.18)	0.64 (0.40, 1.00)	0.80 (0.55, 2.25)	0.70 (0.44, 1.10)
Mg (µg/ml)						
Quartile 1	ref	ref	ref	ref	ref	ref
Quartile 2	0.84 (0.57, 1.21)	1.07 (0.72, 1.60)	0.73 (0.44, 1.22)	0.74 (0.48, 1.14)	0.76 (0.53, 1.09)	1.12 (0.72, 1.75)
Quartile 3	0.90 (0.59, 1.36)	0.70 (0.46, 1.05)	0.86 (0.54, 1.37)	0.60 (0.38, 0.97)	0.83 (0.58, 1.20)	0.69 (0.44, 1.10)
Quartile 4	0.87 (0.55, 1.36)	0.78 (0.52, 1.17)	0.62 (0.39, 0.97)	0.71 (0.43, 1.18)	1.07 (0.75, 1.54)	0.97 (0.62, 1.53)
K (µg/ml)						
Quartile 1	ref	ref	ref	ref	ref	ref
Quartile 2	1.08 (0.74, 1.57)	0.77 (0.51, 1.15)	1.06 (0.68, 1.66)	1.11 (0.71, 1.75)	0.73 (0.51, 1.05)	0.94 (0.60, 1.49)
Quartile 3	1.34 (0.87, 2.08)	0.73 (0.48, 1.09)	0.92 (0.58, 1.45)	0.92 (0.57, 1.50)	1.07 (0.75, 1.53)	1.01 (0.64, 1.60)
Quartile 4	0.98 (0.60, 1.61)	0.86 (0.58, 1.28)	0.74 (0.60, 1.48)	1.20 (0.70, 2.04)	1.04 (0.73, 1.50)	0.93 (0.59, 1.48)

^aModels adjusted for sex, education level, passive smoking, lifestyle factor index

^bModels adjusted for sex, education level, energy intake, passive smoking, lifestyle factor, creatinine

Table S3B: Adjusted hazard ratio (aHR) for composite AMI-Stroke outcome per quartile of the combined dietary score and per quartile of creatinine adjusted urinary mineral concentrations (sex-stratified)

	WOMEN (n=1076)	MEN (n=1200)
aHR (95% CI)		
Combined AMI-Stroke Outcome		
Combined dietary intake score (points)^a		
Quartile 1	ref	ref
Quartile 2	0.93 (0.68, 1.30)	0.73 (0.53, 1.03)
Quartile 3	0.79 (0.57, 1.09)	0.79 (0.57, 1.11)
Quartile 4	0.84 (0.61, 1.17)	0.83 (0.60, 1.15)
Urinary Measures^b		
Ca (µg/ml)		
Quartile 1	ref	ref
Quartile 2	1.03 (0.71, 1.48)	0.86 (0.645, 1.14)
Quartile 3	0.74 (0.52, 1.05)	0.95 (0.71, 1.28)
Quartile 4	0.80 (0.58, 1.10)	0.90 (0.64, 1.26)
Mg (µg/ml)		
Quartile 1	ref	ref
Quartile 2	0.93 (0.64, 1.36)	0.86 (0.66, 1.15)
Quartile 3	0.85 (0.60, 1.20)	0.93 (0.70, 1.26)
Quartile 4	0.74 (0.53, 1.04)	1.06 (0.76, 1.50)
K (µg/ml)		
Quartile 1	ref	ref
Quartile 2	0.73 (0.50, 1.07)	1.12 (0.85, 1.48)
Quartile 3	0.78 (0.55, 1.12)	1.11 (0.83, 1.50)
Quartile 4	0.83 (0.59, 1.16)	1.08 (0.76, 1.53)

^aModels adjusted for sex, education level, passive smoking, lifestyle factor index

^bModels adjusted for sex, education level, energy intake, passive smoking, lifestyle factor index, creatinine

Table S4: Adjusted hazard ratio (HR) for CVD outcomes per quartile of urinary mineral concentrations, creatinine-standardized and creatinine adjusted models

Urinary Minerals	Creatinine standardized model ^a	Creatinine adjusted model ^b
	(mg/g creatinine)	(µg/ml)
Stroke		
Ca		
Quartile 1	ref	ref
Quartile 2	0.82 (0.60, 1.12)	1.08 (0.75, 1.55)
Quartile 3	0.70 (0.51, 0.96)	0.75 (0.51, 1.12)
Quartile 4	0.62 (0.45, 0.87)	0.73 (0.48, 1.10)
Mg		
Quartile 1	ref	ref
Quartile 2	0.82 (0.60, 1.12)	0.92 (0.64, 1.33)
Quartile 3	0.98 (0.71, 1.34)	0.66 (0.44, 0.97)
Quartile 4	0.74 (0.53, 1.04)	0.94 (0.62, 1.43)
K		
Quartile 1	ref	ref
Quartile 2	1.03 (0.75, 1.42)	1.00 (0.69, 1.45)
Quartile 3	1.03 (0.74, 1.42)	1.06 (0.69, 1.62)
Quartile 4	0.95 (0.68, 1.32)	1.07 (0.67, 1.72)
AMI		
Ca		
Quartile 1	ref	ref
Quartile 2	0.78 (0.60, 1.02)	0.81 (0.61, 1.07)
Quartile 3	0.79 (0.60, 1.04)	0.85 (0.63, 1.14)
Quartile 4	0.81 (0.62, 1.07)	0.80 (0.58, 1.09)
Mg		
Quartile 1	ref	ref
Quartile 2	0.88 (0.67, 1.15)	1.09 (0.82, 1.44)
Quartile 3	0.90 (0.68, 1.18)	0.89 (0.65, 1.22)
Quartile 4	0.92 (0.69, 1.22)	0.99 (0.71, 1.39)
K		
Quartile 1	ref	ref
Quartile 2	0.96 (0.73, 1.25)	1.11 (0.84, 1.47)
Quartile 3	0.99 (0.75, 1.29)	1.10 (0.80, 1.51)
Quartile 4	1.01 (0.76, 1.34)	0.98 (0.69, 1.40)
Heart Failure		
Ca		
Quartile 1	ref	ref
Quartile 2	0.82 (0.62, 1.07)	0.89 (0.67, 1.18)
Quartile 3	0.67 (0.51, 0.88)	0.74 (0.55, 0.99)
Quartile 4	0.68 (0.51, 0.89)	0.71 (0.52, 0.96)
Mg		
Quartile 1	ref	ref
Quartile 2	0.86 (0.66, 1.13)	0.82 (0.62, 1.08)
Quartile 3	0.93 (0.71, 1.22)	0.77 (0.56, 1.04)
Quartile 4	0.91 (0.69, 1.21)	0.81 (0.58, 1.13)
K		
Quartile 1	ref	ref
Quartile 2	0.91 (0.69, 1.19)	1.11 (0.84, 1.47)
Quartile 3	1.02 (0.78, 1.34)	1.09 (0.79, 1.50)
Quartile 4	0.90 (0.67, 1.19)	1.09 (0.77, 1.56)

Composite AMI-Stroke

Ca

Quartile 1	ref	ref
Quartile 2	0.92 (0.74, 1.13)	0.95 (0.76, 1.20)
Quartile 3	0.86 (0.70, 1.07)	0.94 (0.75, 1.18)
Quartile 4	0.85 (0.69, 1.06)	0.87 (0.69, 1.10)

Mg

Quartile 1	ref	ref
Quartile 2	0.89 (0.71, 1.11)	1.05 (0.83, 1.32)
Quartile 3	0.91 (0.72, 1.14)	0.94 (0.74, 1.18)
Quartile 4	0.87 (0.69, 1.11)	1.05 (0.83, 1.32)

K

Quartile 1	ref	ref
Quartile 2	0.98 (0.79, 1.21)	1.06 (0.85, 1.33)
Quartile 3	0.99 (0.79, 1.22)	1.05 (0.81, 1.35)
Quartile 4	1.00 (0.80, 1.25)	1.04 (0.78, 1.38)

^a Adjusting for gender, education level, energy intake, passive smoking, lifestyle factor index

^b Adjusting for gender, education level, energy intake, passive smoking, lifestyle factor index, creatinine

Table S5: Adjusted hazard ratio (HR) for CVD outcomes per quartile of dietary intake concentrations, with restrictions

Combined dietary intake score (CDI) (points)	Total ^a	Restriction: Cotinine Levels (90th percentile: <56.20 ug/L) ^a N= 1723	Restriction: Women, post menopause only ^b N=618	Restriction: Participants without hypercholesterolemia, diabetes, hypertension dx at baseline ^a n=1385
Heart Failure				
Quartile 1	ref	ref	ref	ref
Quartile 2	1.02 (0.77, 1.34)	0.98 (0.73, 1.32)	0.97 (0.61, 1.52)	0.91 (0.65, 1.27)
Quartile 3	0.89 (0.67, 1.17)	0.82 (0.61, 1.10)	0.88 (0.55, 1.40)	0.83 (0.59, 1.16)
Quartile 4	1.07 (0.81, 1.41)	1.10 (0.81, 1.48)	0.92 (0.56, 1.51)	0.97 (0.69, 1.36)
AMI				
	Total ^a	Restriction: Cotinine Levels (90th percentile: <59.38 ug/L) ^a N= 1540	Restriction: Women, post menopause only ^b N=726	Restriction: Participants without hypercholesterolemia, diabetes, hypertension dx at baseline ^a N=1354
Quartile 1	ref	ref	ref	ref
Quartile 2	0.85 (0.65, 1.12)	0.83 (0.62, 1.13)	1.09 (0.71, 1.67)	0.89 (0.64, 1.25)
Quartile 3	0.79 (0.60, 1.04)	0.76 (0.56, 1.03)	0.66 (0.42, 1.02)	0.81 (0.58, 1.14)
Quartile 4	0.91 (0.69, 1.21)	0.96 (0.70, 1.31)	0.94 (0.61, 1.45)	1.00 (0.72, 1.42)
Stroke				
	Total ^a	Restriction: Cotinine Levels (90th percentile: <58.90 ug/L) ^a N= 1434	Restriction: Women, post menopause only ^b N=468	Restriction: Participants without hypercholesterolemia, diabetes, hypertension dx at baseline ^a n=1175
Quartile 1	ref	ref	ref	ref
Quartile 2	0.78 (0.56, 1.09)	0.79 (0.56, 1.11)	0.65 (0.38, 1.12)	0.85 (0.57, 1.25)
Quartile 3	0.63 (0.44, 0.88)	0.61 (0.43, 0.87)	0.65 (0.37, 1.13)	0.64 (0.42, 0.96)
Quartile 4	0.83 (0.60, 1.16)	0.89 (0.63, 1.25)	0.47 (0.24, 0.88)	0.89 (0.60, 1.32)
Composite AMI-Stroke				
	Total ^a	Restriction: Cotinine Levels (90th percentile: <62.50 ug/L) ^a N= 1980	Restriction: Women, post menopause only ^b N=924	Restriction: Participants without hypercholesterolemia, diabetes, hypertension dx at baseline ^a n=1614
Quartile 1	ref	ref	ref	ref
Quartile 2	0.85 (0.68, 1.07)	0.90 (0.71, 1.13)	1.12 (0.79, 1.60)	0.89 (0.69, 1.16)
Quartile 3	0.80 (0.63, 1.01)	0.93 (0.74, 1.17)	0.89 (0.62, 1.26)	0.92 (0.70, 1.18)
Quartile 4	0.90 (0.71, 1.13)	0.99 (0.79, 1.25)	0.95 (0.66, 1.36)	1.06 (0.82, 1.37)

^aModels adjusted for sex, education level, passive smoking, lifestyle factor index; ^bModels adjusted for education level, passive smoking, lifestyle factor index

Table S6. Adjusted hazard ratio (HR) for CVD outcomes per quartile of combined dietary score, by covariate models

Combined dietary intake score (points)	Unadjusted Model	Main Model ^a	Model without LFI ^b	Model with LFI components ^c	Model with whole grain ^d	Model with supplement use ^e	Model with whole grain and supplement use ^f
Heart Failure							
Quartile 1	ref	ref	ref	ref	ref	ref	ref
Quartile 2	1.02 (0.77, 1.34)	1.01 (0.77, 1.33)	1.00 (0.77, 1.32)	1.08 (0.82, 1.42)	1.01 (0.77, 1.32)	1.07 (0.81, 1.42)	1.02 (0.77, 1.34)
Quartile 3	0.89 (0.67, 1.17)	0.82 (0.63, 1.08)	0.82 (0.63, 1.08)	0.91 (0.69, 1.21)	0.85 (0.65, 1.11)	0.93 (0.70, 1.24)	0.89 (0.67, 1.17)
Quartile 4	1.07 (0.81, 1.41)	1.03 (0.78, 1.35)	1.02 (0.78, 1.35)	1.25 (0.91, 1.71)	1.06 (0.80, 1.40)	1.27 (0.93, 1.75)	1.07 (0.81, 1.41)
AMI							
Quartile 1	ref	ref	ref	ref	ref	ref	ref
Quartile 2	0.95 (0.73, 1.24)	0.85 (0.65, 1.12)	0.85 (0.64, 1.12)	0.83 (0.62, 1.12)	0.89 (0.67, 1.18)	0.86 (0.65, 1.14)	0.90 (0.68, 1.19)
Quartile 3	0.84 (0.65, 1.09)	0.79 (0.60, 1.04)	0.76 (0.58, 1.01)	0.77 (0.55, 1.07)	0.85 (0.64, 1.14)	0.81 (0.62, 1.08)	0.88 (0.65, 1.17)
Quartile 4	1.09 (0.83, 1.42)	0.91 (0.69, 1.21)	0.90 (0.68, 1.19)	0.90 (0.59, 1.37)	1.05 (0.77, 1.45)	0.94 (0.71, 1.25)	1.08 (0.78, 1.48)
Stroke							
Quartile 1	ref	ref	ref	ref	ref	ref	ref
Quartile 2	0.81 (0.59, 1.11)	0.80 (0.58, 1.10)	0.81 (0.58, 1.11)	0.83 (0.60, 1.15)	0.80 (0.58, 1.10)	0.81 (0.59, 1.13)	0.81 (0.59, 1.11)
Quartile 3	0.63 (0.46, 0.88)	0.61 (0.44, 0.84)	0.63 (0.45, 0.88)	0.66 (0.46, 0.93)	0.65 (0.47, 0.91)	0.67 (0.47, 0.95)	0.63 (0.46, 0.88)
Quartile 4	0.83 (0.60, 1.15)	0.81 (0.59, 1.12)	0.79 (0.57, 1.10)	0.86 (0.59, 1.24)	0.79 (0.57, 1.10)	0.84 (0.57, 1.22)	0.83 (0.60, 1.15)
Composite AMI-Stroke							
Quartile 1	ref	ref	ref	ref	ref	ref	ref
Quartile 2	0.90 (0.72, 1.13)	0.85 (0.68, 1.07)	0.90 (0.72, 1.11)	0.91 (0.71, 1.16)	0.92 (0.73, 1.16)	0.91 (0.72, 1.15)	0.92 (0.73, 1.17)
Quartile 3	0.87 (0.70, 1.09)	0.80 (0.63, 1.01)	0.85 (0.69, 1.06)	0.87 (0.66, 1.14)	0.90 (0.71, 1.14)	0.89 (0.70, 1.12)	0.91 (0.71, 1.17)
Quartile 4	0.93 (0.74, 1.16)	0.90 (0.71, 1.13)	0.90 (0.72, 1.11)	0.91 (0.65, 1.27)	0.97 (0.75, 1.26)	0.94 (0.74, 1.19)	0.99 (0.76, 1.29)

Note: LFI=Lifestyle Factor Index;

^a Adjusting for gender, education level, passive smoking, lifestyle factor index (LFI)

^b Adjusting for gender, education level, passive smoking

^c Adjusting for gender, education level, passive smoking, alcohol intake (drinks/week), waist circumference (cm), physical activity at least 30 mins/day (yes/no), dietary criteria (yes/no: >600 g fruits/vegetables per day, ≤ 500 g red/processed meat/week, and ≥ 3 dietary fiber per MJ dietary energy)

^d Adjusting for gender, education level, passive smoking, alcohol intake (drinks/week), waist circumference (cm), physical activity at least 30 mins/day (yes/no), dietary criteria (yes/no: >600 g fruits/vegetables per day, ≤ 500 g red/processed meat/week, and ≥ 3 dietary fiber per MJ dietary energy), whole grain intake (grams of whole grain cereal)

^e Adjusting for gender, education level, passive smoking, alcohol intake (drinks/week), waist circumference (cm), physical activity at least 30 mins/day (yes/no), dietary criteria (yes/no: >600 g fruits/vegetables per day, ≤ 500 g red/processed meat/week, and ≥ 3 dietary fiber per MJ dietary energy), supplement use (yes vs. no)

^f Adjusting for gender, education level, passive smoking, alcohol intake (drinks/week), waist circumference (cm), physical activity at least 30 mins/day (yes/no), dietary criteria (yes/no: >600 g fruits/vegetables per day, ≤ 500 g red/processed meat/week, and ≥ 3 dietary fiber per MJ dietary energy), supplement use (yes vs. no), whole grain intake (grams of whole grain cereal)

Figure S1. Adjusted hazard ratio (HR) for Composite AMI-Stroke outcomes per quartile dietary intake and urinary concentration of minerals

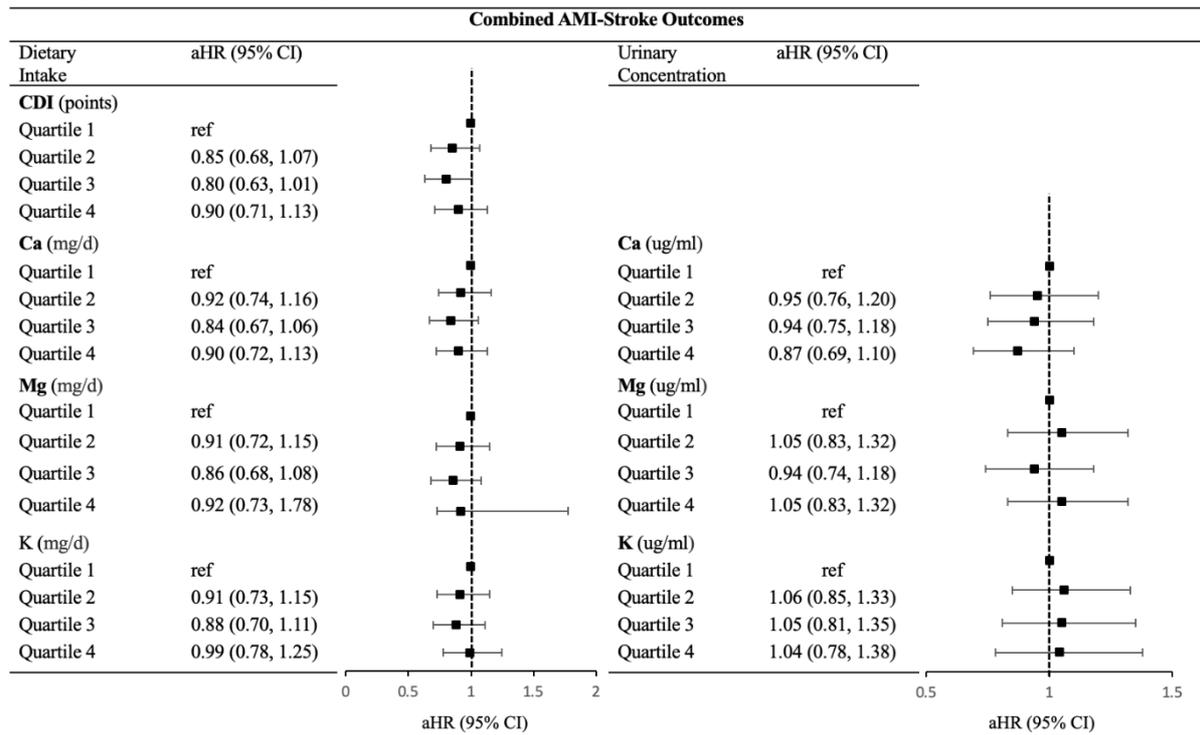


Figure S2. Splines for dietary mineral intake (mg/day) of calcium, magnesium and potassium and heart failure (HF)

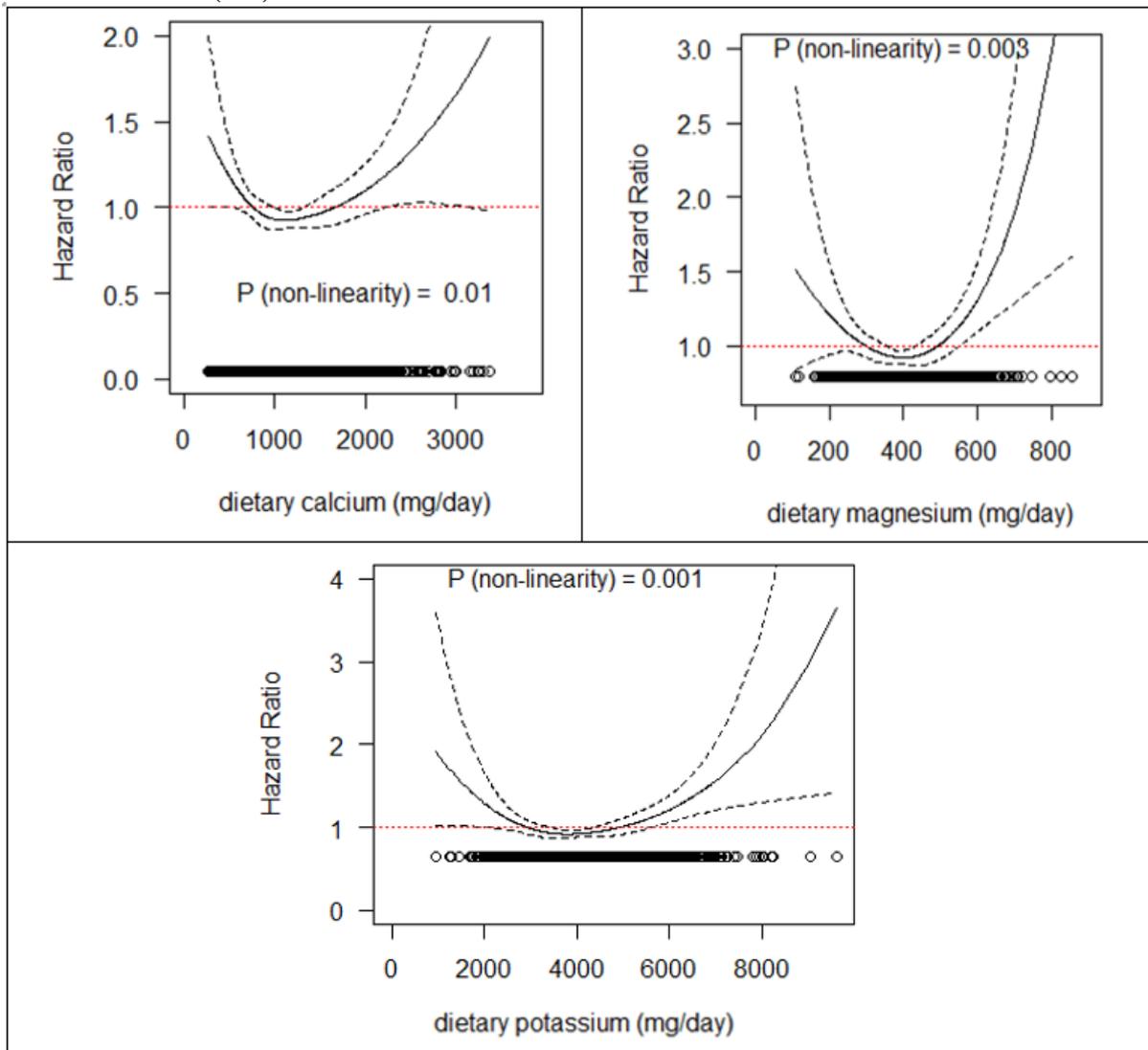


Figure S3. Splines for dietary mineral intake (mg/day) of calcium, magnesium and potassium and acute myocardial infarction (AMI)

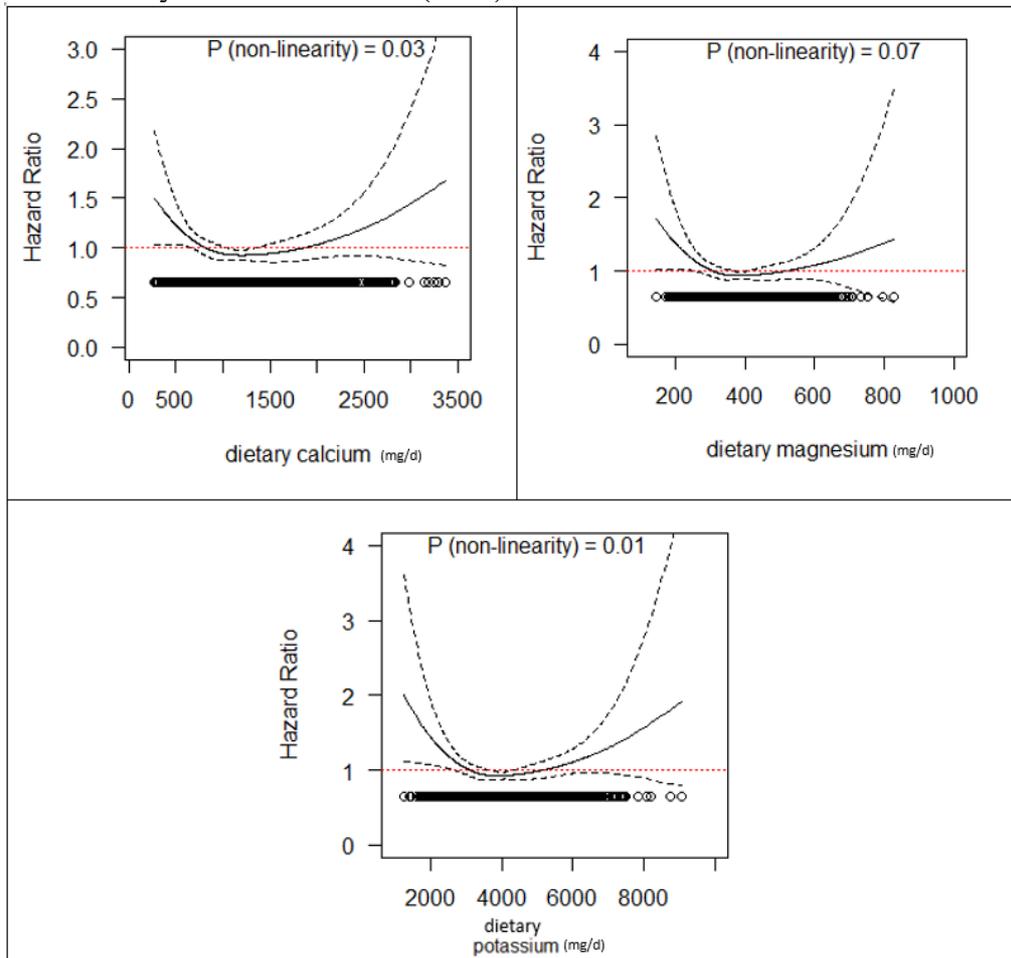


Figure S4. Splines for dietary mineral intake (mg/day) of calcium, magnesium and potassium and stroke

