

Online Supplemental Material

Pan A, Sun Q, Bernstein AM, et al. Red meat consumption and mortality: results from 2 prospective cohort studies. *Arch Intern Med*. Published online March 12, 2012. doi:10.1001/archinternmed.2011.2287.

eTable 1. Hazard ratio (HR) and 95% confidence interval (CI) of all-cause mortality according to specific red meat intake in the HPFS and NHS

eTable 2. Hazard ratio (HR) and 95% confidence interval (CI) of all-cause and cause-specific mortality according to continued updated red meat intake in the HPFS and NHS

eTable 3. Hazard ratio (HR) and 95% confidence interval (CI) of all-cause and cause-specific mortality according to simply updated red meat intake in the HPFS and NHS

eTable 4. Hazard ratio (HR) and 95% confidence interval (CI) of all-cause and cause-specific mortality using energy density methods (serving·1000kcal⁻¹·d⁻¹) for red meat intake in the HPFS and NHS

eTable 5. Hazard ratio (HR) and 95% confidence interval (CI) of all-cause and cause-specific mortality according to baseline red meat intake in the HPFS and NHS

eFigure. Trends of red meat intake in (A) Health Professionals Follow-up Study and (B) Nurses' Health Study.

[This supplementary material has been provided by the authors to give readers additional information about their work.](#)

[©2012 American Medical Association. All rights reserved.](#)

eTable 1. Hazard ratio (HR) and 95% confidence interval (CI) of all-cause mortality according to specific red meat intake in the HPFS and NHS.^a

	Frequency of Consumption, Quintiles					P Value for Trend	HR (95% CI) for a 1-Serving-per-Day Increase
	Q1	Q2	Q3	Q4	Q5		
Beef, pork, or lamb as main dishes							
HPFS	1 [Reference]	1.09 (1.02-1.17)	1.03 (0.96-1.11)	1.11 (1.03-1.19)	1.22 (1.15-1.31)	<0.001	1.29 (1.17-1.43)
NHS	1 [Reference]	1.08 (1.02-1.14)	1.10 (1.04-1.16)	1.21 (1.15-1.28)	1.21 (1.15-1.28)	<0.001	1.29 (1.20-1.39)
Pooled ^b	1 [Reference]	1.08 (1.04-1.13)	1.07 (1.00-1.14)	1.16 (1.07-1.26)	1.21 (1.16-1.27)	<0.001	1.29 (1.21-1.37)
Beef, pork, or lamb as a sandwich or mix dish							
HPFS	1 [Reference]	1.14 (1.07-1.22)	1.20 (1.12-1.28)	1.08 (0.99-1.16)	1.26 (1.17-1.35)	<0.001	1.36 (1.20-1.55)
NHS	1 [Reference]	1.01 (0.95-1.06)	1.04 (0.99-1.09)	1.08 (1.03-1.14)	1.09 (1.04-1.14)	<0.001	1.20 (1.08-1.32)
Pooled ^b	1 [Reference]	1.07 (0.95-1.21)	1.12 (0.97-1.28)	1.08 (1.03-1.13)	1.17 (1.01-1.35)	<0.001	1.27 (1.12-1.43)
Hamburger							
HPFS	1 [Reference]	1.15 (1.08-1.23)	1.16 (1.08-1.24)	1.16 (1.07-1.25)	1.23 (1.14-1.33)	<0.001	1.38 (1.20-1.57)
NHS	1 [Reference]	1.06 (1.01-1.12)	1.05 (1.00-1.11)	0.95 (0.90-1.00)	1.07 (1.02-1.13)	0.04	1.15 (1.01-1.30)
Pooled ^b	1 [Reference]	1.10 (1.02-1.19)	1.10 (1.00-1.21)	1.05 (0.86-1.27)	1.14 (1.00-1.31)	<0.001	1.26 (1.05-1.50)
Bacon							
HPFS	1 [Reference]	0.89 (0.81-0.98)	1.09 (1.02-1.15)	1.17 (1.09-1.25)	1.21 (1.14-1.28)	<0.001	1.35 (1.19-1.52)
NHS	1 [Reference]	1.03 (0.97-1.09)	1.15 (1.09-1.20)	1.13 (1.07-1.19)	1.25 (1.19-1.32)	<0.001	1.63 (1.46-1.83)
Pooled ^b	1 [Reference]	0.96 (0.83-1.11)	1.12 (1.07-1.18)	1.15 (1.10-1.19)	1.23 (1.18-1.28)	<0.001	1.48 (1.23-1.79)
Hot dog							
HPFS	1 [Reference]	0.86 (0.79-0.93)	1.04 (0.98-1.11)	0.99 (0.93-1.05)	1.05 (0.99-1.12)	<0.001	1.40 (1.16-1.69)
NHS	1 [Reference]	1.01 (0.96-1.06)	1.03 (0.98-1.08)	1.03 (0.97-1.09)	1.11 (1.05-1.16)	<0.001	1.40 (1.17-1.67)
Pooled ^b	1 [Reference]	0.93 (0.80-1.09)	1.03 (0.99-1.07)	1.01 (0.97-1.05)	1.09 (1.03-1.14)	<0.001	1.40 (1.23-1.59)
Other processed red meat							
HPFS	1 [Reference]	0.89 (0.81-0.97)	1.14 (1.07-1.21)	1.10 (1.03-1.17)	1.21 (1.13-1.29)	<0.001	1.27 (1.17-1.39)
NHS	1 [Reference]	0.97 (0.92-1.02)	1.06 (1.00-1.11)	1.05 (1.00-1.11)	1.11 (1.05-1.17)	<0.001	1.16 (1.07-1.26)

Pooled ^b	1	0.94	1.10	1.07	1.16	<0.001	1.21 (1.11-1.32)
	[Reference]	(0.86-1.02)	(1.02-1.18)	(1.02-1.12)	(1.06-1.26)		

Abbreviation: HPFS, Health Professionals Follow-up Study; NHS, Nurses' Health Study.

^aThe multivariate model was adjusted for age (continuous); body mass index (calculated as weight in kilograms divided by height in meters squared) category (<23.0, 23.0-24.9, 25.0-29.9, 30.0-34.9, or ≥35.0 kg/m²); alcohol consumption (0, 0.1-4.9, 5.0-14.9, or ≥15.0 g/d in women; 0, 0.1-4.9, 5.0-29.9, or ≥30.0 g/d in men); physical activity level (<3.0, 3.0-8.9, 9.0-17.9, 18.0-26.9, or ≥27.0 hours of metabolic equivalent tasks per week); smoking status (never, past, current [1-14, 15-24, or ≥25 cigarettes per day]); race (white or non-white); menopausal status and hormone use in women (premenopausal, postmenopausal never users, postmenopausal past users, or postmenopausal current users); family history of diabetes mellitus, myocardial infarction, or cancer; history of diabetes mellitus, hypertension, or hypercholesterolemia; and quintiles of total energy intake, whole grains, fruits, and vegetables.

^bResults were combined using the random-effects model.

eTable 2. Hazard ratio (HR) and 95% confidence interval (CI) of all-cause and cause-specific mortality according to continued updated red meat intake in the HPFS and NHS.^a

		Frequency of Consumption, Quintiles					P Value for Trend	HR (95% CI) for a 1-Serving-per-Day Increase
		Q1	Q2	Q3	Q4	Q5		
All-cause mortality								
Total	red meat							
	HPFS	1 [Reference]	1.18 (1.10-1.27)	1.30 (1.21-1.39)	1.31 (1.22-1.41)	1.42 (1.31-1.53)	<0.001	1.14 (1.11-1.18)
	NHS	1 [Reference]	1.09 (1.04-1.15)	1.13 (1.08-1.20)	1.13 (1.07-1.19)	1.16 (1.10-1.22)	<0.001	1.07 (1.04-1.10)
	Pooled ^b	1 [Reference]	1.13 (1.05-1.22)	1.21 (1.06-1.39)	1.21 (1.05-1.40)	1.28 (1.05-1.56)	<0.001	1.10 (1.04-1.17)
	Unprocessed red meat							
	HPFS	1 [Reference]	1.18 (1.10-1.26)	1.26 (1.18-1.35)	1.29 (1.20-1.38)	1.32 (1.22-1.42)	<0.001	1.14 (1.09-1.19)
	NHS	1 [Reference]	1.05 (1.00-1.10)	1.09 (1.04-1.15)	1.09 (1.04-1.15)	1.08 (1.03-1.14)	0.10	1.03 (0.99-1.07)
	Pooled ^b	1 [Reference]	1.11 (0.99-1.24)	1.17 (1.02-1.35)	1.18 (1.00-1.40)	1.19 (0.98-1.45)	<0.001	1.08 (0.98-1.20)
	Processed red meat							
	HPFS	1 [Reference]	1.14 (1.06-1.22)	1.21 (1.13-1.29)	1.33 (1.24-1.43)	1.35 (1.26-1.45)	<0.001	1.22 (1.15-1.28)
	NHS	1 [Reference]	1.11 (1.05-1.17)	1.10 (1.05-1.16)	1.19 (1.13-1.26)	1.23 (1.16-1.29)	<0.001	1.24 (1.16-1.31)
	Pooled ^b	1 [Reference]	1.12 (1.08-1.17)	1.15 (1.05-1.26)	1.26 (1.13-1.40)	1.28 (1.17-1.41)	<0.001	1.23 (1.19-1.27)
CVD mortality								
Total	red meat							
	HPFS	1 [Reference]	1.21 (1.07-1.37)	1.27 (1.12-1.44)	1.26 (1.10-1.43)	1.40 (1.22-1.61)	<0.001	1.14 (1.08-1.21)
	NHS	1 [Reference]	1.19 (1.06-1.33)	1.20 (1.07-1.35)	1.24 (1.10-1.39)	1.30 (1.15-1.46)	<0.001	1.15 (1.08-1.22)
	Pooled ^b	1 [Reference]	1.20 (1.10-1.30)	1.23 (1.13-1.34)	1.25 (1.15-1.36)	1.34 (1.23-1.47)	<0.001	1.15 (1.10-1.19)
	Unprocessed red meat							
	HPFS	1 [Reference]	1.14 (1.01-1.29)	1.15 (1.01-1.30)	1.26 (1.11-1.43)	1.26 (1.10-1.44)	<0.001	1.16 (1.07-1.26)
	NHS	1 [Reference]	1.13 (1.01-1.26)	1.19 (1.06-1.34)	1.19 (1.06-1.33)	1.22 (1.08-1.37)	0.005	1.11 (1.03-1.20)
	Pooled ^b	1 [Reference]	1.13 (1.05-1.23)	1.17 (1.07-1.27)	1.22 (1.12-1.33)	1.24 (1.13-1.35)	<0.001	1.13 (1.07-1.20)
	Processed red meat							
	HPFS	1 [Reference]	1.18 (1.04-1.34)	1.21 (1.06-1.37)	1.27 (1.12-1.44)	1.34 (1.17-1.52)	<0.001	1.15 (1.04-1.28)
	NHS	1 [Reference]	1.10 (0.98-1.23)	1.09 (0.97-1.23)	1.21 (1.08-1.36)	1.33 (1.19-1.49)	<0.001	1.37 (1.22-1.55)

	Pooled ^b	1	1.13	1.15	1.24	1.33	<0.001	1.25 (1.05-1.49)
		[Reference]	(1.04-1.23)	(1.04-1.27)	(1.14-1.35)	(1.23-1.45)		
Cancer mortality								
Total red meat								
	HPFS	1	1.02	1.13	1.18	1.19	0.002	1.09 (1.03-1.16)
		[Reference]	(0.91-1.15)	(1.00-1.27)	(1.04-1.33)	(1.04-1.35)		
	NHS	1	1.04	1.07	1.07	1.08	0.18	1.03 (0.99-1.08)
		[Reference]	(0.96-1.12)	(0.99-1.16)	(0.98-1.16)	(0.99-1.17)		
	Pooled ^b	1	1.03	1.09	1.11	1.12	0.05	1.06 (1.00-1.12)
		[Reference]	(0.97-1.10)	(1.02-1.16)	(1.01-1.22)	(1.02-1.23)		
Unprocessed red meat								
	HPFS	1	1.13	1.15	1.13	1.19	0.05	1.08 (1.00-1.17)
		[Reference]	(1.00-1.26)	(1.02-1.29)	(1.00-1.28)	(1.05-1.35)		
	NHS	1	1.03	1.04	1.10	1.04	0.82	1.01 (0.95-1.06)
		[Reference]	(0.96-1.12)	(0.96-1.13)	(1.01-1.19)	(0.95-1.12)		
	Pooled ^b	1	1.07	1.08	1.10	1.19	0.30	1.04 (0.97-1.11)
		[Reference]	(1.03-1.11)	(1.04-1.12)	(1.06-1.15)	(1.15-1.24)		
Processed red meat								
	HPFS	1	1.06	1.11	1.20	1.20	0.001	1.17 (1.06-1.29)
		[Reference]	(0.94-1.20)	(0.98-1.25)	(1.07-1.35)	(1.06-1.35)		
	NHS	1	1.09	1.09	1.13	1.14	0.009	1.13 (1.03-1.25)
		[Reference]	(1.01-1.18)	(1.00-1.18)	(1.04-1.23)	(1.05-1.23)		
	Pooled ^b	1	1.08	1.10	1.15	1.16	<0.001	1.15 (1.08-1.23)
		[Reference]	(1.01-1.16)	(1.03-1.17)	(1.08-1.24)	(1.09-1.23)		

Abbreviation: HPFS, Health Professionals Follow-up Study; NHS, Nurses' Health Study.

^aThe multivariate model was adjusted for age (continuous); body mass index (calculated as weight in kilograms divided by height in meters squared) category (<23.0, 23.0-24.9, 25.0-29.9, 30.0-34.9, or ≥35.0 kg/m²); alcohol consumption (0, 0.1-4.9, 5.0-14.9, or ≥15.0 g/d in women; 0, 0.1-4.9, 5.0-29.9, or ≥30.0 g/d in men); physical activity level (<3.0, 3.0-8.9, 9.0-17.9, 18.0-26.9, or ≥27.0 hours of metabolic equivalent tasks per week); smoking status (never, past, current [1-14, 15-24, or ≥25 cigarettes per day]); race (white or non-white); menopausal status and hormone use in women (premenopausal, postmenopausal never users, postmenopausal past users, or postmenopausal current users); family history of diabetes mellitus, myocardial infarction, or cancer; history of diabetes mellitus, hypertension, or hypercholesterolemia; and quintiles of total energy intake, whole grains, fruits, and vegetables.

^bResults were combined using the random-effects model.

eTable 3. Hazard ratio (HR) and 95% confidence interval (CI) of all-cause and cause-specific mortality according to simply updated red meat intake in the HPFS and NHS.^a

		Frequency of Consumption, Quintiles					P Value for Trend	HR (95% CI) for a 1-Serving-per-Day Increase
		Q1	Q2	Q3	Q4	Q5		
All-cause mortality								
Total	red meat							
HPFS		1	1.16	1.27	1.30	1.37	<0.001	1.11 (1.08-1.14)
		[Reference]	(1.08-1.25)	(1.18-1.36)	(1.21-1.40)	(1.27-1.48)		
NHS		1	1.10	1.16	1.26	1.32		
		[Reference]	(1.04-1.16)	(1.22-1.26)	(1.19-1.33)	(1.25-1.40)	<0.001	1.12 (1.09-1.14)
Pooled ^b		1	1.12	1.22	1.27	1.34	<0.001	1.12 (1.10-1.13)
		[Reference]	(1.07-1.18)	(1.11-1.33)	(1.22-1.33)	(1.28-1.40)		
Unprocessed red meat								
HPFS		1	1.16	1.22	1.26	1.32	<0.001	1.14 (1.10-1.18)
		[Reference]	(1.08-1.24)	(1.13-1.31)	(1.18-1.36)	(1.23-1.42)		
NHS		1	1.12	1.15	1.25	1.27		
		[Reference]	(1.06-1.18)	(1.09-1.21)	(1.18-1.32)	(1.21-1.35)	<0.001	1.12 (1.09-1.15)
Pooled ^b		1	1.14	1.18	1.25	1.29	<0.001	1.13 (1.10-1.15)
		[Reference]	(1.09-1.18)	(1.11-1.25)	(1.20-1.31)	(1.26-1.35)		
Processed red meat								
HPFS		1	1.13	1.14	1.24	1.26	<0.001	1.13 (1.08-1.18)
		[Reference]	(1.05-1.21)	(1.07-1.22)	(1.16-1.33)	(1.17-1.35)		
NHS		1	1.07	1.09	1.17	1.25		
		[Reference]	(1.01-1.13)	(1.03-1.15)	(1.12-1.23)	(1.19-1.31)	<0.001	1.18 (1.13-1.24)
Pooled ^b		1	1.10	1.11	1.20	1.25	<0.001	1.15 (1.10-1.20)
		[Reference]	(1.04-1.15)	(1.06-1.16)	(1.13-1.27)	(1.21-1.30)		
CVD mortality								
Total	red meat							
HPFS		1	1.26	1.32	1.37	1.40	<0.001	1.11 (1.06-1.17)
		[Reference]	(1.10-1.43)	(1.16-1.51)	(1.20-1.56)	(1.22-1.61)		
NHS		1	1.17	1.29	1.46	1.58		
		[Reference]	(1.03-1.32)	(1.14-1.46)	(1.29-1.65)	(1.39-1.78)	<0.001	1.18 (1.13-1.23)
Pooled ^b		1	1.21	1.30	1.42	1.50	<0.001	1.15 (1.08-1.22)
		[Reference]	(1.11-1.32)	(1.19-1.43)	(1.30-1.55)	(1.33-1.68)		
Unprocessed red meat								
HPFS		1	1.23	1.30	1.29	1.39	<0.001	1.16 (1.09-1.24)
		[Reference]	(1.08-1.39)	(1.14-1.48)	(1.13-1.46)	(1.22-1.58)		
NHS		1	1.12	1.32	1.35	1.46		
		[Reference]	(0.99-1.26)	(1.17-1.48)	(1.19-1.53)	(1.30-1.65)	<0.001	1.19 (1.13-1.25)
Pooled ^b		1	1.17	1.31	1.32	1.43	<0.001	1.18 (1.13-1.23)
		[Reference]	(1.07-1.28)	(1.20-1.43)	(1.21-1.44)	(1.31-1.56)		
Processed red meat								
HPFS		1	1.06	1.15	1.23	1.23	<0.001	1.11 (1.01-1.21)
		[Reference]	(0.92-1.22)	(1.01-1.29)	(1.08-1.39)	(1.08-1.40)		
NHS		1	1.09	1.14	1.25	1.44		
		[Reference]	(0.96-1.23)	(1.02-1.28)	(1.12-1.40)	(1.29-1.60)	<0.001	1.25 (1.15-1.36)

	Pooled ^b	1	1.08	1.15	1.24	1.34	<0.001	1.18 (1.05-1.32)
		[Reference]	(0.98-1.18)	(1.06-1.24)	(1.14-1.35)	(1.15-1.56)		
Cancer mortality								
Total red meat								
	HPFS	1	1.09	1.17	1.23	1.27	<0.001	1.10 (1.05-1.15)
		[Reference]	(0.96-1.22)	(1.03-1.32)	(1.09-1.39)	(1.12-1.45)		
	NHS	1	1.20	1.26	1.38	1.44	<0.001	1.14 (1.10-1.18)
		[Reference]	(1.10-1.31)	(1.15-1.37)	(1.27-1.50)	(1.31-1.57)		
	Pooled ^b	1	1.15	1.23	1.32	1.37	<0.001	1.12 (1.08-1.16)
		[Reference]	(1.05-1.26)	(1.15-1.32)	(1.17-1.49)	(1.21-1.54)		
Unprocessed red meat								
	HPFS	1	1.11	1.11	1.20	1.25	<0.001	1.11 (1.04-1.18)
		[Reference]	(0.98-1.24)	(0.98-1.25)	(1.07-1.35)	(1.10-1.41)		
	NHS	1	1.23	1.20	1.38	1.42	<0.001	1.15 (1.11-1.20)
		[Reference]	(1.13-1.34)	(1.10-1.30)	(1.27-1.50)	(1.30-1.54)		
	Pooled ^b	1	1.18	1.17	1.30	1.34	<0.001	1.14 (1.10-1.18)
		[Reference]	(1.06-1.30)	(1.09-1.26)	(1.13-1.48)	(1.19-1.52)		
Processed red meat								
	HPFS	1	1.16	1.08	1.20	1.23	<0.001	1.16 (1.10-1.22)
		[Reference]	(1.02-1.31)	(0.96-1.21)	(1.07-1.35)	(1.09-1.39)		
	NHS	1	1.19	1.16	1.25	1.27	<0.001	1.16 (1.08-1.25)
		[Reference]	(1.10-1.29)	(1.07-1.26)	(1.16-1.36)	(1.18-1.38)		
	Pooled ^b	1	1.18	1.13	1.23	1.26	<0.001	1.16 (1.11-1.21)
		[Reference]	(1.10-1.26)	(1.06-1.21)	(1.15-1.32)	(1.17-1.35)		

Abbreviation: HPFS, Health Professionals Follow-up Study; NHS, Nurses' Health Study.

^aThe multivariate model was adjusted for age (continuous); body mass index (calculated as weight in kilograms divided by height in meters squared) category (<23.0, 23.0-24.9, 25.0-29.9, 30.0-34.9, or ≥35.0 kg/m²); alcohol consumption (0, 0.1-4.9, 5.0-14.9, or ≥15.0 g/d in women; 0, 0.1-4.9, 5.0-29.9, or ≥30.0 g/d in men); physical activity level (<3.0, 3.0-8.9, 9.0-17.9, 18.0-26.9, or ≥27.0 hours of metabolic equivalent tasks per week); smoking status (never, past, current [1-14, 15-24, or ≥25 cigarettes per day]); race (white or non-white); menopausal status and hormone use in women (premenopausal, postmenopausal never users, postmenopausal past users, or postmenopausal current users); family history of diabetes mellitus, myocardial infarction, or cancer; history of diabetes mellitus, hypertension, or hypercholesterolemia; and quintiles of total energy intake, whole grains, fruits, and vegetables.

^bResults were combined using the random-effects model.

eTable 4. Hazard ratio (HR) and 95% confidence interval (CI) of all-cause and cause-specific mortality using energy density methods (serving/1000kcal) for red meat intake in the HPFS and NHS.^a

		Frequency of Consumption, Quintiles					P Value for Trend	HR (95% CI) for 1 Serving/1000kcal Increase
		Q1	Q2	Q3	Q4	Q5		
All-cause mortality								
Total	red meat							
	HPFS	1 [Reference]	1.07 (1.00-1.15)	1.11 (1.03-1.19)	1.17 (1.09-1.25)	1.30 (1.21-1.39)	<0.001	1.26 (1.19-1.34)
	NHS	1 [Reference]	1.00 (0.94-1.05)	1.04 (0.99-1.10)	1.07 (1.01-1.13)	1.18 (1.12-1.25)	<0.001	1.17 (1.13-1.21)
	Pooled ^b	1 [Reference]	1.03 (0.96-1.10)	1.07 (1.00-1.14)	1.12 (1.02-1.22)	1.24 (1.12-1.36)	<0.001	1.21 (1.12-1.30)
	Unprocessed red meat							
	HPFS	1 [Reference]	1.11 (1.03-1.18)	1.12 (1.04-1.20)	1.12 (1.05-1.20)	1.25 (1.17-1.34)	<0.001	1.31 (1.22-1.42)
	NHS	1 [Reference]	1.02 (0.96-1.07)	1.03 (0.98-1.09)	1.05 (0.99-1.10)	1.13 (1.08-1.19)	<0.001	1.17 (1.12-1.21)
	Pooled ^b	1 [Reference]	1.06 (0.98-1.15)	1.07 (0.99-1.16)	1.08 (1.01-1.15)	1.19 (1.07-1.31)	<0.001	1.23 (1.10-1.37)
	Processed red meat							
	HPFS	1 [Reference]	1.10 (1.02-1.17)	1.13 (1.05-1.21)	1.19 (1.11-1.28)	1.27 (1.18-1.36)	<0.001	1.39 (1.25-1.53)
	NHS	1 [Reference]	1.03 (0.98-1.09)	1.05 (1.00-1.11)	1.05 (1.00-1.11)	1.19 (1.13-1.25)	<0.001	1.29 (1.20-1.38)
	Pooled ^b	1 [Reference]	1.06 (1.00-1.13)	1.09 (1.01-1.17)	1.12 (0.99-1.26)	1.22 (1.15-1.30)	<0.001	1.33 (1.24-1.43)
CVD mortality								
Total	red meat							
	HPFS	1 [Reference]	1.05 (0.93-1.19)	1.05 (0.92-1.19)	1.16 (1.02-1.32)	1.23 (1.08-1.39)	<0.001	1.24 (1.13-1.37)
	NHS	1 [Reference]	1.05 (0.93-1.19)	1.08 (0.95-1.22)	1.25 (1.11-1.41)	1.33 (1.19-1.49)	<0.001	1.24 (1.16-1.32)
	Pooled ^b	1 [Reference]	1.05 (0.96-1.15)	1.07 (0.98-1.16)	1.21 (1.11-1.32)	1.28 (1.18-1.39)	<0.001	1.24 (1.18-1.31)
	Unprocessed red meat							
	HPFS	1 [Reference]	1.07 (0.95-1.21)	1.12 (0.99-1.27)	1.09 (0.96-1.23)	1.20 (1.06-1.36)	<0.001	1.32 (1.15-1.51)
	NHS	1 [Reference]	0.99 (0.87-1.11)	1.09 (0.97-1.23)	1.12 (0.99-1.25)	1.23 (1.10-1.37)	<0.001	1.27 (1.17-1.37)
	Pooled ^b	1 [Reference]	1.03 (0.94-1.12)	1.10 (1.01-1.20)	1.11 (1.02-1.20)	1.22 (1.12-1.32)	<0.001	1.28 (1.20-1.37)
	Processed red meat							
	HPFS	1 [Reference]	1.02 (0.89-1.16)	1.12 (0.98-1.27)	1.15 (1.01-1.31)	1.21 (1.07-1.37)	<0.001	1.35 (1.12-1.62)
	NHS	1	0.99	1.08	1.08	1.28	<0.001	1.31 (1.15-1.49)

	[Reference]	(0.88-1.11)	(0.97-1.22)	(0.96-1.21)	(1.15-1.42)		
Pooled ^b	1	1.00	1.10	1.11	1.25	<0.001	1.32 (1.19-1.47)
	[Reference]	(0.92-1.09)	(1.01-1.20)	(1.02-1.21)	(1.15-1.35)		
Cancer mortality							
Total red meat							
HPFS	1	0.97	1.05	1.04	1.20	<0.001	1.16 (1.05-1.28)
	[Reference]	(0.86-1.10)	(0.93-1.18)	(0.92-1.17)	(1.07-1.35)		
NHS	1	0.99	1.06	1.04	1.13	<0.001	1.14 (1.07-1.20)
	[Reference]	(0.91-1.07)	(0.98-1.15)	(0.96-1.13)	(1.04-1.23)		
Pooled ^b	1	0.98	1.06	1.04	1.15	<0.001	1.14 (1.09-1.20)
	[Reference]	(0.92-1.05)	(0.99-1.13)	(0.97-1.11)	(1.08-1.24)		
Unprocessed red meat							
HPFS	1	1.07	1.03	1.02	1.19	0.02	1.18 (1.03-1.35)
	[Reference]	(0.95-1.19)	(0.91-1.15)	(0.91-1.15)	(1.06-1.33)		
NHS	1	1.04	1.01	1.05	1.12	<0.001	1.14 (1.06-1.22)
	[Reference]	(0.96-1.13)	(0.93-1.10)	(0.97-1.14)	(1.03-1.21)		
Pooled ^b	1	1.05	1.02	1.04	1.14	<0.001	1.15 (1.08-1.22)
	[Reference]	(0.98-1.12)	(0.95-1.09)	(0.97-1.11)	(1.07-1.22)		
Processed red meat							
HPFS	1	1.08	1.02	1.15	1.16	0.006	1.28 (1.07-1.53)
	[Reference]	(0.96-1.21)	(0.90-1.15)	(1.02-1.30)	(1.03-1.30)		
NHS	1	1.08	1.05	1.05	1.12	0.003	1.21 (1.07-1.37)
	[Reference]	(1.00-1.17)	(0.97-1.14)	(0.97-1.14)	(1.03-1.21)		
Pooled ^b	1	1.08	1.04	1.09	1.13	<0.001	1.23 (1.11-1.36)
	[Reference]	(1.01-1.15)	(0.97-1.11)	(1.00-1.18)	(1.06-1.21)		

Abbreviation: HPFS, Health Professionals Follow-up Study; NHS, Nurses' Health Study.

^aThe multivariate model was adjusted for age (continuous); body mass index (calculated as weight in kilograms divided by height in meters squared) category (<23.0, 23.0-24.9, 25.0-29.9, 30.0-34.9, or ≥35.0 kg/m²); alcohol consumption (0, 0.1-4.9, 5.0-14.9, or ≥15.0 g/d in women; 0, 0.1-4.9, 5.0-29.9, or ≥30.0 g/d in men); physical activity level (<3.0, 3.0-8.9, 9.0-17.9, 18.0-26.9, or ≥27.0 hours of metabolic equivalent tasks per week); smoking status (never, past, current [1-14, 15-24, or ≥25 cigarettes per day]); race (white or non-white); menopausal status and hormone use in women (premenopausal, postmenopausal never users, postmenopausal past users, or postmenopausal current users); family history of diabetes mellitus, myocardial infarction, or cancer; history of diabetes mellitus, hypertension, or hypercholesterolemia; and quintiles of total energy intake, whole grains, fruits, and vegetables.

^bResults were combined using the random-effects model.

eTable 5. Hazard ratio (HR) and 95% confidence interval (CI) of all-cause and cause-specific mortality according to baseline red meat intake in the HPFS and NHS.^a

		Frequency of Consumption, Quintiles					P Value for Trend	HR (95% CI) for a 1-Serving-per-Day Increase
		Q1	Q2	Q3	Q4	Q5		
All-cause mortality								
Total	red meat							
	HPFS	1 [Reference]	1.09 (1.02-1.17)	1.13 (1.05-1.21)	1.14 (1.06-1.22)	1.25 (1.15-1.35)	<0.001	1.08 (1.05-1.11)
	NHS	1 [Reference]	1.08 (1.02-1.13)	1.08 (1.02-1.14)	1.08 (1.02-1.14)	1.13 (1.07-1.20)	<0.001	1.05 (1.03-1.07)
	Pooled ^b	1 [Reference]	1.08 (1.04-1.12)	1.10 (1.05-1.14)	1.11 (1.05-1.16)	1.18 (1.07-1.31)	<0.001	1.06 (1.03-1.09)
	Unprocessed red meat							
	HPFS	1 [Reference]	1.05 (0.98-1.12)	1.09 (1.02-1.16)	1.06 (0.99-1.14)	1.16 (1.07-1.24)	0.001	1.07 (1.03-1.11)
	NHS	1 [Reference]	1.03 (0.98-1.08)	1.05 (0.99-1.10)	1.07 (1.01-1.13)	1.08 (1.02-1.14)	<0.001	1.04 (1.01-1.06)
	Pooled ^b	1 [Reference]	1.04 (1.00-1.08)	1.06 (1.03-1.10)	1.07 (1.02-1.11)	1.12 (1.04-1.20)	<0.001	1.05 (1.02-1.08)
	Processed red meat							
	HPFS	1 [Reference]	1.03 (0.96-1.10)	1.09 (1.02-1.16)	1.12 (1.04-1.19)	1.18 (1.11-1.27)	<0.001	1.11 (1.06-1.16)
	NHS	1 [Reference]	1.00 (0.95-1.06)	1.02 (0.97-1.07)	1.03 (0.98-1.09)	1.09 (1.03-1.14)	<0.001	1.09 (1.05-1.14)
	Pooled ^b	1 [Reference]	1.01 (0.97-1.06)	1.05 (0.99-1.12)	1.07 (0.99-1.17)	1.13 (1.04-1.22)	<0.001	1.10 (1.07-1.14)
CVD mortality								
Total	red meat							
	HPFS	1 [Reference]	1.19 (1.05-1.34)	1.09 (0.96-1.24)	1.21 (1.06-1.38)	1.28 (1.11-1.47)	<0.001	1.10 (1.04-1.16)
	NHS	1 [Reference]	1.23 (1.10-1.37)	1.09 (0.96-1.23)	1.23 (1.08-1.39)	1.27 (1.11-1.45)	<0.001	1.08 (1.04-1.13)
	Pooled ^b	1 [Reference]	1.21 (1.12-1.31)	1.09 (1.00-1.19)	1.22 (1.12-1.34)	1.27 (1.16-1.40)	<0.001	1.09 (1.05-1.13)
	Unprocessed red meat							
	HPFS	1 [Reference]	1.06 (0.94-1.21)	1.09 (0.96-1.23)	1.07 (0.94-1.22)	1.23 (1.08-1.40)	0.007	1.11 (1.03-1.19)
	NHS	1 [Reference]	1.08 (0.97-1.21)	1.13 (1.00-1.26)	1.10 (0.97-1.25)	1.17 (1.03-1.32)	0.01	1.07 (1.01-1.12)
	Pooled ^b	1 [Reference]	1.07 (0.98-1.17)	1.11 (1.03-1.21)	1.09 (0.99-1.19)	1.20 (1.10-1.31)	<0.001	1.08 (1.04-1.12)
	Processed red meat							
	HPFS	1 [Reference]	1.06 (0.93-1.20)	1.16 (1.03-1.30)	1.15 (1.03-1.30)	1.16 (1.02-1.31)	0.009	1.12 (1.03-1.21)
	NHS	1 [Reference]	1.02 (0.91-1.15)	0.99 (0.89-1.11)	1.14 (1.02-1.28)	1.21 (1.08-1.36)	0.003	1.14 (1.05-1.25)

	Pooled ^b	1	1.04	1.07	1.15	1.19	<0.001	1.13 (1.06-1.20)
		[Reference]	(0.95-1.13)	(0.92-1.25)	(1.10-1.20)	(1.09-1.29)		
Cancer mortality								
Total red meat								
	HPFS	1	0.96	1.03	1.04	1.11	0.12	1.04 (0.99-1.09)
		[Reference]	(0.86-1.08)	(0.92-1.16)	(0.92-1.17)	(0.98-1.27)		
	NHS	1	1.03	1.08	1.02	1.07	0.14	1.02 (0.99-1.06)
		[Reference]	(0.95-1.12)	(1.00-1.17)	(0.93-1.11)	(0.98-1.18)		
	Pooled ^b	1	1.01	1.06	1.03	1.08	0.04	1.03 (1.00-1.06)
		[Reference]	(0.94-1.08)	(1.00-1.14)	(0.96-1.10)	(1.00-1.17)		
Unprocessed red meat								
	HPFS	1	0.96	1.03	0.98	1.03	0.48	1.03 (0.96-1.10)
		[Reference]	(0.85-1.08)	(0.92-1.15)	(0.86-1.10)	(0.91-1.17)		
	NHS	1	0.99	1.04	1.03	1.05	0.28	1.02 (0.98-1.06)
		[Reference]	(0.92-1.07)	(0.96-1.13)	(0.94-1.12)	(0.96-1.14)		
	Pooled ^b	1	0.98	1.01	1.01	1.04	0.20	1.02 (0.99-1.06)
		[Reference]	(0.92-1.05)	(0.91-1.11)	(0.95-1.08)	(0.97-1.12)		
Processed red meat								
	HPFS	1	1.00	1.07	1.01	1.14	0.06	1.08 (1.00-1.17)
		[Reference]	(0.88-1.13)	(0.95-1.19)	(0.90-1.13)	(1.02-1.29)		
	NHS	1	1.00	1.04	0.98	1.00	0.29	1.04 (0.97-1.11)
		[Reference]	(0.92-1.08)	(0.97-1.12)	(0.91-1.06)	(0.92-1.09)		
	Pooled ^b	1	1.00	1.05	0.99	1.08	0.04	1.06 (1.00-1.11)
		[Reference]	(0.94-1.07)	(0.99-1.12)	(0.93-1.06)	(0.95-1.22)		

Abbreviation: HPFS, Health Professionals Follow-up Study; NHS, Nurses' Health Study.

^aThe multivariate model was adjusted for age (continuous); body mass index (calculated as weight in kilograms divided by height in meters squared) category (<23.0, 23.0-24.9, 25.0-29.9, 30.0-34.9, or ≥35.0 kg/m²); alcohol consumption (0, 0.1-4.9, 5.0-14.9, or ≥15.0 g/d in women; 0, 0.1-4.9, 5.0-29.9, or ≥30.0 g/d in men); physical activity level (<3.0, 3.0-8.9, 9.0-17.9, 18.0-26.9, or ≥27.0 hours of metabolic equivalent tasks per week); smoking status (never, past, current [1-14, 15-24, or ≥25 cigarettes per day]); race (white or non-white); menopausal status and hormone use in women (premenopausal, postmenopausal never users, postmenopausal past users, or postmenopausal current users); family history of diabetes mellitus, myocardial infarction, or cancer; history of diabetes mellitus, hypertension, or hypercholesterolemia; and quintiles of total energy intake, whole grains, fruits, and vegetables.

^bResults were combined using the random-effects model.

eFigure 1. Trends of red meat intake in (A) Health Professionals Follow-up Study and (B) Nurses' Health Study.

