

Supplementary Material

Supplementary Table 1. Stratified analyses of the associations of RC with all-cause mortality among 13,383 individuals.

Supplementary Table 2. Stratified analyses of the associations of RC with CVD mortality among 13,383 individuals.

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Supplementary Table 4. Sensitivity analyses of the association between RC and mortality after adjusting for LDL-C.

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Supplementary Table 6. Sensitivity analyses of the association between RC and mortality excluding those who developed died within four years of follow-up (n=12,855).

Supplementary Figure 1. Flow chart of participants in this study.

Supplementary Table 1. Stratified analyses of the associations of RC with all-cause mortality

RC levels, mg/dL					
All-cause mortality	Q1, <14.26 mg/dL, HR (95% CI)	Q2, 14.26-19.77 mg/dL, HR (95% CI)	Q3, 19.77-29.80 mg/dL, HR (95% CI)	Q4, ≥29.80 mg/dL, HR (95% CI)	P value for interaction
Age, years					
<60	1.00 (ref.)	1.20 (0.96, 1.50)	1.44 (1.20, 1.73)	1.55 (1.28, 1.88)	<0.0001
≥60	1.00 (ref.)	1.10 (0.90, 1.35)	1.20 (0.98, 1.46)	1.06 (0.91, 1.24)	
Sex					
Men	1.00 (ref.)	1.20 (0.96, 1.50)	1.19 (1.01, 1.39)	1.24 (1.00, 1.54)	0.54
Women	1.00 (ref.)	1.00 (0.86, 1.17)	1.24 (1.01, 1.52)	1.21 (0.98, 1.50)	
Race/ethnicity					
White	1.00 (ref.)	1.18 (0.96, 1.44)	1.36 (1.18, 1.57)	1.27 (1.06, 1.52)	0.44
Non-White	1.00 (ref.)	1.08 (0.94, 1.25)	1.25 (1.04, 1.49)	1.26 (1.08, 1.47)	
Obesity					
BMI <30 kg/m ²	1.00 (ref.)	1.07 (0.81, 1.42)	1.17 (0.88, 1.55)	1.02 (0.78, 1.35)	0.17
BMI ≥30 kg/m ²	1.00 (ref.)	1.07 (0.76, 1.51)	1.28 (0.94, 1.75)	1.35 (0.98, 1.85)	
Smoking status					
Never smoker	1.00 (ref.)	1.18 (0.99, 1.40)	1.24 (1.05, 1.48)	1.08 (0.89, 1.32)	0.17
Ever smoker	1.00 (ref.)	1.17 (0.94, 1.45)	1.48 (1.27, 1.74)	1.46 (1.20, 1.78)	
Alcohol consumption					
Never drinker	1.00 (ref.)	1.14 (0.99, 1.31)	1.36 (1.22, 1.51)	1.22 (1.06, 1.41)	0.98
Ever drinker	1.00 (ref.)	1.34 (0.93, 1.94)	1.42 (1.07, 1.88)	1.67 (1.20, 2.32)	
Physical activity level					
Lower	1.00 (ref.)	1.32 (1.10, 1.59)	1.30 (1.13, 1.49)	1.34 (1.13, 1.60)	0.94
Meets or exceeds guidelines	1.00 (ref.)	1.01 (0.81, 1.25)	1.43 (1.19, 1.71)	1.27 (1.03, 1.58)	
Diabetes					
Yes	1.00 (ref.)	1.05 (0.75, 1.49)	1.25 (0.91, 1.73)	1.33 (0.99, 1.78)	0.31
No	1.00 (ref.)	1.21 (1.02, 1.44)	1.39 (1.24, 1.57)	1.33 (1.14, 1.55)	
Hypertension					
Yes	1.00 (ref.)	0.96 (0.81, 1.15)	1.13 (0.94, 1.36)	0.98 (0.81, 1.17)	0.0001
No	1.00 (ref.)	1.25 (0.98, 1.59)	1.44 (1.24, 1.68)	1.48 (1.22, 1.78)	

HR, hazard ratio; CI, confidence interval. Adjusted for age, sex, race/ethnicity, education, family income level, TEI, HEI, smoking status, alcohol intake, physical activity, BMI, diabetes, and hypertension.

Abbreviations: HEI, healthy eating index; TEI, total energy intake; BMI, body mass index.

Supplementary Table 2. Stratified analyses of the associations of RC with CVD mortality

RC levels, mg/dL					
CVD	Q1, <14.26 mg/dL HR (95% CI)	Q2, 14.26-19.77 mg/dL, HR (95% CI)	Q3, 19.77-29.80 mg/dL, HR (95% CI)	Q4, ≥29.80 mg/dL, HR (95% CI)	P value for interaction
Age, years					
<60	1.00 (ref.)	1.10 (0.73, 1.66)	1.49 (0.98, 2.27)	1.91 (1.21, 3.03)	<0.0001
≥60	1.00 (ref.)	0.93 (0.71, 1.21)	1.01 (0.79, 1.29)	0.91 (0.74, 1.12)	
Sex					
Men	1.00 (ref.)	0.95 (0.66, 1.37)	1.03 (0.73, 1.46)	1.16 (0.78, 1.73)	0.93
Women	1.00 (ref.)	0.92 (0.67, 1.26)	1.14 (0.79, 1.63)	1.19 (0.90, 1.58)	
Race/ethnicity					
White	1.00 (ref.)	1.01 (0.76, 1.35)	1.30 (0.99, 1.71)	1.24 (0.91, 1.69)	0.58
Non-White	1.00 (ref.)	1.02 (0.77, 1.35)	1.02 (0.63, 1.65)	1.19 (0.87, 1.63)	
Obesity					
BMI <30 kg/m ²	1.00 (ref.)	1.01 (0.77, 1.34)	1.19 (0.91, 1.56)	1.13 (0.86, 1.48)	0.28
BMI ≥30 kg/m ²	1.00 (ref.)	0.92 (0.57, 1.50)	1.28 (0.84, 1.95)	1.37 (0.91, 2.06)	
Smoking status					
Never smoker	1.00 (ref.)	0.996 (0.76, 1.31)	1.07 (0.77, 1.49)	0.90 (0.65, 1.25)	0.026
Ever smoker	1.00 (ref.)	1.05 (0.76, 1.45)	1.44 (1.07, 1.93)	1.56 (1.11, 2.17)	
Alcohol consumption					
Never drinker	1.00 (ref.)	1.14 (0.99, 1.31)	1.36 (1.22, 1.51)	1.22 (1.06, 1.41)	0.035
Ever drinker	1.00 (ref.)	1.34 (0.93, 1.94)	1.42 (1.07, 1.88)	1.67 (1.20, 2.32)	
Physical activity level					
Lower	1.00 (ref.)	1.23 (0.88, 1.72)	1.32 (1.003, 1.73)	1.41 (1.01, 1.98)	0.54
Meets or exceeds guidelines	1.00 (ref.)	0.83 (0.62, 1.11)	1.14 (0.75, 1.72)	1.07 (0.75, 1.52)	
Diabetes					
Yes	1.00 (ref.)	1.12 (0.58, 2.17)	1.09 (0.59, 2.01)	1.42 (0.74, 2.72)	0.62
No	1.00 (ref.)	1.03 (0.79, 1.34)	1.36 (1.06, 1.74)	1.27 (1.01, 1.58)	
Hypertension					
Yes	1.00 (ref.)	0.96 (0.81, 1.15)	1.13 (0.94, 1.36)	0.98 (0.81, 1.17)	0.019
No	1.00 (ref.)	1.25 (0.98, 1.59)	1.44 (1.24, 1.68)	1.48 (1.22, 1.78)	

HR, hazard ratio; CI, confidence interval. Adjusted for age, sex, race/ethnicity, education, family income level, TEI, HEI, smoking status, alcohol intake, physical activity, BMI, diabetes, and hypertension.

Abbreviations: HEI, healthy eating index; TEI, total energy intake; BMI, body mass index.

Supplementary Table 3. Stratified analyses of the associations of RC with IHD mortality

RC levels, mg/dL					
IHD	Q1, <14.26 mg/dL HR (95% CI)	Q2, 14.26-19.77 mg/dL, HR (95% CI)	Q3, 19.77-29.80 mg/dL, HR (95% CI)	Q4, ≥29.80 mg/dL, HR (95% CI)	P value for interaction
Age, years					
<60	1.00 (ref.)	1.17 (0.74, 1.86)	1.68 (1.05, 2.69)	2.16 (1.33, 3.51)	<.0001
≥60	1.00 (ref.)	1.02 (0.75, 1.41)	1.11 (0.85, 1.46)	0.97 (0.78, 1.21)	
Sex					
Men	1.00 (ref.)	0.91 (0.61, 1.36)	1.07 (0.75, 1.53)	1.14 (0.75, 1.75)	0.61
Women	1.00 (ref.)	1.13 (0.78, 1.63)	1.38 (0.91, 2.10)	1.44 (1.01, 2.05)	
Race/ethnicity					
White	1.00 (ref.)	1.16 (0.83, 1.62)	1.51 (1.12, 2.03)	1.41 (1.001, 1.98)	0.25
Nonwhite	1.00 (ref.)	0.97 (0.72, 1.31)	1.03 (0.61, 1.75)	1.17 (0.82, 1.66)	
Obesity					
BMI <30 kg/m ²	1.00 (ref.)	1.15 (0.84, 1.57)	1.32 (0.98, 1.78)	1.26 (0.96, 1.67)	0.71
BMI ≥30 kg/m ²	1.00 (ref.)	0.80 (0.44, 1.45)	1.19 (0.77, 1.83)	1.20 (0.74, 1.93)	
Smoking status					
Never smoker	1.00 (ref.)	1.10 (0.77, 1.56)	1.11 (0.74, 1.65)	0.91 (0.64, 1.30)	0.023
Ever smoker	1.00 (ref.)	1.14 (0.78, 1.67)	1.68 (1.22, 2.30)	1.74 (1.19, 2.55)	
Alcohol consumption					
Never drinker	1.00 (ref.)	0.98 (0.76, 1.26)	1.14 (0.86, 1.51)	1.10 (0.84, 1.45)	0.003
Ever drinker	1.00 (ref.)	1.24 (0.62, 2.48)	1.70 (0.91, 3.19)	2.30 (1.23, 4.32)	
Physical activity level					
Lower	1.00 (ref.)	1.32 (0.89, 1.95)	1.43 (1.04, 1.96)	1.58 (1.10, 2.26)	0.39
Meets or exceeds guidelines	1.00 (ref.)	0.92 (0.65, 1.31)	1.28 (0.78, 2.10)	1.07 (0.70, 1.64)	
Diabetes					
Yes	1.00 (ref.)	1.15 (0.57, 2.32)	1.17 (0.59, 2.32)	1.55 (0.74, 3.25)	0.902
No	1.00 (ref.)	1.13 (0.84, 1.51)	1.51 (1.18, 1.93)	1.34 (1.05, 1.71)	
Hypertension					
Yes	1.00 (ref.)	0.94 (0.73, 1.20)	1.12 (0.88, 1.43)	1.08 (0.86, 1.37)	0.0013
No	1.00 (ref.)	1.07 (0.73, 1.57)	1.31 (0.92, 1.87)	1.36 (0.93, 1.99)	

HR, hazard ratio; CI, confidence interval. Adjusted for age, sex, race/ethnicity, education, family income level, TEI, HEI, smoking status, alcohol intake, physical activity, BMI, diabetes, and hypertension.

Abbreviations: HEI, healthy eating index; TEI, total energy intake; BMI, body mass index.

Supplementary Table 4. Sensitivity analyses of the association between RC and mortality after adjusting for LDL-C.

RC levels, mg/dl				
Outcomes	Q1, <14.26 mg/dL, n=3345	Q2, 14.26-19.77 mg/dL, n=3346	Q3, 19.77-29.80 mg/dL, n=3346	Q4, ≥29.80 mg/dL, n=3346
All-cause mortality				
Deaths/person years	846/38591	1102/56357	1434/80897	1662/157147
Model 5	1 (ref.)	1.09 (0.95, 1.25)	1.20 (1.07, 1.35)	1.23 (1.06, 1.41)
CVD mortality				
Deaths/person years	308/38591	366/56357	477/80897	590/157147
Model 5	1 (ref.)	0.93 (0.72, 1.19)	1.08 (0.85, 1.39)	1.19 (0.93, 1.52)
IHD mortality				
Deaths/person years	245/38591	305/56357	382/80897	477/157147
Model 5	1 (ref.)	0.995 (0.74, 1.34)	1.19 (0.92, 1.55)	1.27 (0.98, 1.66)
Stroke mortality				
Deaths/person years	63/38590	61/56357	95/80897	113/157147
Model 5	1 (ref.)	0.68 (0.43, 1.08)	0.72 (0.43, 1.21)	0.90 (0.54, 1.48)
Cancer mortality				
Deaths/person years	199/38591	233/56357	338/80897	356/157147
Model 5	1 (ref.)	1.02 (0.77, 1.36)	1.38 (1.07, 1.77)	1.16 (0.90, 1.51)

HR, hazard ratio; CI, confidence interval.

Model 5 = Table 3 model 4+ LDL-C

Abbreviations: HEI, healthy eating index; TEI, total energy intake; BMI, body mass index; LDL-C, low-density lipoprotein cholesterol.

Supplementary Table 5 Sensitivity analyses of the association between RC and mortality after adjusting for ApoB.

RC levels, mg/dl				
Outcomes	Q1, <14.26 mg/dL, n=3345	Q2, 14.26-19.77 mg/dL, n=3346	Q3, 19.77-29.80 mg/dL, n=3346	Q4, ≥29.80 mg/dL, n=3346
All-cause mortality				
Deaths/person years	846/38591	1102/56357	1434/80897	1662/157147
Model 6	1 (ref.)	1.09 (0.95, 1.25)	1.2 (1.06, 1.35)	1.22 (1.06, 1.40)
CVD mortality				
Deaths/person years	308/38591	366/56357	477/80897	590/157147
Model 6	1 (ref.)	0.94 (0.73, 1.21)	1.10 (0.86, 1.39)	1.20 (0.95, 1.53)
IHD mortality				
Deaths/person years	245/38591	305/56357	382/80897	477/157147
Model 6	1 (ref.)	1.02 (0.76, 1.37)	1.22 (0.94, 1.57)	1.30 (1.00, 1.69)
Stroke mortality				
Deaths/person years	63/38590	61/56357	95/80897	113/157147
Model 6	1 (ref.)	0.65 (0.41, 1.03)	0.69 (0.42, 1.14)	0.88 (0.55, 1.40)
Cancer mortality				
Deaths/person years	199/38591	233/56357	338/80897	356/157147
Model 6	1 (ref.)	1.04 (0.78, 1.39)	1.40 (1.09, 1.79)	1.17 (0.91, 1.52)

HR, hazard ratio; CI, confidence interval.

Model 6 = Table 3 model 4+ ApoB

Abbreviations: HEI, healthy eating index; TEI, total energy intake; BMI, body mass index;

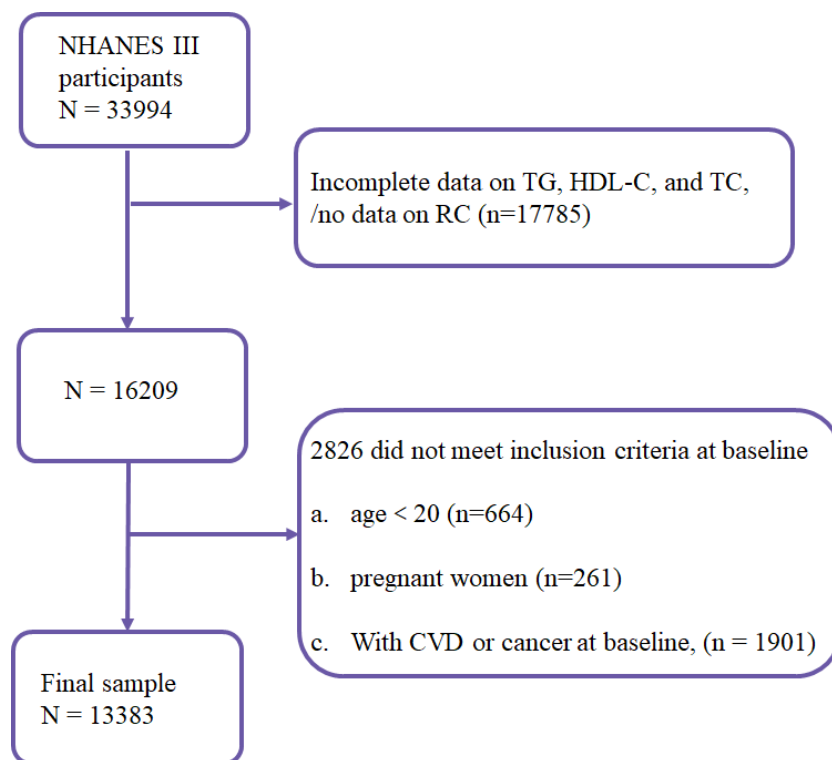
Supplementary Table 6. Sensitivity analyses of the association between RC and mortality excluding those who developed died within four years of follow-up (n=12,855)

Outcomes	RC levels, mg/dL			
	<14.22 mg/dL, n=3213	14.22-19.72 mg/dL, n=3214	19.72-29.76 mg/dL, n=3214	≥29.76 mg/dL, n=3214
All-cause mortality	1 (ref.)	1.12 (0.98, 1.29)	1.21 (1.05, 1.39)	1.26 (1.08, 1.47)
CVD mortality	1 (ref.)	1.01 (0.78, 1.32)	1.13 (0.87, 1.48)	1.30 (1.004, 1.69)
IHD mortality	1 (ref.)	1.07 (0.77, 1.49)	1.21 (0.91, 1.62)	1.37 (1.03, 1.82)
Stroke mortality	1 (ref.)	0.77 (0.47, 1.25)	0.82 (0.47, 1.41)	1.04 (0.60, 1.78)
Cancer mortality	1 (ref.)	0.99 (0.74, 1.33)	1.31 (1.000, 1.71)	1.17 (0.90, 1.53)

Data were presented as hazard ratios (95% CIs) with adjustment of age, sex, race/ethnicity, education, family income level, TEI, HEI, smoking status, alcohol intake, physical activity, BMI, diabetes, and hypertension.

Abbreviations: HEI, healthy eating index; TEI, total energy intake; BMI, body mass index; CVD, cardiovascular disease; IHD, ischemic heart disease.

Supplementary Figure 1. Flow chart of participants in this study.



Abbreviations: CVD, cardiovascular disease; HDL-C, high-density lipoprotein-cholesterol; LDL-C, low-density lipoprotein-cholesterol; NHANES, National Health and Nutrition Examination Survey; TC, total cholesterol; TG, triglyceride; RC, remnant cholesterol.