

Supplementary Figure 1 The flowchart of participants inclusion and exclusion

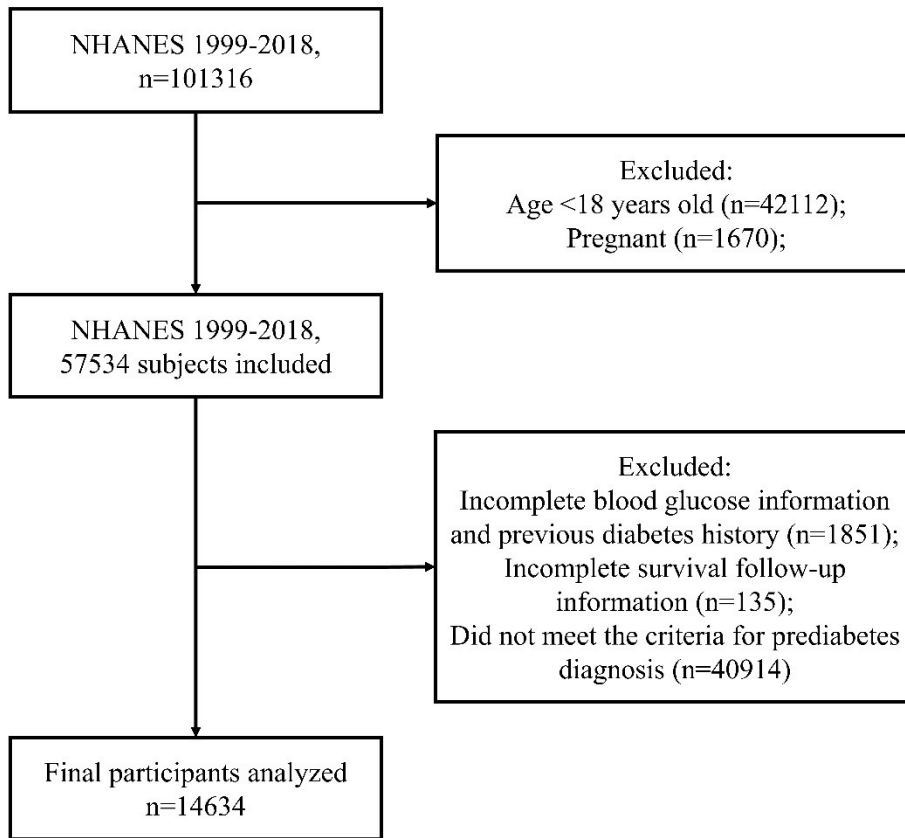
Supplementary Figure 2 Distribution density of vitamin levels within the mortality of the prediabetic population

Supplementary Figure 3 Kaplan-Meier analysis of the survival probability among the Q1-Q4 quartiles of vitamin levels

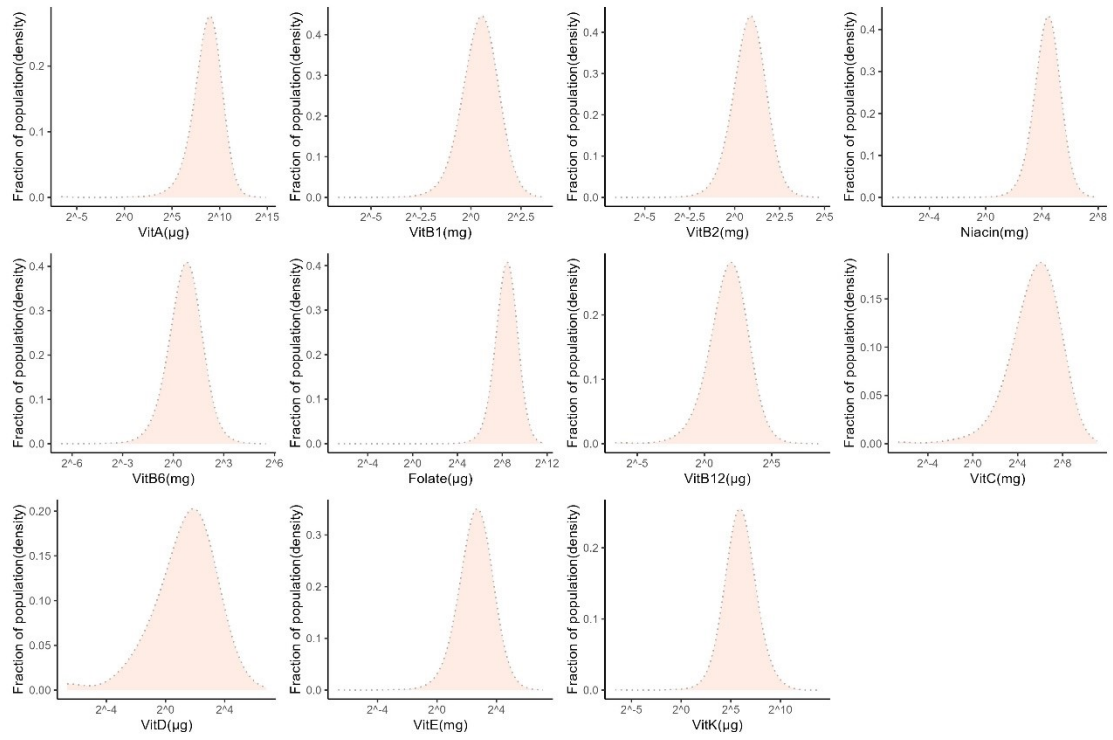
Supplementary Table 1 Baseline levels of laboratory characteristics in participants with prediabetes according to the vitamin level quartiles

Supplementary Table 2 (1-11) Subgroup analysis of hazard ratios for vitamin levels with all-cause and CVD mortality in participants with prediabetes from NHANES 1999-2018

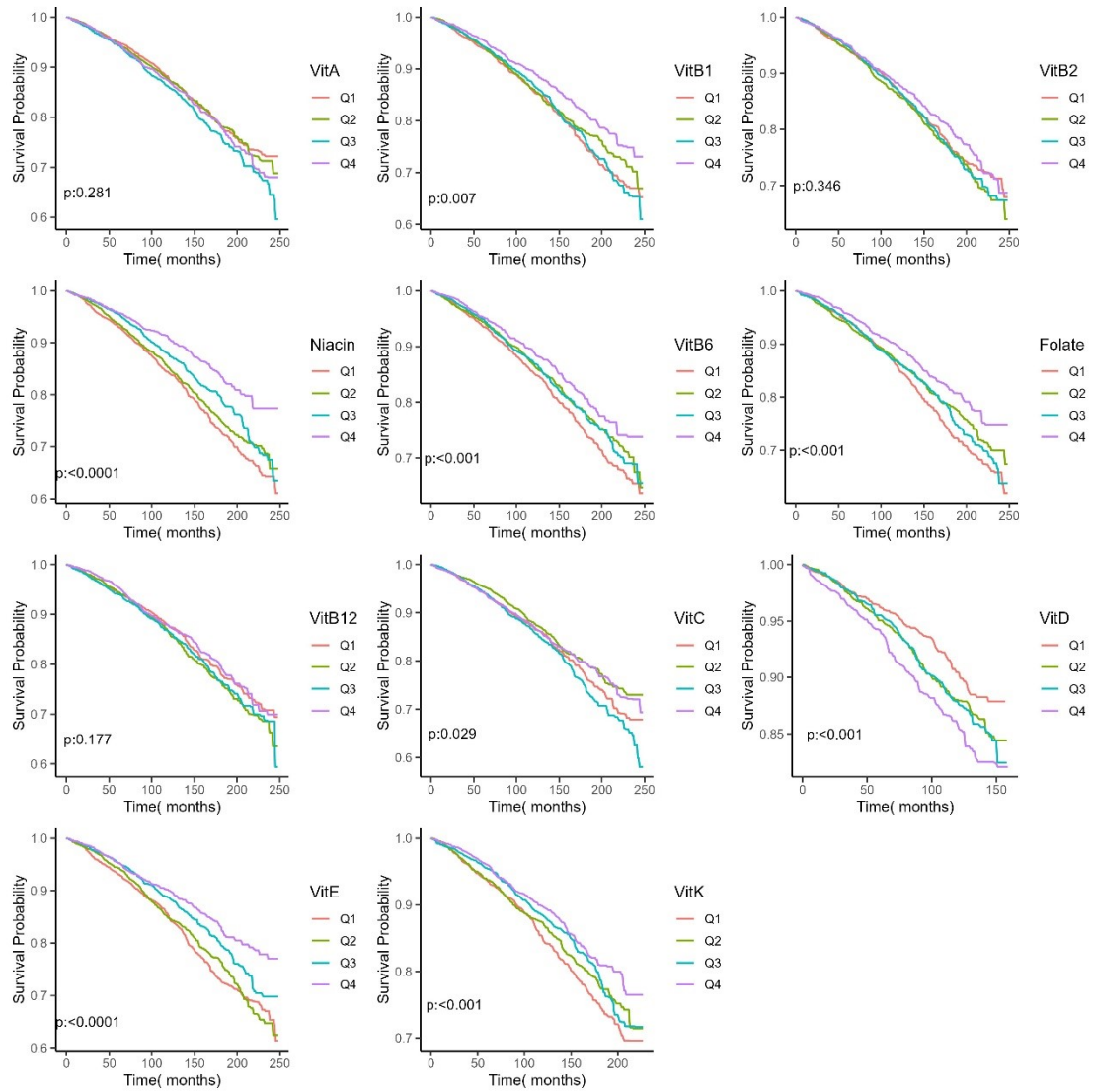
Supplementary Table 3 Sensitivity analysis of hazard ratios for vitamin levels with all-cause and CVD mortality in prediabetes after excluding participants who experienced an outcome event within the first three years of follow-up



Supplementary Figure 1 The flowchart of participants inclusion and exclusion



Supplementary Figure 2 Distribution density of vitamin levels within the mortality of the prediabetic population



Supplementary Figure 3 Kaplan-Meier analysis of the survival probability among the Q1-Q4 quartiles of vitamin levels

Supplementary Table 1 Baseline levels of laboratory characteristics in participants with prediabetes according to the vitamin level quartiles

Variable	Quartiles of vitamin levels				P value
	Q1	Q2	Q3	Q4	
Vitamin A					
FBG (mmol/L)	5.77(5.61,6.11)	5.83(5.61,6.11)	5.83(5.61,6.11)	5.79(5.61,6.05)	0.64
2-h PG (mmol/L)	6.61(5.27,8.10)	6.66(5.38,8.22)	6.55(5.33,8.05)	6.55(5.38,8.10)	0.92
HbA _{1c} (mmol/mol)	5.70(5.40,5.90)	5.70(5.40,5.80)	5.70(5.40,5.90)	5.70(5.40,5.90)	0.18
Vitamin B1					
FBG (mmol/L)	5.77(5.61,6.10)	5.78(5.61,6.11)	5.83(5.61,6.11)	5.81(5.61,6.11)	0.62
2-h PG (mmol/L)	6.77(5.50,8.22)	6.61(5.38,7.99)	6.72(5.38,8.27)	6.38(5.16,7.94)	0.01
HbA _{1c} (mmol/mol)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.80)	0.02
Vitamin B2					
FBG (mmol/L)	5.77(5.55,6.05)	5.82(5.61,6.06)	5.83(5.61,6.11)	5.83(5.61,6.11)	0.005
2-h PG (mmol/L)	6.88(5.61,8.27)	6.72(5.44,8.05)	6.61(5.38,8.16)	6.38(5.05,7.94)	0.002
HbA _{1c} (mmol/mol)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.80)	< 0.001
Niacin					
FBG (mmol/L)	5.77(5.55,6.05)	5.83(5.61,6.06)	5.82(5.61,6.11)	5.83(5.61,6.11)	< 0.001
2-h PG (mmol/L)	6.88(5.66,8.38)	6.72(5.38,8.22)	6.61(5.44,8.10)	6.33(5.05,7.88)	< 0.001
HbA _{1c} (mmol/mol)	5.70(5.50,5.90)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.80)	< 0.0001
Vitamin B6					
FBG (mmol/L)	5.77(5.61,6.09)	5.77(5.61,6.05)	5.83(5.61,6.11)	5.83(5.61,6.11)	0.05
2-h PG (mmol/L)	6.83(5.55,8.22)	6.55(5.38,8.10)	6.61(5.44,8.16)	6.44(5.05,7.99)	0.01
HbA _{1c} (mmol/mol)	5.70(5.50,5.90)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.80)	< 0.0001
Folate					
FBG (mmol/L)	5.77(5.61,6.11)	5.82(5.61,6.05)	5.83(5.61,6.11)	5.79(5.61,6.05)	0.63
2-h PG (mmol/L)	6.77(5.50,8.22)	6.61(5.38,8.05)	6.61(5.33,8.10)	6.44(5.22,8.05)	0.26
HbA _{1c} (mmol/mol)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.80)	0.02
Vitamin B12					
FBG (mmol/L)	5.77(5.55,6.05)	5.77(5.61,6.05)	5.83(5.61,6.11)	5.83(5.61,6.11)	0.01
2-h PG (mmol/L)	6.77(5.50,8.27)	6.61(5.33,8.05)	6.66(5.44,8.16)	6.33(5.11,7.99)	0.01
HbA _{1c} (mmol/mol)	5.70(5.50,5.90)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.80)	0.002
Vitamin C					
FBG (mmol/L)	5.77(5.61,6.10)	5.82(5.61,6.11)	5.83(5.61,6.11)	5.82(5.61,6.05)	0.96
2-h PG (mmol/L)	6.61(5.33,7.99)	6.61(5.44,8.22)	6.66(5.50,8.22)	6.55(5.16,8.16)	0.39
HbA _{1c} (mmol/mol)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.90)	0.12
Vitamin D					
FBG (mmol/L)	5.77(5.61,6.11)	5.83(5.61,6.05)	5.83(5.55,6.05)	5.82(5.61,6.11)	0.91
2-h PG (mmol/L)	6.49(5.27,8.10)	6.66(5.38,8.16)	6.66(5.44,8.10)	6.44(5.16,7.88)	0.36
HbA _{1c} (mmol/mol)	5.70(5.40,5.90)	5.70(5.50,5.90)	5.70(5.40,5.90)	5.70(5.50,5.90)	0.16
Vitamin E					
FBG (mmol/L)	5.77(5.55,6.05)	5.83(5.61,6.11)	5.83(5.61,6.05)	5.83(5.61,6.05)	0.03
2-h PG (mmol/L)	6.72(5.44,8.33)	6.72(5.44,8.16)	6.55(5.33,7.94)	6.44(5.22,8.10)	0.1
HbA _{1c} (mmol/mol)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.80)	< 0.001

Vitamin K

FBG (mmol/L)	5.77(5.55,6.06)	5.80(5.61,6.11)	5.83(5.61,6.11)	5.83(5.61,6.11)	0.03
2-h PG (mmol/L)	6.83(5.55,8.33)	6.66(5.44,8.05)	6.50(5.16,7.99)	6.44(5.33,8.10)	0.004
HbA _{1c} (mmol/mol)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.90)	5.70(5.40,5.90)	0.47

Data are presented as HR (95% CI) unless otherwise indicated. FPG: Fasting plasma glucose; 2-h PG: 2-hour post-load plasma glucose; HbA_{1c}: Hemoglobin A1c

Supplementary Table 2.1 Subgroup analysis of hazard ratios for vitamin A levels with all-cause and CVD mortality in participants with prediabetes from NHANES 1999-2018

	Q1	Q2	Q3	Q4	<i>P</i> _{trend}	<i>P</i> _{interaction}
All-cause mortality						
Sex						0.41
Male	1	0.86(0.67,1.11) 0.25	1.08(0.83,1.40) 0.57	1.00(0.76,1.32) 1.00	0.57	
Female	1	1.03(0.82,1.29) 0.80	0.97(0.79,1.19) 0.77	0.98(0.76,1.27) 0.89	0.78	
Age, years						0.92
<60	1	0.97(0.63,1.48) 0.88	1.16(0.79,1.71) 0.44	1.09(0.68,1.74) 0.73	0.56	
≥60	1	0.92(0.77,1.10) 0.37	0.94(0.78,1.13) 0.50	0.93(0.76,1.15) 0.51	0.65	
BMI, kg/m ²						0.56
Normal weight (<25)	1	0.88(0.67,1.16) 0.37	0.98(0.72,1.33) 0.90	1.15(0.84,1.57) 0.39	0.22	
Overweight (25-30)	1	0.79(0.58,1.09) 0.15	0.87(0.65,1.17) 0.36	0.81(0.55,1.18) 0.28	0.44	
Obesity (≥30)	1	1.07(0.80,1.44) 0.64	1.16(0.84,1.61) 0.37	0.96(0.70,1.31) 0.78	0.93	
Race						0.75
Non-Hispanic White	1	0.94(0.76,1.16) 0.57	1.02(0.84,1.24) 0.80	0.99(0.79,1.25) 0.94	0.84	
Non-Hispanic Black	1	0.87(0.63,1.21) 0.41	0.94(0.59,1.48) 0.79	0.77(0.52,1.15) 0.20	0.29	
Mexican American	1	1.08(0.63,1.85) 0.78	0.95(0.53,1.70) 0.86	1.29(0.71,2.33) 0.40	0.53	
Others	1	0.89(0.51,1.54) 0.68	1.09(0.65,1.84) 0.75	1.09(0.56,2.14) 0.80	0.65	
Education level						0.55
Less than high school	1	0.93(0.71,1.22) 0.58	0.87(0.68,1.11) 0.25	1.04(0.78,1.38) 0.81	0.92	
High school or equivalent	1	0.87(0.64,1.19) 0.39	1.15(0.82,1.60) 0.42	0.86(0.58,1.28) 0.46	0.78	
College or above	1	0.96(0.71,1.29) 0.77	0.97(0.74,1.28) 0.85	0.98(0.71,1.36) 0.92	1	
Family income-poverty ratio						0.58
<1.0	1	1.10(0.73,1.65) 0.64	0.91(0.65,1.27) 0.58	1.00(0.72,1.39) 0.99	0.74	
1.0-3.0	1	0.81(0.65,1.01) 0.06	0.91(0.73,1.15) 0.43	0.89(0.70,1.14) 0.37	0.66	
>3.0	1	1.15(0.78,1.70) 0.48	1.34(0.91,1.98) 0.13	1.19(0.79,1.80) 0.40	0.39	
Smoking status						0.81
Never	1	0.99(0.77,1.26) 0.91	0.99(0.77,1.26) 0.91	1.03(0.80,1.32) 0.84	0.81	
Former	1	0.91(0.69,1.21) 0.52	1.02(0.79,1.31) 0.91	0.95(0.73,1.22) 0.67	0.92	
Current	1	0.95(0.69,1.33) 0.78	1.07(0.76,1.50) 0.71	0.99(0.60,1.64) 0.97	0.92	
Alcohol drinking						0.76
Never	1	1.00(0.79,1.27) 0.98	1.02(0.77,1.37) 0.87	0.89(0.68,1.19) 0.44	0.52	
Low to moderate	1	0.89(0.67,1.16) 0.39	0.97(0.75,1.26) 0.82	0.99(0.73,1.36) 0.97	0.78	
Heavy	1	0.83(0.55,1.27) 0.39	1.01(0.65,1.58) 0.95	1.00(0.67,1.48) 0.99	0.74	
Healthy eating index score						0.24
Quarter 1	1	0.78(0.54,1.12) 0.18	0.83(0.58,1.18) 0.30	0.59(0.40,0.86) 0.01	0.02	
Quarter 2	1	1.22(0.88,1.71) 0.23	1.15(0.81,1.64) 0.42	1.19(0.84,1.68) 0.34	0.44	
Quarter 3	1	1.24(0.92,1.67) 0.16	1.25(0.88,1.76) 0.21	1.38(0.99,1.91) 0.06	0.11	
Quarter 4	1	0.64(0.41,1.01) 0.06	0.88(0.59,1.30) 0.51	0.80(0.53,1.20) 0.28	0.85	
Total energy intake from diet, kcal						0.33
[0,1445.5]	1	1.08(0.84,1.39) 0.56	1.07(0.85,1.34) 0.58	1.00(0.74,1.35) 0.99	0.89	
(1445.5,1908]	1	0.84(0.60,1.17) 0.31	0.81(0.57,1.14) 0.22	1.02(0.69,1.49) 0.94	0.92	
(1908,2494.5]	1	0.83(0.55,1.26) 0.39	1.17(0.77,1.79) 0.47	1.03(0.66,1.59) 0.91	0.4	
(2494.5,15594]	1	0.73(0.40,1.34) 0.31	0.96(0.61,1.49) 0.84	0.77(0.46,1.29) 0.32	0.46	
Self reported health						0.09
Very good to excellent	1	1.07(0.81,1.41) 0.63	1.27(0.98,1.64) 0.07	1.12(0.85,1.47) 0.41	0.27	

Good	1	0.82(0.61,1.10) 0.18	0.77(0.55,1.08) 0.13	0.79(0.56,1.12) 0.19	0.23
Poor to fair	1	0.82(0.61,1.11) 0.46	0.99(0.75,1.32) 0.96	1.03(0.77,1.38) 0.84	0.60
Family history of cardiovascular disease					0.24
No	1	0.92(0.75,1.14) 0.46	1.00(0.82,1.23) 0.98	1.08(0.87,1.32) 0.49	0.32
Yes	1	0.94(0.68,1.31) 0.73	1.03(0.72,1.46) 0.88	0.76(0.53,1.09) 0.14	0.18
Cardiovascular disease					0.70
No	1	0.90(0.73,1.12) 0.36	1.02(0.85,1.22) 0.85	0.94(0.74,1.19) 0.60	0.86
Yes	1	0.99(0.74,1.32) 0.95	1.03(0.77,1.37) 0.85	1.10(0.82,1.49) 0.53	0.48
Chronic obstructive pulmonary diseases					0.85
No	1	0.94(0.79,1.12) 0.48	1.03(0.87,1.23) 0.72	1.03(0.85,1.24) 0.79	0.54
Yes	1	0.79(0.48,1.31) 0.35	0.85(0.52,1.40) 0.53	0.70(0.40,1.22) 0.21	0.32
History of chronic kidney disease					0.78
No	1	0.93(0.78,1.11) 0.40	1.00(0.84,1.19) 0.98	0.97(0.80,1.18) 0.76	0.99
Yes	1	1.01(0.39,2.63) 0.98	1.32(0.60,2.92) 0.49	1.12(0.47,2.66) 0.80	0.69
Cancer					0.47
No	1	0.91(0.75,1.11) 0.35	1.08(0.89,1.30) 0.46	1.04(0.83,1.30) 0.76	0.44
Yes	1	0.99(0.67,1.46) 0.95	0.83(0.57,1.20) 0.32	0.83(0.56,1.21) 0.33	0.19
CVD mortality					
Sex					0.08
Male	1	1.46(0.96,2.22) 0.08	1.61(1.05,2.48) 0.03	1.97(1.25,3.10) 0.004	0.01
Female	1	0.99(0.65,1.50) 0.96	1.10(0.72,1.68) 0.67	0.79(0.48,1.30) 0.35	0.45
Age, years					0.76
<60	1	2.12(0.95,4.70) 0.07	1.75(0.64,4.82) 0.28	2.16(0.91,5.14) 0.08	0.14
≥60	1	1.03(0.74,1.43) 0.88	1.15(0.85,1.56) 0.35	1.14(0.79,1.64) 0.48	0.42
BMI, kg/m2					0.27
Normal weight (<25)	1	0.80(0.46,1.40) 0.44	0.96(0.58,1.57) 0.86	1.45(0.81,2.57) 0.21	0.09
Overweight (25-30)	1	0.92(0.52,1.64) 0.78	1.12(0.66,1.91) 0.68	1.03(0.53,2.01) 0.92	0.76
Obesity (≥30)	1	1.67(0.98,2.83) 0.06	1.71(0.94,3.10) 0.08	1.41(0.80,2.48) 0.23	0.33
Race					0.31
Non-Hispanic White	1	1.24(0.83,1.86) 0.30	1.46(0.99,2.17) 0.06	1.38(0.89,2.14) 0.16	0.18
Non-Hispanic Black	1	1.27(0.69,2.34) 0.44	0.78(0.36,1.72) 0.54	0.95(0.44,2.06) 0.89	0.68
Mexican American	1	1.42(0.64,3.13) 0.39	1.17(0.38,3.58) 0.78	3.16(1.05,9.55) 0.04	0.09
Others	1	1.00(0.35,2.90) 0.99	0.53(0.14,1.96) 0.34	1.96(0.54,7.16) 0.31	0.49
Education level					0.46
Less than high school	1	1.23(0.82,1.84) 0.32	0.97(0.62,1.52) 0.89	1.18(0.73,1.90) 0.50	0.77
High school or equivalent	1	1.00(0.50,1.98) 1.00	1.85(0.94,3.63) 0.07	1.84(0.89,3.78) 0.10	0.03
College or above	1	1.14(0.64,2.03) 0.66	1.16(0.66,2.04) 0.61	1.09(0.64,1.87) 0.75	0.86
Family income-poverty ratio					0.09
<1.0	1	2.22(1.29,3.82) 0.004	1.05(0.55,2.00) 0.87	1.68(0.87,3.22) 0.12	0.57
1.0-3.0	1	0.83(0.56,1.24) 0.37	1.02(0.67,1.56) 0.91	1.02(0.63,1.66) 0.94	0.70
>3.0	1	1.86(0.84,4.08) 0.12	2.45(1.13,5.34) 0.02	2.11(1.02,4.36) 0.04	0.06
Smoking status					0.16
Never	1	0.89(0.57,1.37) 0.59	1.31(0.81,2.10) 0.27	1.10(0.70,1.72) 0.68	0.37
Former	1	0.97(0.56,1.69) 0.91	1.06(0.65,1.74) 0.82	1.20(0.69,2.09) 0.51	0.41
Current	1	2.51(1.50,4.20) <0.001	1.47(0.71,3.04) 0.29	2.30(1.04,5.11) 0.04	0.15
Alcohol drinking					0.31
Never	1	1.06(0.69,1.62) 0.79	1.25(0.76,2.06) 0.38	0.81(0.47,1.40) 0.45	0.61

Low to moderate	1	1.13(0.68,1.87) 0.63	1.33(0.74,2.40) 0.35	1.51(0.90,2.53) 0.12	0.12
Heavy	1	1.54(0.78,3.05) 0.21	1.25(0.66,2.38) 0.50	2.03(1.02,4.06) 0.04	0.11
Healthy eating index score					0.45
Quarter 1	1	0.81(0.46,1.41) 0.45	1.12(0.55,2.28) 0.76	0.85(0.39,1.85) 0.68	0.94
Quarter 2	1	1.21(0.51,2.87) 0.66	1.08(0.56,2.08) 0.81	1.76(0.79,3.89) 0.16	0.14
Quarter 3	1	1.67(0.98,2.86) 0.06	1.48(0.79,2.75) 0.22	1.26(0.71,2.25) 0.43	0.86
Quarter 4	1	1.30(0.64,2.66) 0.47	2.09(1.02,4.28) 0.04	2.01(0.93,4.34) 0.08	0.05
Total energy intake from diet, kcal					0.45
[0,1445.5]	1	1.16(0.77,1.73) 0.48	1.32(0.89,1.96) 0.17	1.08(0.60,1.95) 0.79	0.54
(1445.5,1908]	1	0.76(0.40,1.46) 0.42	0.90(0.47,1.73) 0.75	1.22(0.68,2.21) 0.50	0.26
(1908,2494.5]	1	1.49(0.78,2.82) 0.22	2.26(1.12,4.55) 0.02	1.90(0.99,3.64) 0.05	0.03
(2494.5,15594]	1	2.00(0.71,5.66) 0.19	0.91(0.30,2.73) 0.87	1.28(0.41,3.99) 0.66	0.77
Self reported health					0.32
Very good to excellent	1	1.15(0.77,1.71) 0.50	1.43(0.89,2.29) 0.14	1.09(0.71,1.66) 0.70	0.56
Good	1	1.10(0.64,1.89) 0.73	1.02(0.59,1.76) 0.95	1.04(0.54,1.99) 0.92	0.98
Poor to fair	1	1.22(0.61,2.42) 0.58	1.40(0.78,2.50) 0.26	1.99(1.06,3.74) 0.03	0.02
Family history of cardiovascular disease					0.57
No	1	1.10(0.78,1.55) 0.59	1.28(0.87,1.89) 0.21	1.34(0.89,2.03) 0.16	0.14
Yes	1	1.41(0.83,2.40) 0.20	1.35(0.79,2.30) 0.28	1.25(0.67,2.34) 0.48	0.68
Cardiovascular disease					0.27
No	1	1.13(0.76,1.68) 0.55	1.14(0.73,1.78) 0.56	1.07(0.68,1.69) 0.78	0.85
Yes	1	1.31(0.81,2.12) 0.26	1.69(1.14,2.51) 0.01	1.84(1.12,3.03) 0.02	0.02
Chronic obstructive pulmonary diseases					0.11
No	1	1.10(0.80,1.51) 0.57	1.28(0.92,1.79) 0.14	1.36(0.95,1.93) 0.09	0.07
Yes	1	1.14(0.35,3.69) 0.83	1.44(0.53,3.91) 0.47	0.83(0.21,3.21) 0.79	0.92
History of chronic kidney disease					0.29
No	1	1.18(0.86,1.61) 0.31	1.27(0.91,1.79) 0.16	1.25(0.87,1.80) 0.23	0.27
Yes	1	0.93(0.16, 5.52) 0.93	0.82(0.10, 6.51) 0.85	1.63(0.26,10.09) 0.60	0.40
Cancer					0.61
No	1	1.33(0.94,1.88) 0.11	1.53(1.08,2.18) 0.02	1.52(1.01,2.28) 0.04	0.04
Yes	1	0.79(0.32,1.96) 0.62	0.73(0.33,1.61) 0.43	0.77(0.37,1.60) 0.48	0.53
Cancer mortality					
Sex					0.001
Male	1	0.49(0.31,0.79) 0.003	1.01(0.65,1.57) 0.96	0.68(0.43,1.08) 0.10	0.55
Female	1	1.20(0.76,1.90) 0.43	0.64(0.41,1.01) 0.05	0.78(0.45,1.32) 0.35	0.08
Age, years					0.3
<60	1	0.70(0.32,1.53) 0.37	1.27(0.72,2.26) 0.41	0.75(0.32,1.74) 0.50	0.83
≥60	1	0.80(0.56,1.14) 0.21	0.70(0.50,0.98) 0.04	0.67(0.46,0.97) 0.04	0.04
BMI, kg/m2					0.21
Normal weight (<25)	1	0.56(0.32,0.97) 0.04	0.98(0.49,1.98) 0.97	0.86(0.45,1.63) 0.64	0.93
Overweight (25-30)	1	0.60(0.33,1.07) 0.09	0.55(0.31,1.00) 0.05	0.57(0.31,1.05) 0.07	0.14
Obesity (≥30)	1	1.00(0.58,1.74) 1.00	1.06(0.60,1.85) 0.84	0.56(0.30,1.04) 0.07	0.10
Race					0.59
Non-Hispanic White	1	0.77(0.53,1.14) 0.19	0.84(0.60,1.17) 0.31	0.69(0.45,1.04) 0.08	0.11
Non-Hispanic Black	1	0.89(0.49,1.62) 0.71	0.86(0.46,1.63) 0.64	0.75(0.38,1.47) 0.40	0.39
Mexican American	1	0.81(0.35,1.90) 0.63	0.76(0.24,2.44) 0.64	0.48(0.13,1.79) 0.28	0.26

Others	1	0.24(0.07,0.78) 0.02	1.30(0.42,4.02) 0.65	0.82(0.27,2.48) 0.73	0.77	
Education level						0.23
Less than high school	1	0.58(0.31,1.07) 0.08	0.92(0.54,1.55) 0.75	0.70(0.40,1.22) 0.21	0.46	
High school or equivalent	1	0.85(0.47,1.52) 0.58	0.88(0.46,1.70) 0.71	0.38(0.16,0.89) 0.03	0.03	
College or above	1	0.79(0.47,1.33) 0.38	0.74(0.49,1.12) 0.16	0.84(0.52,1.36) 0.48	0.59	
Family income-poverty ratio						0.13
<1.0	1	0.76(0.31,1.81) 0.53	0.81(0.39,1.72) 0.59	0.43(0.19,0.98) 0.04	0.07	
1.0-3.0	1	0.62(0.38,1.02) 0.06	0.59(0.35,1.00) 0.05	0.44(0.27,0.71) <0.001	0.003	
>3.0	1	1.14(0.68,1.91) 0.63	1.52(0.95,2.43) 0.08	1.31(0.81,2.12) 0.27	0.26	
Smoking status						0.18
Never	1	0.86(0.49,1.51) 0.61	0.59(0.30,1.17) 0.13	0.76(0.41,1.39) 0.37	0.29	
Former	1	0.93(0.57,1.51) 0.77	1.12(0.68,1.86) 0.66	0.70(0.41,1.22) 0.21	0.25	
Current	1	0.56(0.30,1.04) 0.07	0.80(0.47,1.36) 0.41	0.68(0.33,1.39) 0.29	0.39	
Alcohol drinking						0.89
Never	1	0.95(0.59,1.51) 0.82	0.97(0.53,1.80) 0.93	0.68(0.41,1.13) 0.14	0.23	
Low to moderate	1	0.66(0.42,1.07) 0.09	0.72(0.48,1.07) 0.10	0.63(0.35,1.14) 0.13	0.18	
Heavy	1	0.67(0.29,1.53) 0.34	0.96(0.44,2.07) 0.91	0.71(0.37,1.35) 0.30	0.52	
Healthy eating index score						0.79
Quarter 1	1	0.58(0.29,1.15) 0.12	0.60(0.29,1.22) 0.16	0.34(0.15,0.76) 0.01	0.01	
Quarter 2	1	1.08(0.54,2.16) 0.82	1.14(0.55,2.34) 0.72	0.83(0.39,1.78) 0.63	0.68	
Quarter 3	1	1.15(0.57,2.32) 0.69	1.24(0.57,2.72) 0.59	1.21(0.61,2.42) 0.59	0.61	
Quarter 4	1	0.46(0.21,1.04) 0.06	0.64(0.33,1.24) 0.19	0.56(0.30,1.06) 0.08	0.27	
Total energy intake from diet, kcal						0.06
[0,1445.5]	1	1.27(0.75,2.15) 0.38	0.85(0.50,1.44) 0.53	0.54(0.28,1.04) 0.07	0.04	
(1445.5,1908]	1	0.53(0.31,0.89) 0.02	0.53(0.25,1.12) 0.10	0.63(0.33,1.20) 0.16	0.21	
(1908,2494.5]	1	0.58(0.33,1.05) 0.07	0.70(0.40,1.22) 0.21	0.70(0.39,1.23) 0.21	0.64	
(2494.5,15594]	1	0.57(0.20,1.60) 0.29	1.55(0.77,3.13) 0.22	0.84(0.39,1.82) 0.66	0.95	
Self reported health						0.37
Very good to excellent	1	0.79(0.42,1.50) 0.48	0.77(0.45,1.30) 0.33	0.66(0.37,1.19) 0.17	0.17	
Good	1	0.75(0.45,1.26) 0.28	0.51(0.28,0.95) 0.03	0.50(0.28,0.88) 0.02	0.01	
Poor to fair	1	0.70(0.41,1.21) 0.20	1.19(0.72,1.95) 0.49	0.87(0.47,1.60) 0.65	0.93	
Family history of cardiovascular disease						0.69
No	1	0.73(0.48,1.10) 0.13	0.82(0.55,1.22) 0.32	0.76(0.51,1.14) 0.19	0.33	
Yes	1	0.89(0.49,1.60) 0.69	0.88(0.48,1.61) 0.68	0.55(0.29,1.06) 0.07	0.07	
Cardiovascular disease						0.76
No	1	0.75(0.51,1.09) 0.13	0.87(0.64,1.20) 0.40	0.73(0.49,1.09) 0.13	0.23	
Yes	1	0.83(0.48,1.43) 0.50	0.75(0.41,1.39) 0.37	0.51(0.26,1.00) 0.05	0.05	
Chronic obstructive pulmonary diseases						0.56
No	1	0.79(0.56,1.11) 0.18	0.92(0.69,1.25) 0.60	0.76(0.53,1.10) 0.14	0.24	
Yes	1	0.53(0.15,1.90) 0.33	0.32(0.09,1.09) 0.07	0.26(0.07,1.01) 0.05	0.03	
History of chronic kidney disease						0.12
No	1	0.74(0.54,1.03) 0.07	0.86(0.65,1.14) 0.28	0.71(0.50,1.02) 0.06	0.12	
Yes	1	2.15(0.52,8.90) 0.29	0.32(0.04,2.93) 0.32	0.14(0.03,0.75) 0.02	0.02	
Cancer						0.13
No	1	0.62(0.43,0.91) 0.02	0.85(0.59,1.22) 0.37	0.63(0.40,0.99) 0.05	0.12	
Yes	1	1.45(0.72,2.90) 0.29	1.00(0.51,1.98) 0.99	1.11(0.54,2.30) 0.77	0.77	
Other mortality						

Sex							0.39	
Male	1	0.88(0.58,1.32)	0.52	0.88(0.59,1.30)	0.51	0.82(0.53,1.28)	0.39	0.42
Female	1	0.94(0.67,1.32)	0.72	1.11(0.82,1.50)	0.50	1.22(0.86,1.72)	0.26	0.16
Age, years								0.97
<60	1	0.91(0.50,1.64)	0.74	0.89(0.51,1.55)	0.68	1.07(0.56,2.04)	0.83	0.87
≥60	1	0.92(0.69,1.24)	0.59	0.96(0.74,1.25)	0.79	0.95(0.71,1.27)	0.75	0.88
BMI, kg/m2								0.95
Normal weight (<25)	1	1.12(0.71,1.78)	0.61	1.00(0.66,1.53)	0.98	1.11(0.72,1.70)	0.65	0.78
Overweight (25-30)	1	0.84(0.53,1.35)	0.47	0.96(0.62,1.51)	0.88	0.83(0.46,1.48)	0.52	0.65
Obesity (≥30)	1	0.84(0.53,1.34)	0.47	0.95(0.61,1.48)	0.80	1.05(0.69,1.60)	0.81	0.70
Race								0.41
Non-Hispanic White	1	0.90(0.65,1.25)	0.54	0.95(0.69,1.29)	0.74	1.01(0.72,1.41)	0.97	0.81
Non-Hispanic Black	1	0.67(0.39,1.16)	0.15	1.06(0.52,2.13)	0.87	0.69(0.39,1.22)	0.21	0.46
Mexican American	1	1.11(0.46,2.70)	0.81	0.93(0.38,2.30)	0.88	1.34(0.51,3.53)	0.55	0.68
Others	1	1.39(0.57,3.40)	0.46	1.21(0.59,2.47)	0.60	1.02(0.34,3.09)	0.97	0.91
Education level								0.6
Less than high school	1	0.93(0.64,1.36)	0.71	0.77(0.52,1.14)	0.19	1.13(0.75,1.73)	0.56	0.75
High school or equivalent	1	0.83(0.50,1.37)	0.46	1.03(0.61,1.74)	0.92	0.80(0.47,1.36)	0.41	0.61
College or above	1	0.98(0.58,1.67)	0.94	1.03(0.63,1.70)	0.91	0.99(0.56,1.77)	0.99	0.97
Family income-poverty ratio								0.46
<1.0	1	0.91(0.55,1.52)	0.73	0.99(0.62,1.59)	0.96	1.11(0.66,1.86)	0.68	0.68
1.0-3.0	1	0.94(0.68,1.29)	0.69	1.08(0.81,1.45)	0.59	1.14(0.82,1.58)	0.44	0.28
>3.0	1	0.87(0.45,1.67)	0.67	0.83(0.45,1.54)	0.56	0.75(0.37,1.52)	0.42	0.40
Smoking status								0.65
Never	1	1.14(0.73,1.79)	0.56	0.99(0.65,1.51)	0.97	1.11(0.71,1.72)	0.65	0.83
Former	1	0.88(0.57,1.35)	0.56	0.93(0.63,1.38)	0.72	0.97(0.67,1.39)	0.85	0.98
Current	1	0.81(0.47,1.37)	0.43	1.12(0.66,1.89)	0.69	0.96(0.47,1.96)	0.91	0.88
Alcohol drinking								0.9
Never	1	0.97(0.65,1.46)	0.88	0.90(0.57,1.43)	0.67	1.05(0.66,1.67)	0.84	0.90
Low to moderate	1	0.96(0.64,1.44)	0.85	1.01(0.68,1.50)	0.97	1.03(0.64,1.65)	0.89	0.82
Heavy	1	0.66(0.36,1.23)	0.19	0.95(0.49,1.84)	0.88	0.82(0.45,1.49)	0.51	0.81
Healthy eating index score								0.57
Quarter 1	1	0.90(0.50,1.60)	0.72	0.86(0.48,1.52)	0.60	0.67(0.36,1.25)	0.21	0.25
Quarter 2	1	1.26(0.79,2.01)	0.34	1.21(0.77,1.92)	0.41	1.08(0.68,1.71)	0.76	0.89
Quarter 3	1	1.00(0.64,1.55)	0.98	1.12(0.69,1.83)	0.64	1.55(0.88,2.72)	0.13	0.10
Quarter 4	1	0.61(0.31,1.21)	0.16	0.73(0.41,1.30)	0.28	0.64(0.35,1.18)	0.15	0.34
Total energy intake from diet, kcal								0.46
[0,1445.5]	1	0.92(0.64,1.32)	0.65	1.05(0.72,1.54)	0.80	1.20(0.76,1.89)	0.44	0.43
(1445.5,1908]	1	1.13(0.68,1.90)	0.64	1.02(0.66,1.59)	0.93	1.15(0.66,2.00)	0.63	0.75
(1908,2494.5]	1	0.75(0.34,1.63)	0.46	1.01(0.49,2.10)	0.98	0.86(0.37,2.01)	0.73	0.97
(2494.5,15594]	1	0.51(0.20,1.30)	0.16	0.68(0.34,1.35)	0.27	0.60(0.30,1.19)	0.14	0.35
Self reported health								0.02
Very good to excellent	1	1.22(0.80,1.86)	0.35	1.48(0.97,2.25)	0.07	1.40(0.88,2.23)	0.15	0.10
Good	1	0.68(0.41,1.14)	0.14	0.79(0.49,1.26)	0.32	0.82(0.46,1.45)	0.49	0.73
Poor to fair	1	0.84(0.54,1.31)	0.45	0.67(0.42,1.06)	0.09	0.77(0.53,1.12)	0.17	0.16
Family history of cardiovascular disease								0.4
No	1	0.97(0.71,1.33)	0.85	0.96(0.70,1.33)	0.82	1.13(0.82,1.56)	0.46	0.44

Yes	1	0.73(0.45,1.19) 0.21	1.01(0.60,1.70) 0.96	0.70(0.40,1.22) 0.21	0.41
Cardiovascular disease					0.88
No	1	0.91(0.65,1.28) 0.60	1.07(0.79,1.43) 0.67	1.02(0.73,1.43) 0.90	0.67
Yes	1	0.89(0.58,1.37) 0.61	0.82(0.54,1.25) 0.36	0.98(0.61,1.59) 0.94	0.90
Chronic obstructive pulmonary diseases					0.34
No	1	0.95(0.71,1.29) 0.75	0.97(0.73,1.28) 0.80	1.02(0.76,1.37) 0.90	0.84
Yes	1	0.69(0.33,1.46) 0.34	0.91(0.45,1.82) 0.79	0.81(0.39,1.69) 0.57	0.82
History of chronic kidney disease					0.6
No	1	0.91(0.70,1.19) 0.50	0.95(0.73,1.24) 0.70	0.98(0.74,1.31) 0.90	0.97
Yes	1	0.74(0.16,3.35) 0.70	1.97(0.52,7.47) 0.32	0.98(0.19,5.17) 0.98	0.66
Cancer					0.68
No	1	0.90(0.67,1.21) 0.51	1.01(0.76,1.33) 0.96	1.08(0.78,1.50) 0.63	0.48
Yes	1	0.83(0.49,1.41) 0.49	0.80(0.46,1.39) 0.42	0.65(0.39,1.10) 0.11	0.08

Adjusted for sex, age, race, BMI, educational level, smoking status, drinking status, family income poverty ratio, healthy eating index-2015, total energy intake from the diet, self-reported health status, family history of cardiovascular diseases, self-reported cardiovascular disease, self-reported chronic obstructive pulmonary disease, self-reported chronic kidney disease, and self-reported cancer.

Supplementary Table 2.2 Subgroup analysis of hazard ratios for vitamin B1 levels with all-cause and CVD

mortality in participants with prediabetes from NHANES 1999-2018

	Q1	Q2	Q3	Q4	<i>P</i> _{trend}	<i>P</i> _{interaction}
All-cause mortality						0.78
Sex						
Male	1	1.03(0.79,1.34) 0.83	1.12(0.86,1.44) 0.41	1.12(0.82,1.55) 0.48	0.44	
Female	1	1.08(0.85,1.38) 0.51	1.21(0.97,1.51) 0.09	1.00(0.75,1.35) 0.98	0.45	
Age, years						0.71
<60	1	0.86(0.57,1.30) 0.48	1.12(0.76,1.66) 0.56	1.13(0.72,1.77) 0.60	0.39	
≥60	1	1.07(0.92,1.25) 0.39	1.11(0.94,1.32) 0.23	1.02(0.83,1.26) 0.85	0.72	
BMI, kg/m ²						0.12
Normal weight (<25)	1	1.15(0.86,1.55) 0.34	1.42(1.03,1.95) 0.03	1.22(0.86,1.73) 0.26	0.11	
Overweight (25-30)	1	1.34(1.04,1.72) 0.02	1.36(1.02,1.80) 0.04	1.30(0.88,1.91) 0.18	0.27	
Obesity (≥30)	1	0.79(0.60,1.03) 0.08	0.82(0.60,1.10) 0.19	0.87(0.61,1.23) 0.43	0.45	
Race						0.79
Non-Hispanic White	1	1.01(0.85,1.21) 0.90	1.13(0.94,1.36) 0.20	1.07(0.84,1.37) 0.58	0.41	
Non-Hispanic Black	1	1.19(0.84,1.69) 0.33	1.32(0.85,2.04) 0.22	1.33(0.87,2.03) 0.19	0.17	
Mexican American	1	1.01(0.62,1.63) 0.97	0.67(0.41,1.11) 0.12	0.69(0.35,1.35) 0.28	0.14	
Others	1	0.92(0.51,1.66) 0.79	0.99(0.55,1.76) 0.96	0.92(0.43,1.95) 0.82	0.88	
Education level						0.28
Less than high school	1	1.13(0.86,1.48) 0.39	1.07(0.80,1.42) 0.66	0.84(0.62,1.13) 0.24	0.3	
High school or equivalent	1	1.06(0.78,1.44) 0.70	1.28(0.99,1.67) 0.06	1.42(0.97,2.07) 0.07	0.03	
College or above	1	0.95(0.74,1.21) 0.65	1.01(0.77,1.33) 0.95	1.01(0.72,1.41) 0.96	0.85	
Family income-poverty ratio						0.71
<1.0	1	1.14(0.80,1.63) 0.46	0.90(0.64,1.25) 0.52	1.05(0.72,1.54) 0.80	0.91	
1.0-3.0	1	0.98(0.78,1.21) 0.82	1.09(0.87,1.35) 0.46	0.91(0.68,1.23) 0.54	0.79	
>3.0	1	1.15(0.82,1.61) 0.42	1.36(0.94,1.97) 0.10	1.38(0.91,2.10) 0.13	0.1	
Smoking status						0.02
Never	1	1.05(0.81,1.35) 0.73	1.12(0.86,1.47) 0.40	0.99(0.73,1.35) 0.94	0.88	
Former	1	1.05(0.82,1.34) 0.70	0.97(0.74,1.28) 0.83	1.00(0.74,1.36) 0.98	0.88	
Current	1	0.88(0.61,1.27) 0.49	1.39(0.98,1.97) 0.06	1.25(0.76,2.08) 0.38	0.16	
Alcohol drinking						0.8
Never	1	1.09(0.84,1.40) 0.52	1.20(0.94,1.53) 0.15	0.98(0.70,1.36) 0.90	0.79	
Low to moderate	1	0.97(0.77,1.23) 0.83	1.03(0.83,1.29) 0.77	1.15(0.84,1.57) 0.39	0.34	
Heavy	1	1.08(0.68,1.71) 0.74	1.14(0.79,1.65) 0.48	1.01(0.68,1.50) 0.95	0.92	
Healthy eating index score						0.29
Quarter 1	1	0.98(0.71,1.36) 0.90	1.18(0.81,1.72) 0.38	0.95(0.66,1.37) 0.78	0.82	
Quarter 2	1	1.37(1.05,1.77) 0.02	1.11(0.79,1.57) 0.55	1.13(0.75,1.69) 0.56	0.79	
Quarter 3	1	0.93(0.68,1.27) 0.64	0.97(0.72,1.31) 0.84	1.14(0.74,1.78) 0.55	0.55	
Quarter 4	1	0.94(0.68,1.32) 0.74	1.25(0.89,1.75) 0.19	1.06(0.73,1.54) 0.77	0.46	
Total energy intake from diet, kcal						0.73
[0,1445.5]	1	1.08(0.87,1.35) 0.48	1.00(0.74,1.34) 0.98	1.11(0.78,1.57) 0.56	0.63	
(1445.5,1908]	1	1.11(0.81,1.53) 0.51	1.22(0.88,1.70) 0.23	1.01(0.63,1.61) 0.97	0.63	
(1908,2494.5]	1	0.89(0.63,1.27) 0.53	1.12(0.77,1.63) 0.54	1.17(0.82,1.67) 0.38	0.15	
(2494.5,15594]	1	0.80(0.41,1.57) 0.52	0.98(0.55,1.72) 0.93	0.85(0.50,1.43) 0.54	0.69	
Self reported health						0.29
Very good to excellent	1	1.04(0.81,1.33) 0.75	1.22(0.95,1.56) 0.12	1.10(0.78,1.55) 0.60	0.38	
Good	1	1.10(0.84,1.44) 0.50	1.12(0.88,1.43) 0.37	1.08(0.77,1.51) 0.65	0.63	
Poor to fair	1	0.92(0.69,1.24) 0.60	1.00(0.72,1.39) 0.98	1.02(0.72,1.45) 0.92	0.81	

Family history of cardiovascular disease							0.21
No	1	1.08(0.90,1.29) 0.41	1.09(0.89,1.34) 0.39	1.13(0.88,1.46) 0.33		0.35	
Yes	1	0.91(0.64,1.28) 0.58	1.25(0.91,1.72) 0.17	0.92(0.65,1.30) 0.65		0.77	
Cardiovascular disease							0.27
No	1	0.92(0.76,1.12) 0.40	1.07(0.88,1.31) 0.48	0.98(0.76,1.27) 0.88		0.8	
Yes	1	1.31(1.00,1.70) 0.05	1.26(0.95,1.67) 0.10	1.30(0.92,1.85) 0.14		0.15	
Chronic obstructive pulmonary diseases							0.46
No	1	1.02(0.85,1.23) 0.81	1.13(0.95,1.35) 0.18	1.06(0.85,1.32) 0.59		0.41	
Yes	1	0.95(0.61,1.48) 0.83	0.91(0.55,1.50) 0.71	1.16(0.65,2.07) 0.61		0.69	
History of chronic kidney disease							0.56
No	1	1.04(0.89,1.22) 0.62	1.14(0.96,1.36) 0.14	1.12(0.91,1.39) 0.30		0.21	
Yes	1	1.28(0.53,3.10) 0.59	1.18(0.54,2.57) 0.68	0.44(0.13,1.43) 0.17		0.39	
Cancer							0.82
No	1	1.02(0.85,1.22) 0.82	1.09(0.89,1.32) 0.40	1.07(0.83,1.37) 0.61		0.51	
Yes	1	1.19(0.87,1.63) 0.28	1.44(1.01,2.06) 0.04	1.33(0.91,1.93) 0.14		0.09	
CVD mortality							
Sex							0.07
Male	1	0.98(0.67,1.42) 0.91	1.19(0.80,1.78) 0.39	1.29(0.80,2.08) 0.30		0.19	
Female	1	1.32(0.91,1.92) 0.15	1.46(0.97,2.20) 0.07	0.81(0.43,1.52) 0.52		0.81	
Age, years							0.32
<60	1	0.79(0.30,2.08) 0.63	0.84(0.34,2.10) 0.71	1.70(0.59,4.87) 0.32		0.33	
≥60	1	1.18(0.89,1.58) 0.25	1.38(1.02,1.88) 0.04	1.09(0.75,1.58) 0.64		0.34	
BMI, kg/m ²							0.81
Normal weight (<25)	1	1.19(0.72,1.97) 0.49	1.28(0.71,2.30) 0.41	1.34(0.72,2.50) 0.36		0.32	
Overweight (25-30)	1	1.28(0.87,1.89) 0.21	1.60(1.02,2.50) 0.04	1.10(0.65,1.86) 0.72		0.53	
Obesity (≥30)	1	0.92(0.55,1.52) 0.74	1.12(0.68,1.83) 0.65	1.27(0.67,2.41) 0.47		0.37	
Race							0.59
Non-Hispanic White	1	1.09(0.77,1.54) 0.62	1.24(0.87,1.78) 0.23	1.17(0.77,1.80) 0.46		0.35	
Non-Hispanic Black	1	1.28(0.70,2.34) 0.43	2.22(1.02,4.86) 0.04	1.20(0.57,2.55) 0.63		0.24	
Mexican American	1	2.42(1.03,5.72) 0.04	1.12(0.39,3.24) 0.83	1.74(0.67,4.49) 0.26		0.64	
Others	1	0.81(0.20,3.35) 0.77	0.76(0.21,2.69) 0.67	1.26(0.14,11.06) 0.83		0.93	
Education level							0.11
Less than high school	1	1.09(0.70,1.68) 0.71	1.11(0.65,1.90) 0.70	0.84(0.46,1.52) 0.56		0.68	
High school or equivalent	1	1.57(0.87,2.81) 0.13	2.07(1.17,3.69) 0.01	3.20(1.54,6.68) 0.002		0.001	
College or above	1	0.96(0.60,1.55) 0.87	1.06(0.65,1.74) 0.81	0.89(0.53,1.50) 0.66		0.78	
Family income-poverty ratio							0.56
<1.0	1	1.36(0.80,2.31) 0.25	0.96(0.54,1.71) 0.90	0.99(0.46,2.16) 0.99		0.82	
1.0-3.0	1	1.22(0.84,1.79) 0.29	1.60(1.08,2.37) 0.02	1.25(0.78,2.01) 0.35		0.12	
>3.0	1	0.79(0.42,1.52) 0.48	0.96(0.55,1.67) 0.88	1.05(0.53,2.08) 0.88		0.71	
Smoking status							0.14
Never	1	1.11(0.73,1.71) 0.62	1.37(0.90,2.08) 0.15	0.96(0.53,1.73) 0.90		0.76	
Former	1	1.09(0.65,1.82) 0.74	0.93(0.56,1.54) 0.77	1.03(0.57,1.84) 0.93		0.90	
Current	1	0.97(0.49,1.91) 0.93	1.79(0.86,3.70) 0.12	2.05(0.90,4.69) 0.09		0.04	
Alcohol drinking							0.04
Never	1	1.00(0.69,1.44) 0.99	1.26(0.83,1.91) 0.28	0.59(0.32,1.11) 0.10		0.41	
Low to moderate	1	1.57(0.93,2.65) 0.09	1.55(0.89,2.68) 0.12	2.07(1.13,3.81) 0.02		0.03	
Heavy	1	0.69(0.34,1.41) 0.31	0.96(0.48,1.90) 0.91	0.94(0.43,2.09) 0.89		0.89	

Less than high school	1	1.00(0.57,1.76) 0.99	0.85(0.51,1.43) 0.55	0.75(0.43,1.33) 0.33	0.27
High school or equivalent	1	0.53(0.29,0.98) 0.04	0.99(0.54,1.84) 0.98	0.96(0.50,1.86) 0.91	0.60
College or above	1	0.83(0.51,1.35) 0.46	0.63(0.38,1.05) 0.08	0.81(0.46,1.45) 0.48	0.38
Family income-poverty ratio					0.63
<1.0	1	0.67(0.35,1.29) 0.23	0.53(0.25,1.11) 0.09	0.64(0.29,1.44) 0.28	0.20
1.0-3.0	1	0.64(0.40,1.03) 0.07	0.68(0.39,1.20) 0.18	0.73(0.43,1.26) 0.26	0.32
>3.0	1	1.18(0.65,2.16) 0.58	1.22(0.66,2.25) 0.53	1.37(0.75,2.50) 0.31	0.34
Smoking status					0.44
Never	1	0.85(0.50,1.46) 0.56	0.75(0.38,1.48) 0.40	1.02(0.52,1.99) 0.96	0.95
Former	1	0.87(0.53,1.43) 0.58	0.73(0.44,1.22) 0.23	0.82(0.47,1.43) 0.48	0.42
Current	1	0.55(0.26,1.17) 0.12	1.03(0.53,1.98) 0.94	0.91(0.40,2.06) 0.82	0.88
Alcohol drinking					0.88
Never	1	1.05(0.63,1.76) 0.85	0.90(0.44,1.85) 0.78	1.30(0.66,2.58) 0.44	0.61
Low to moderate	1	0.62(0.37,1.02) 0.06	0.65(0.42,1.01) 0.05	0.60(0.32,1.13) 0.11	0.14
Heavy	1	0.93(0.42,2.04) 0.85	1.01(0.52,1.98) 0.97	1.17(0.60,2.28) 0.65	0.57
Healthy eating index score					0.44
Quarter 1	1	0.79(0.41,1.53) 0.48	1.00(0.56,1.78) 0.99	0.73(0.34,1.58) 0.43	0.55
Quarter 2	1	1.16(0.63,2.15) 0.63	0.62(0.31,1.24) 0.18	1.05(0.51,2.17) 0.88	0.79
Quarter 3	1	0.65(0.36,1.20) 0.17	0.83(0.40,1.69) 0.60	0.69(0.35,1.33) 0.26	0.47
Quarter 4	1	0.65(0.36,1.20) 0.17	0.78(0.41,1.50) 0.46	0.98(0.51,1.88) 0.96	0.81
Total energy intake from diet, kcal					0.76
[0,1445.5]	1	0.94(0.59,1.50) 0.80	0.86(0.48,1.56) 0.63	1.23(0.58,2.62) 0.59	0.96
(1445.5,1908]	1	0.69(0.37,1.28) 0.24	0.62(0.31,1.22) 0.16	0.56(0.30,1.06) 0.08	0.08
(1908,2494.5]	1	0.76(0.37,1.54) 0.44	0.74(0.38,1.45) 0.39	0.91(0.43,1.91) 0.80	0.96
(2494.5,15594]	1	0.65(0.19,2.24) 0.50	1.13(0.41,3.14) 0.81	1.00(0.39,2.55) 1.00	0.68
Self reported health					0.7
Very good to excellent	1	0.77(0.45,1.34) 0.36	0.76(0.42,1.36) 0.35	0.79(0.40,1.58) 0.51	0.51
Good	1	0.98(0.53,1.80) 0.94	1.02(0.55,1.89) 0.94	0.78(0.41,1.50) 0.46	0.53
Poor to fair	1	0.72(0.41,1.26) 0.25	0.71(0.39,1.27) 0.25	0.96(0.52,1.78) 0.89	0.97
Family history of cardiovascular disease					0.51
No	1	0.85(0.58,1.24) 0.39	0.83(0.54,1.26) 0.38	0.83(0.53,1.30) 0.42	0.44
Yes	1	0.63(0.35,1.13) 0.12	0.80(0.40,1.57) 0.51	1.03(0.50,2.15) 0.93	0.76
Cardiovascular disease					0.73
No	1	0.74(0.51,1.06) 0.10	0.84(0.59,1.19) 0.32	0.83(0.56,1.25) 0.37	0.55
Yes	1	0.91(0.43,1.93) 0.80	0.68(0.32,1.47) 0.33	1.04(0.46,2.36) 0.92	0.85
Chronic obstructive pulmonary diseases					0.68
No	1	0.83(0.59,1.17) 0.29	0.88(0.63,1.23) 0.47	0.96(0.66,1.42) 0.86	0.97
Yes	1	0.36(0.09,1.37) 0.13	0.23(0.08,0.68) 0.01	0.27(0.11,0.71) 0.01	0.01
History of chronic kidney disease					0.49
No	1	0.77(0.56,1.08) 0.13	0.83(0.59,1.15) 0.26	0.91(0.62,1.34) 0.64	0.77
Yes	1	1.51(0.42,5.39) 0.53	0.45(0.09,2.42) 0.35	0.09(0.01,0.74) 0.03	0.004
Cancer					0.82
No	1	0.69(0.49,0.97) 0.03	0.74(0.51,1.07) 0.11	0.82(0.53,1.28) 0.39	0.45
Yes	1	1.12(0.66,1.91) 0.66	1.08(0.58,2.04) 0.80	1.20(0.63,2.27) 0.58	0.65
Other mortality					
Sex					0.54
Male	1	1.29(0.87,1.90) 0.20	1.27(0.84,1.92) 0.25	1.16(0.72,1.88) 0.55	0.75

Female	1	1.13(0.81,1.56) 0.47	1.39(1.02,1.89) 0.04	1.15(0.78,1.71) 0.47	0.14
Age, years					0.67
<60	1	1.40(0.77,2.57) 0.27	1.56(0.91,2.67) 0.11	1.06(0.54,2.07) 0.87	0.87
≥60	1	1.10(0.88,1.37) 0.41	1.16(0.90,1.50) 0.26	1.12(0.80,1.56) 0.51	0.44
BMI, kg/m ²					0.56
Normal weight (<25)	1	1.15(0.80,1.65) 0.45	1.54(1.00,2.39) 0.05	1.20(0.78,1.84) 0.40	0.18
Overweight (25-30)	1	1.43(0.99,2.07) 0.05	1.53(1.02,2.30) 0.04	1.34(0.77,2.32) 0.30	0.33
Obesity (≥30)	1	0.98(0.67,1.41) 0.90	0.91(0.60,1.38) 0.66	0.91(0.54,1.53) 0.72	0.66
Race					0.97
Non-Hispanic White	1	1.15(0.89,1.50) 0.29	1.32(1.01,1.72) 0.04	1.18(0.81,1.72) 0.38	0.26
Non-Hispanic Black	1	1.29(0.73,2.29) 0.38	1.27(0.58,2.81) 0.55	1.20(0.57,2.56) 0.63	0.62
Mexican American	1	0.98(0.51,1.88) 0.95	0.69(0.34,1.37) 0.29	0.50(0.18,1.39) 0.18	0.10
Others	1	0.79(0.34,1.81) 0.57	0.76(0.35,1.64) 0.48	0.62(0.24,1.61) 0.33	0.33
Education level					0.83
Less than high school	1	1.19(0.79,1.80) 0.41	1.11(0.71,1.73) 0.64	0.85(0.51,1.40) 0.52	0.59
High school or equivalent	1	1.21(0.82,1.80) 0.34	1.18(0.79,1.76) 0.41	1.01(0.61,1.65) 0.98	0.87
College or above	1	1.14(0.79,1.64) 0.48	1.37(0.94,2.00) 0.10	1.33(0.82,2.18) 0.25	0.20
Family income-poverty ratio					0.78
<1.0	1	1.29(0.73,2.29) 0.38	1.15(0.71,1.86) 0.57	1.42(0.86,2.32) 0.17	0.22
1.0-3.0	1	0.99(0.72,1.36) 0.95	1.03(0.74,1.43) 0.87	0.81(0.51,1.27) 0.35	0.42
>3.0	1	1.62(0.99,2.66) 0.06	2.07(1.18,3.61) 0.01	1.85(0.97,3.54) 0.06	0.06
Smoking status					0.27
Never	1	1.10(0.74,1.64) 0.64	1.11(0.74,1.66) 0.61	0.96(0.60,1.55) 0.88	0.95
Former	1	1.17(0.86,1.60) 0.31	1.19(0.83,1.69) 0.35	1.13(0.77,1.66) 0.53	0.56
Current	1	1.12(0.74,1.68) 0.60	1.56(0.96,2.54) 0.08	1.22(0.57,2.64) 0.61	0.41
Alcohol drinking					0.78
Never	1	1.23(0.84,1.79) 0.28	1.34(0.93,1.93) 0.11	1.12(0.71,1.76) 0.62	0.44
Low to moderate	1	1.01(0.74,1.38) 0.95	1.15(0.84,1.58) 0.38	1.24(0.80,1.95) 0.34	0.27
Heavy	1	1.38(0.74,2.55) 0.31	1.27(0.70,2.32) 0.43	0.85(0.45,1.61) 0.62	0.48
Healthy eating index score					0.48
Quarter 1	1	1.18(0.71,1.96) 0.51	1.40(0.78,2.51) 0.26	1.11(0.61,2.01) 0.73	0.49
Quarter 2	1	1.29(0.89,1.88) 0.18	1.11(0.73,1.67) 0.62	0.74(0.41,1.34) 0.32	0.33
Quarter 3	1	1.24(0.77,1.99) 0.37	1.08(0.71,1.65) 0.71	1.25(0.63,2.50) 0.53	0.66
Quarter 4	1	1.06(0.67,1.67) 0.81	1.66(0.98,2.81) 0.06	1.46(0.83,2.57) 0.18	0.10
Total energy intake from diet, kcal					0.65
[0,1445.5]	1	1.05(0.76,1.45) 0.77	1.41(0.97,2.04) 0.07	0.79(0.44,1.42) 0.44	0.48
(1445.5,1908]	1	1.39(0.91,2.13) 0.13	1.49(1.00,2.22) 0.05	1.15(0.55,2.37) 0.71	0.42
(1908,2494.5]	1	1.06(0.62,1.84) 0.83	1.36(0.77,2.39) 0.29	1.33(0.75,2.35) 0.33	0.25
(2494.5,15594]	1	1.34(0.42,4.27) 0.62	0.98(0.32,3.00) 0.97	1.01(0.34,2.97) 0.98	0.66
Self reported health					0.29
Very good to excellent	1	1.22(0.86,1.71) 0.26	1.58(1.09,2.29) 0.02	1.15(0.68,1.95) 0.61	0.30
Good	1	1.24(0.80,1.91) 0.33	1.16(0.79,1.70) 0.46	1.25(0.73,2.11) 0.42	0.49
Poor to fair	1	0.98(0.64,1.51) 0.92	1.04(0.64,1.68) 0.89	0.99(0.58,1.71) 0.98	0.96
Family history of cardiovascular disease					0.61
No	1	1.15(0.89,1.48) 0.27	1.21(0.92,1.60) 0.17	1.18(0.79,1.76) 0.42	0.37
Yes	1	1.22(0.75,1.99) 0.43	1.44(0.90,2.31) 0.13	0.99(0.65,1.51) 0.95	0.77
Cardiovascular disease					0.86

No	1	1.10(0.82,1.48) 0.52	1.18(0.87,1.59) 0.28	1.02(0.70,1.48) 0.94	0.84
Yes	1	1.26(0.83,1.89) 0.27	1.47(0.94,2.30) 0.09	1.34(0.77,2.34) 0.30	0.15
Chronic obstructive pulmonary diseases					0.14
No	1	1.14(0.89,1.45) 0.31	1.20(0.93,1.55) 0.16	1.04(0.73,1.48) 0.83	0.69
Yes	1	1.25(0.65,2.39) 0.50	1.56(0.86,2.81) 0.14	1.91(0.88,4.17) 0.10	0.06
History of chronic kidney disease					0.36
No	1	1.18(0.93,1.49) 0.18	1.26(0.98,1.62) 0.08	1.15(0.83,1.61) 0.40	0.33
Yes	1	2.21(0.46,10.48) 0.32	2.52(0.68,9.34) 0.17	0.50(0.07,3.73) 0.50	0.65
Cancer					0.41
No	1	1.21(0.92,1.58) 0.17	1.21(0.90,1.62) 0.21	1.17(0.78,1.77) 0.44	0.42
Yes	1	1.16(0.68,1.98) 0.58	1.84(1.04,3.27) 0.04	1.24(0.69,2.21) 0.47	0.20

Adjusted for sex, age, race, BMI, educational level, smoking status, drinking status, family income poverty ratio, healthy eating index-2015, total energy intake from the diet, self-reported health status, family history of cardiovascular diseases, self-reported cardiovascular disease, self-reported chronic obstructive pulmonary disease, self-reported chronic kidney disease, and self-reported cancer.

Supplementary Table 2.3 Subgroup analysis of hazard ratios for vitamin B2 levels with all-cause and CVD mortality in participants with prediabetes from NHANES 1999-2018

	Q1	Q2	Q3	Q4	<i>P</i> _{trend}	<i>P</i> _{interaction}
All-cause mortality						
Sex						0.63
Male	1	1.15(0.89,1.49) 0.29	1.01(0.79,1.30) 0.92	1.12(0.82,1.53) 0.46	0.69	
Female	1	0.96(0.78,1.18) 0.68	0.92(0.74,1.14) 0.44	0.97(0.73,1.29) 0.84	0.70	
Age, years						0.13
<60	1	0.99(0.65,1.50) 0.95	1.02(0.68,1.53) 0.93	1.45(0.95,2.20) 0.09	0.08	
≥60	1	1.03(0.86,1.23) 0.79	0.91(0.77,1.07) 0.24	0.87(0.70,1.09) 0.23	0.10	
BMI, kg/m ²						0.66
Normal weight (<25)	1	0.92(0.71,1.21) 0.56	0.85(0.65,1.12) 0.25	0.93(0.72,1.20) 0.56	0.50	
Overweight (25-30)	1	1.17(0.87,1.56) 0.30	1.03(0.77,1.38) 0.85	1.27(0.87,1.85) 0.21	0.32	
Obesity (≥30)	1	0.98(0.74,1.31) 0.89	0.91(0.69,1.20) 0.51	0.85(0.59,1.24) 0.41	0.36	
Race						0.21
Non-Hispanic White	1	0.96(0.79,1.17) 0.69	0.89(0.75,1.05) 0.15	0.97(0.77,1.23) 0.82	0.76	
Non-Hispanic Black	1	1.39(1.00,1.91) 0.05	0.85(0.58,1.25) 0.40	1.12(0.69,1.81) 0.65	0.93	
Mexican American	1	0.82(0.48,1.40) 0.47	1.35(0.70,2.59) 0.37	0.84(0.41,1.71) 0.63	0.94	
Others	1	1.01(0.57,1.77) 0.99	1.24(0.72,2.11) 0.44	1.17(0.57,2.41) 0.66	0.49	
Education level						0.91
Less than high school	1	1.04(0.79,1.36) 0.80	0.94(0.71,1.25) 0.68	0.93(0.70,1.25) 0.64	0.53	
High school or equivalent	1	0.95(0.69,1.31) 0.77	0.91(0.66,1.26) 0.58	1.02(0.65,1.58) 0.94	0.97	
College or above	1	1.04(0.79,1.37) 0.78	0.92(0.70,1.20) 0.53	1.05(0.75,1.46) 0.79	0.97	
Family income-poverty ratio						0.58
<1.0	1	1.03(0.69,1.53) 0.90	0.87(0.60,1.24) 0.44	1.19(0.83,1.70) 0.34	0.58	
1.0-3.0	1	1.03(0.85,1.25) 0.77	0.92(0.76,1.11) 0.37	0.82(0.62,1.09) 0.17	0.10	
>3.0	1	1.07(0.74,1.53) 0.72	1.03(0.70,1.51) 0.88	1.33(0.90,1.96) 0.15	0.14	
Smoking status						0.01
Never	1	1.18(0.91,1.53) 0.22	1.02(0.81,1.29) 0.86	1.02(0.75,1.39) 0.90	0.81	
Former	1	0.95(0.71,1.28) 0.73	0.89(0.69,1.15) 0.38	0.86(0.62,1.19) 0.37	0.33	
Current	1	0.91(0.64,1.29) 0.61	0.85(0.58,1.24) 0.40	1.23(0.79,1.93) 0.35	0.34	
Alcohol drinking						0.47
Never	1	1.00(0.78,1.29) 1.00	1.01(0.79,1.30) 0.92	0.86(0.62,1.20) 0.37	0.43	
Low to moderate	1	1.03(0.79,1.33) 0.83	0.91(0.71,1.17) 0.48	1.13(0.81,1.57) 0.47	0.60	
Heavy	1	1.19(0.76,1.86) 0.44	0.98(0.67,1.42) 0.92	1.19(0.78,1.81) 0.42	0.61	
Healthy eating index score						0.39
Quarter 1	1	1.11(0.80,1.55) 0.53	0.80(0.57,1.13) 0.20	0.83(0.56,1.23) 0.35	0.15	
Quarter 2	1	1.02(0.76,1.38) 0.88	0.97(0.69,1.34) 0.83	1.06(0.71,1.60) 0.77	0.85	
Quarter 3	1	1.21(0.84,1.75) 0.31	1.10(0.83,1.46) 0.51	1.39(0.90,2.16) 0.14	0.21	
Quarter 4	1	0.76(0.54,1.07) 0.11	0.86(0.62,1.18) 0.35	0.75(0.51,1.11) 0.15	0.31	
Total energy intake from diet, kcal						0.22
[0,1445.5]	1	1.06(0.86,1.30) 0.57	0.78(0.60,1.03) 0.08	1.38(1.02,1.86) 0.04	0.72	
(1445.5,1908]	1	0.88(0.64,1.21) 0.42	0.82(0.59,1.12) 0.21	0.87(0.58,1.31) 0.50	0.41	
(1908,2494.5]	1	1.01(0.66,1.56) 0.96	1.16(0.74,1.80) 0.52	1.17(0.76,1.81) 0.47	0.34	
(2494.5,15594]	1	1.29(0.69,2.43) 0.43	1.09(0.62,1.90) 0.77	1.00(0.57,1.75) 0.99	0.43	
Self reported health						0.17
Very good to excellent	1	1.09(0.85,1.40) 0.48	1.00(0.76,1.31) 1.00	1.03(0.74,1.41) 0.87	0.96	
Good	1	1.06(0.80,1.41) 0.66	0.77(0.56,1.06) 0.10	1.03(0.75,1.43) 0.84	0.75	
Poor to fair	1	0.89(0.64,1.25) 0.51	1.01(0.72,1.42) 0.94	0.95(0.65,1.39) 0.81	0.96	
Family history of cardiovascular disease						0.64
No	1	1.09(0.91,1.31) 0.37	0.97(0.82,1.14) 0.72	1.14(0.90,1.44) 0.28	0.48	
Yes	1	0.80(0.53,1.21) 0.29	0.83(0.59,1.18) 0.29	0.76(0.51,1.13) 0.18	0.25	
Cardiovascular disease						0.85
No	1	1.00(0.82,1.23) 0.99	0.92(0.76,1.10) 0.36	1.01(0.80,1.28) 0.92	0.96	
Yes	1	1.12(0.85,1.47) 0.43	1.03(0.80,1.32) 0.81	1.06(0.77,1.45) 0.72	0.91	
Chronic obstructive pulmonary						0.56

diseases								
No	1	1.01(0.85,1.19)	0.94	0.93(0.79,1.09)	0.36	1.00(0.81,1.24)	1.00	0.84
Yes	1	1.00(0.64,1.55)	0.99	0.83(0.48,1.43)	0.50	0.95(0.57,1.57)	0.83	0.69
History of chronic kidney disease								0.74
No	1	1.06(0.90,1.24)	0.51	0.95(0.82,1.12)	0.57	1.04(0.84,1.28)	0.74	1
Yes	1	0.75(0.38,1.48)	0.42	0.62(0.27,1.42)	0.26	0.87(0.39,1.91)	0.72	0.58
Cancer								0.28
No	1	0.97(0.81,1.16)	0.70	0.97(0.81,1.16)	0.74	1.04(0.82,1.30)	0.76	0.72
Yes	1	1.30(0.95,1.78)	0.10	0.91(0.69,1.22)	0.53	1.03(0.72,1.48)	0.86	0.52
CVD mortality								
Sex								0.06
Male	1	1.17(0.76,1.81)	0.48	1.24(0.79,1.96)	0.35	1.74(1.04,2.92)	0.03	0.02
Female	1	1.18(0.78,1.78)	0.43	1.13(0.76,1.69)	0.54	0.83(0.45,1.54)	0.56	0.68
Age, years								0.61
<60	1	1.38(0.58,3.31)	0.46	1.26(0.55,2.91)	0.59	2.50(0.95,6.57)	0.06	0.09
≥60	1	1.08(0.81,1.43)	0.60	1.10(0.84,1.45)	0.49	1.14(0.80,1.62)	0.48	0.49
BMI, kg/m ²								0.91
Normal weight (<25)	1	1.06(0.65,1.72)	0.81	1.07(0.67,1.71)	0.77	1.35(0.83,2.18)	0.23	0.23
Overweight (25-30)	1	1.07(0.63,1.80)	0.81	1.24(0.75,2.06)	0.41	1.64(0.93,2.91)	0.09	0.05
Obesity (≥30)	1	1.22(0.76,1.96)	0.42	1.27(0.77,2.08)	0.35	1.24(0.62,2.47)	0.55	0.58
Race								0.55
Non-Hispanic White	1	1.10(0.79,1.55)	0.57	1.15(0.82,1.60)	0.42	1.30(0.85,1.99)	0.23	0.23
Non-Hispanic Black	1	1.12(0.64,1.98)	0.69	0.73(0.32,1.67)	0.46	1.19(0.48,3.00)	0.71	0.98
Mexican American	1	1.12(0.49,2.55)	0.80	3.16(1.29,7.77)	0.01	1.84(0.59,5.75)		0.03
Others	1	2.49(1.17,5.29)	0.02	1.31(0.34,5.12)	0.69	2.92(0.38,22.28)		0.42
Education level								0.09
Less than high school	1	1.08(0.72,1.60)	0.71	0.97(0.59,1.61)	0.92	1.14(0.68,1.92)	0.61	0.70
High school or equivalent	1	0.69(0.40,1.19)	0.18	1.17(0.65,2.09)	0.60	1.89(0.95,3.77)	0.07	0.03
College or above	1	1.47(0.93,2.33)	0.10	1.18(0.72,1.93)	0.51	1.18(0.67,2.08)	0.57	0.97
Family income-poverty ratio								0.27
<1.0	1	1.31(0.74,2.31)	0.35	1.05(0.54,2.04)	0.89	1.56(0.71,3.42)	0.27	0.38
1.0-3.0	1	0.97(0.68,1.38)	0.84	1.11(0.80,1.54)	0.53	0.89(0.58,1.36)	0.58	0.77
>3.0	1	1.53(0.82,2.88)	0.18	1.37(0.73,2.58)	0.33	2.35(1.06,5.21)	0.04	0.07
Smoking status								0.58
Never	1	1.16(0.79,1.70)	0.44	1.15(0.79,1.68)	0.45	1.12(0.65,1.93)	0.68	0.70
Former	1	0.98(0.59,1.63)	0.95	0.91(0.53,1.56)	0.74	1.35(0.77,2.36)	0.29	0.21
Current	1	1.33(0.62,2.87)	0.47	1.76(0.86,3.58)	0.12	1.72(0.79,3.78)	0.17	0.12
Alcohol drinking								0.10
Never	1	0.86(0.58,1.29)	0.47	1.15(0.77,1.72)	0.48	0.88(0.51,1.53)	0.65	0.97
Low to moderate	1	1.51(0.93,2.47)	0.10	1.13(0.69,1.85)	0.63	1.77(0.96,3.26)	0.07	0.20
Heavy	1	1.25(0.58,2.68)	0.57	1.74(0.88,3.43)	0.11	2.17(0.91,5.16)	0.08	0.04
Healthy eating index score								0.13
Quarter 1	1	1.05(0.56,1.98)	0.88	1.04(0.56,1.96)	0.90	0.70(0.31,1.57)	0.39	0.53
Quarter 2	1	1.68(0.86,3.30)	0.13	1.51(0.73,3.15)	0.27	2.67(1.23,5.80)	0.01	0.02
Quarter 3	1	0.93(0.53,1.64)	0.80	1.17(0.73,1.88)	0.52	1.57(0.74,3.35)	0.24	0.18
Quarter 4	1	1.03(0.59,1.81)	0.91	0.93(0.53,1.63)	0.81	0.83(0.44,1.59)	0.58	0.47
Total energy intake from diet, kcal								0.40
[0,1445.5]	1	1.03(0.71,1.50)	0.88	0.73(0.43,1.25)	0.26	1.71(1.02,2.84)	0.04	0.49
(1445.5,1908]	1	0.88(0.55,1.41)	0.59	1.18(0.73,1.89)	0.50	1.01(0.56,1.82)	0.98	0.48
(1908,2494.5]	1	1.91(0.72,5.01)	0.19	1.98(0.79,4.93)	0.14	2.22(0.87,5.69)	0.10	0.28
(2494.5,15594]	1	0.99(0.24,4.09)	0.99	0.73(0.25,2.19)	0.58	0.96(0.31,2.93)	0.94	0.81
Self reported health								0.80
Very good to excellent	1	0.91(0.56,1.46)	0.68	0.98(0.62,1.55)	0.93	1.09(0.57,2.09)	0.80	0.73
Good	1	1.17(0.76,1.80)	0.48	0.95(0.59,1.52)	0.82	1.12(0.63,1.99)	0.70	0.90
Poor to fair	1	1.32(0.73,2.37)	0.35	1.83(1.00,3.35)	0.05	2.25(1.21,4.20)	0.01	0.01

[0,1445.5]	1	1.04(0.65,1.66) 0.86	0.53(0.27,1.02) 0.06	0.73(0.30,1.75) 0.48	0.14
(1445.5,1908]	1	0.59(0.30,1.17) 0.13	0.42(0.20,0.85) 0.02	0.59(0.28,1.23) 0.16	0.12
(1908,2494.5]	1	0.73(0.35,1.52) 0.40	0.69(0.32,1.47) 0.34	0.67(0.31,1.45) 0.31	0.44
(2494.5,15594]	1	0.98(0.30,3.17) 0.97	1.61(0.53,4.92) 0.40	1.69(0.61,4.70) 0.31	0.22
Self reported health					0.61
Very good to excellent	1	0.90(0.51,1.58) 0.71	0.42(0.21,0.83) 0.01	0.63(0.34,1.17) 0.14	0.05
Good	1	0.76(0.45,1.27) 0.29	0.47(0.24,0.89) 0.02	0.59(0.31,1.14) 0.12	0.10
Poor to fair	1	0.73(0.36,1.48) 0.38	0.87(0.45,1.66) 0.67	0.94(0.46,1.91) 0.87	0.84
Family history of cardiovascular disease					0.97
No	1	0.81(0.54,1.20) 0.29	0.64(0.46,0.89) 0.01	0.77(0.54,1.11) 0.17	0.15
Yes	1	0.66(0.31,1.42) 0.29	0.48(0.21,1.09) 0.08	0.66(0.31,1.42) 0.29	0.31
Cardiovascular disease					0.37
No	1	0.76(0.51,1.15) 0.20	0.62(0.42,0.92) 0.02	0.83(0.56,1.22) 0.34	0.41
Yes	1	0.83(0.44,1.57) 0.56	0.56(0.28,1.13) 0.11	0.45(0.20,1.06) 0.07	0.04
Chronic obstructive pulmonary diseases					0.66
No	1	0.82(0.57,1.18) 0.30	0.64(0.45,0.92) 0.01	0.83(0.58,1.20) 0.33	0.32
Yes	1	0.30(0.10,0.91) 0.03	0.27(0.07,1.08) 0.06	0.15(0.05,0.46)	0.01
				<0.001	
History of chronic kidney disease					0.74
No	1	0.77(0.54,1.08) 0.13	0.61(0.44,0.86)	0.75(0.52,1.07) 0.11	0.13
			0.004		
Yes	1	1.27(0.33,4.92) 0.73	0.19(0.04,0.97) 0.05	0.55(0.09,3.31) 0.51	0.17
Cancer					0.85
No	1	0.69(0.46,1.04) 0.08	0.54(0.35,0.84) 0.01	0.70(0.46,1.07) 0.10	0.14
Yes	1	1.17(0.64,2.14) 0.61	0.86(0.46,1.59) 0.63	1.01(0.52,1.94)	0.76
				0.98	
Other mortality					
Sex					0.09
Male	1	1.34(0.95,1.89) 0.10	1.03(0.73,1.46) 0.85	0.93(0.60,1.46) 0.76	0.31
Female	1	0.99(0.72,1.37) 0.97	1.09(0.81,1.45) 0.58	1.22(0.82,1.82) 0.33	0.28
Age, years					0.19
<60	1	1.59(0.88,2.86) 0.12	1.52(0.85,2.72) 0.16	1.76(1.01,3.08) 0.05	0.12
≥60	1	0.99(0.77,1.27) 0.92	0.92(0.71,1.18) 0.51	0.80(0.55,1.15) 0.23	0.19
BMI, kg/m2					0.53
Normal weight (<25)	1	0.95(0.63,1.44) 0.81	0.74(0.49,1.11) 0.14	0.82(0.54,1.26) 0.36	0.22
Overweight (25-30)	1	1.36(0.88,2.11) 0.17	1.22(0.80,1.86) 0.35	1.28(0.72,2.25) 0.40	0.63
Obesity (≥30)	1	1.07(0.71,1.62) 0.73	1.14(0.77,1.69) 0.50	0.89(0.50,1.57) 0.68	0.75
Race					0.23
Non-Hispanic White	1	1.13(0.86,1.50) 0.38	1.04(0.81,1.35) 0.76	1.03(0.72,1.49) 0.86	0.93
Non-Hispanic Black	1	1.68(0.99,2.85) 0.06	0.87(0.48,1.59) 0.66	1.16(0.52,2.59) 0.71	0.98
Mexican American	1	0.52(0.24,1.13) 0.10	1.59(0.61,4.15) 0.35	0.64(0.19,2.17) 0.47	0.83
Others	1	0.53(0.21,1.29) 0.16	0.87(0.44,1.71) 0.69	0.75(0.33,1.69) 0.49	0.57
Education level					0.70
Less than high school	1	1.08(0.71,1.64) 0.73	1.03(0.67,1.58) 0.89	0.78(0.46,1.33) 0.37	0.41
High school or equivalent	1	1.12(0.67,1.86) 0.67	1.01(0.62,1.65) 0.96	0.80(0.46,1.40) 0.44	0.36
College or above	1	1.18(0.78,1.77) 0.43	1.15(0.79,1.66) 0.47	1.32(0.79,2.19) 0.29	0.38
Family income-poverty ratio					0.92
<1.0	1	1.11(0.60,2.07) 0.73	0.89(0.52,1.54) 0.69	1.36(0.82,2.24) 0.24	0.41
1.0-3.0	1	1.04(0.77,1.42) 0.79	1.02(0.75,1.39) 0.90	0.84(0.55,1.27) 0.41	0.40
>3.0	1	1.28(0.76,2.15) 0.35	1.13(0.69,1.85) 0.63	1.27(0.70,2.31) 0.42	0.68
Smoking status					0.001
Never	1	1.28(0.84,1.96) 0.26	1.30(0.90,1.89) 0.17	1.10(0.68,1.79) 0.70	0.63
Former	1	0.87(0.60,1.25) 0.45	0.87(0.62,1.21) 0.40	0.62(0.39,0.99) 0.05	0.05
Current	1	1.42(0.87,2.32) 0.16	0.86(0.49,1.51) 0.60	1.63(0.89,3.01) 0.12	0.33
Alcohol drinking					0.77
Never	1	1.06(0.71,1.58) 0.79	1.15(0.80,1.65) 0.46	0.91(0.56,1.47) 0.69	0.85
Low to moderate	1	1.16(0.83,1.63) 0.39	1.03(0.72,1.46) 0.88	1.13(0.70,1.83) 0.61	0.81

Heavy	1	1.28(0.72,2.26) 0.40	0.97(0.57,1.64) 0.91	1.08(0.56,2.10) 0.82	0.88	
Healthy eating index score						0.63
Quarter 1	1	1.21(0.73,2.01) 0.45	0.67(0.39,1.17) 0.16	0.96(0.52,1.77) 0.88	0.48	
Quarter 2	1	1.05(0.68,1.63) 0.83	1.04(0.65,1.69) 0.86	0.71(0.38,1.32) 0.28	0.26	
Quarter 3	1	1.32(0.75,2.30) 0.34	1.25(0.82,1.91) 0.30	1.29(0.70,2.38) 0.42	0.53	
Quarter 4	1	0.90(0.54,1.49) 0.67	1.16(0.73,1.84) 0.53	1.03(0.54,1.96) 0.94	0.72	
Total energy intake from diet, kcal						0.04
[0,1445.5]	1	1.10(0.81,1.49) 0.54	0.97(0.66,1.42) 0.88	1.50(0.97,2.31) 0.07	0.25	
(1445.5,1908]	1	1.14(0.72,1.81) 0.58	0.93(0.60,1.44) 0.74	1.02(0.54,1.94) 0.95	0.75	
(1908,2494.5]	1	0.82(0.42,1.59) 0.56	1.20(0.70,2.08) 0.51	1.15(0.63,2.09) 0.65	0.28	
(2494.5,15594]	1	1.56(0.61,4.02) 0.35	0.97(0.40,2.32) 0.94	0.71(0.30,1.67) 0.43	0.02	
Self reported health						0.02
Very good to excellent	1	1.31(0.89,1.92) 0.17	1.36(0.91,2.04) 0.13	1.19(0.74,1.94) 0.47	0.48	
Good	1	1.17(0.75,1.83) 0.48	0.85(0.53,1.37) 0.51	1.29(0.76,2.20) 0.34	0.55	
Poor to fair	1	0.84(0.52,1.34) 0.45	0.82(0.51,1.30) 0.40	0.56(0.32,0.98) 0.04	0.06	
Family history of cardiovascular disease						0.78
No	1	1.21(0.93,1.56) 0.16	1.06(0.80,1.40) 0.67	1.12(0.78,1.63) 0.53	0.77	
Yes	1	0.88(0.46,1.72) 0.72	1.05(0.65,1.70) 0.83	0.86(0.48,1.57) 0.63	0.79	
Cardiovascular disease						0.91
No	1	1.15(0.84,1.58) 0.40	1.11(0.82,1.50) 0.49	1.08(0.73,1.59) 0.71	0.82	
Yes	1	1.19(0.76,1.86) 0.46	1.02(0.67,1.57) 0.92	0.96(0.54,1.71) 0.89	0.74	
Chronic obstructive pulmonary diseases						0.10
No	1	1.06(0.81,1.40) 0.65	1.01(0.78,1.31) 0.93	0.92(0.64,1.32) 0.65	0.55	
Yes	1	1.45(0.85,2.48) 0.17	1.01(0.49,2.08) 0.98	1.45(0.75,2.81) 0.27	0.58	
History of chronic kidney disease						0.79
No	1	1.19(0.94,1.50) 0.14	1.07(0.85,1.36) 0.56	1.05(0.75,1.47) 0.78	0.97	
Yes	1	1.13(0.33,3.84) 0.84	1.51(0.40,5.65) 0.54	0.89(0.19,4.21) 0.88	0.91	
Cancer						0.18
No	1	1.05(0.80,1.37) 0.74	1.12(0.87,1.45) 0.38	1.09(0.77,1.55) 0.62	0.56	
Yes	1	1.44(0.89,2.32) 0.14	0.87(0.55,1.39) 0.56	0.80(0.45,1.45) 0.47	0.15	

Adjusted for sex, age, race, BMI, educational level, smoking status, drinking status, family income poverty ratio, healthy eating index-2015, total energy intake from the diet, self-reported health status, family history of cardiovascular diseases, self-reported cardiovascular disease, self-reported chronic obstructive pulmonary disease, self-reported chronic kidney disease, and self-reported cancer.

Supplementary Table 2.4 Subgroup analysis of hazard ratios for niacin levels with all-cause and CVD mortality in participants with prediabetes from NHANES 1999-2018

	Q1	Q2	Q3	Q4	<i>P</i> _{trend}	<i>P</i> _{interaction}
All-cause mortality						
Sex						0.85
Male	1	1.04(0.83,1.32) 0.72	0.99(0.79,1.24) 0.92	0.90(0.70,1.14) 0.37	0.24	
Female	1	1.06(0.88,1.28) 0.52	0.92(0.74,1.15) 0.49	0.91(0.66,1.26) 0.56	0.41	
Age, years						0.68
<60	1	1.03(0.72,1.48) 0.87	1.09(0.73,1.61) 0.68	0.98(0.68,1.41) 0.91	0.94	
≥60	1	1.06(0.91,1.24) 0.47	0.88(0.74,1.06) 0.17	0.86(0.72,1.04) 0.13	0.05	
BMI, kg/m ²						0.65
Normal weight (<25)	1	1.02(0.78,1.35) 0.88	0.82(0.61,1.10) 0.18	0.82(0.57,1.17) 0.27	0.16	
Overweight (25-30)	1	1.21(0.94,1.57) 0.15	1.15(0.90,1.48) 0.27	1.02(0.74,1.39) 0.92	0.94	
Obesity (≥30)	1	0.94(0.76,1.17) 0.60	0.86(0.66,1.12) 0.28	0.82(0.60,1.12) 0.21	0.16	
Race						0.46
Non-Hispanic White	1	1.08(0.90,1.30) 0.40	0.96(0.79,1.17) 0.68	0.91(0.73,1.12) 0.37	0.23	
Non-Hispanic Black	1	0.90(0.66,1.23) 0.52	0.76(0.50,1.15) 0.20	0.65(0.46,0.94) 0.02	0.02	
Mexican American	1	1.06(0.62,1.80) 0.83	0.71(0.39,1.28) 0.25	0.67(0.33,1.39) 0.29	0.19	
Others	1	0.75(0.44,1.29) 0.30	1.13(0.57,2.22) 0.73	1.57(0.78,3.18) 0.21	0.21	
Education level						0.10
Less than high school	1	1.19(0.94,1.51) 0.15	0.94(0.69,1.28) 0.70	0.81(0.59,1.13) 0.21	0.21	
High school or equivalent	1	1.03(0.81,1.32) 0.78	1.10(0.82,1.48) 0.54	1.19(0.81,1.74) 0.39	0.34	
College or above	1	0.93(0.73,1.17) 0.54	0.78(0.61,1.01) 0.06	0.74(0.57,0.97) 0.03	0.01	
Family income-poverty ratio						0.85
<1.0	1	1.05(0.79,1.41) 0.73	0.86(0.62,1.21) 0.39	1.06(0.76,1.47) 0.73	0.89	
1.0-3.0	1	1.09(0.90,1.32) 0.37	0.94(0.74,1.21) 0.66	0.85(0.68,1.07) 0.16	0.13	
>3.0	1	0.92(0.68,1.25) 0.61	0.91(0.67,1.23) 0.54	0.87(0.62,1.22) 0.43	0.42	
Smoking status						0.05
Never	1	1.02(0.81,1.28) 0.86	1.05(0.82,1.35) 0.71	0.92(0.65,1.31) 0.65	0.78	
Former	1	1.00(0.80,1.26) 0.98	0.75(0.57,0.97) 0.03	0.84(0.62,1.13) 0.25	0.07	
Current	1	1.14(0.83,1.56) 0.43	1.13(0.79,1.62) 0.49	0.92(0.62,1.37) 0.68	0.71	
Alcohol drinking						0.03
Never	1	1.02(0.84,1.26) 0.81	1.23(0.96,1.57) 0.10	0.82(0.58,1.17) 0.27	0.89	
Low to moderate	1	1.07(0.85,1.35) 0.57	0.72(0.56,0.92) 0.01	0.86(0.64,1.17) 0.34	0.06	
Heavy	1	0.95(0.67,1.34) 0.76	1.06(0.73,1.53) 0.76	0.87(0.61,1.22) 0.42	0.51	
Healthy eating index score						0.72
Quarter 1	1	0.99(0.71,1.38) 0.94	0.93(0.63,1.39) 0.73	1.12(0.76,1.65) 0.57	0.78	
Quarter 2	1	0.87(0.65,1.16) 0.33	0.85(0.61,1.18) 0.33	0.58(0.40,0.86) 0.01	0.01	
Quarter 3	1	1.22(0.92,1.61) 0.17	1.04(0.74,1.45) 0.84	1.04(0.70,1.54) 0.84	0.97	
Quarter 4	1	1.14(0.87,1.50) 0.33	0.96(0.73,1.27) 0.77	0.98(0.70,1.38) 0.92	0.63	
Total energy intake from diet, kcal						0.92
[0,1445.5]	1	1.10(0.88,1.36) 0.40	0.95(0.69,1.31) 0.76	0.76(0.47,1.24) 0.28	0.60	
(1445.5,1908]	1	1.11(0.83,1.47) 0.48	0.96(0.70,1.32) 0.80	0.90(0.62,1.32) 0.60	0.49	
(1908,2494.5]	1	0.93(0.63,1.36) 0.70	0.88(0.61,1.27) 0.50	0.81(0.55,1.19) 0.28	0.23	
(2494.5,15594]	1	0.75(0.41,1.37) 0.35	0.92(0.55,1.56) 0.77	0.89(0.52,1.50) 0.65	0.95	
Self reported health						0.02
Very good to excellent	1	1.18(0.95,1.48) 0.14	0.79(0.59,1.06) 0.12	1.07(0.80,1.43) 0.65	0.71	

Good	1	1.09(0.83,1.42) 0.54	1.04(0.79,1.39) 0.77	0.78(0.54,1.11) 0.17	0.22
Poor to fair	1	0.90(0.72,1.13) 0.36	0.93(0.69,1.25) 0.63	0.83(0.59,1.17) 0.29	0.36
Family history of cardiovascular disease					0.71
No	1	1.07(0.91,1.27) 0.41	0.94(0.78,1.14) 0.54	0.95(0.78,1.18) 0.66	0.42
Yes	1	0.94(0.71,1.25) 0.67	0.91(0.66,1.26) 0.56	0.73(0.51,1.06) 0.10	0.10
Cardiovascular disease					0.39
No	1	0.94(0.79,1.13) 0.50	0.87(0.73,1.05) 0.15	0.83(0.66,1.05) 0.13	0.07
Yes	1	1.32(1.05,1.67) 0.02	1.12(0.83,1.51) 0.46	1.06(0.75,1.50) 0.74	0.82
Chronic obstructive pulmonary diseases					0.12
No	1	0.99(0.86,1.15) 0.94	0.96(0.81,1.13) 0.60	0.88(0.74,1.05) 0.16	0.15
Yes	1	1.45(0.99,2.13) 0.06	0.82(0.50,1.33) 0.42	0.98(0.54,1.78) 0.94	0.45
History of chronic kidney disease					0.99
No	1	1.05(0.90,1.23) 0.53	0.96(0.80,1.14) 0.61	0.91(0.76,1.10) 0.34	0.23
Yes	1	1.02(0.52,2.01) 0.95	0.70(0.29,1.71) 0.43	0.65(0.23,1.85) 0.42	0.28
Cancer					0.93
No	1	1.04(0.87,1.24) 0.70	0.91(0.75,1.09) 0.31	0.88(0.71,1.09) 0.24	0.14
Yes	1	1.11(0.79,1.57) 0.54	1.11(0.75,1.65) 0.59	1.02(0.68,1.52) 0.93	0.89
CVD mortality					
Sex					0.36
Male	1	1.01(0.63,1.62) 0.96	1.04(0.70,1.54) 0.86	1.11(0.66,1.88) 0.70	0.67
Female	1	1.11(0.78,1.60) 0.56	0.98(0.60,1.60) 0.93	0.73(0.39,1.37) 0.33	0.51
Age, years					0.90
<60	1	0.75(0.32,1.78) 0.52	0.60(0.23,1.55) 0.29	0.90(0.30,2.69) 0.84	0.86
≥60	1	1.08(0.82,1.43) 0.59	1.00(0.74,1.36) 0.98	0.99(0.70,1.42) 0.98	0.91
BMI, kg/m2					0.68
Normal weight (<25)	1	0.86(0.56,1.31) 0.47	0.78(0.46,1.33) 0.36	0.78(0.43,1.42) 0.42	0.37
Overweight (25-30)	1	1.37(0.85,2.19) 0.20	1.27(0.82,1.97) 0.29	1.08(0.61,1.90) 0.79	0.79
Obesity (≥30)	1	1.00(0.62,1.60) 0.99	0.97(0.60,1.55) 0.89	1.20(0.66,2.17) 0.55	0.61
Race					0.63
Non-Hispanic White	1	1.08(0.76,1.52) 0.68	0.95(0.65,1.39) 0.81	0.97(0.61,1.54) 0.88	0.76
Non-Hispanic Black	1	0.93(0.53,1.63) 0.79	0.61(0.29,1.30) 0.20	0.85(0.43,1.66) 0.63	0.40
Mexican American	1	0.82(0.35,1.91) 0.65	0.80(0.35,1.83) 0.60	1.25(0.38,4.13) 0.71	0.91
Others	1	0.50(0.09,2.66) 0.42	1.65(0.37,7.29) 0.51	4.22(0.58,30.88) 0.16	0.18
Education level					0.17
Less than high school	1	1.29(0.83,2.01) 0.25	0.97(0.55,1.70) 0.91	1.05(0.56,1.97) 0.87	1
High school or equivalent	1	0.77(0.46,1.31) 0.34	1.16(0.67,2.00) 0.60	1.41(0.68,2.92) 0.35	0.21
College or above	1	1.05(0.66,1.67) 0.83	0.84(0.51,1.37) 0.48	0.80(0.47,1.35) 0.41	0.28
Family income-poverty ratio					0.63
<1.0	1	0.68(0.42,1.12) 0.13	0.71(0.38,1.35) 0.30	0.87(0.43,1.79) 0.71	0.61
1.0-3.0	1	1.18(0.82,1.71) 0.37	1.13(0.73,1.73) 0.59	0.95(0.59,1.51) 0.81	0.91
>3.0	1	0.89(0.50,1.56) 0.67	0.81(0.47,1.42) 0.47	0.96(0.49,1.88) 0.91	0.87
Smoking status					0.62
Never	1	0.95(0.63,1.43) 0.81	0.89(0.57,1.39) 0.61	0.97(0.54,1.75) 0.92	0.79
Former	1	0.94(0.58,1.51) 0.80	0.85(0.53,1.37) 0.51	0.85(0.48,1.50) 0.57	0.50
Current	1	1.68(0.86,3.29) 0.13	1.40(0.59,3.34) 0.45	1.60(0.70,3.66) 0.27	0.38
Alcohol drinking					0.25
Never	1	1.05(0.72,1.53) 0.79	1.26(0.82,1.95) 0.29	0.70(0.38,1.27) 0.24	0.71

Low to moderate	1	1.07(0.66,1.75) 0.77	0.80(0.44,1.45) 0.46	1.14(0.58,2.25) 0.70	0.96
Heavy	1	0.88(0.44,1.76) 0.71	1.09(0.60,1.98) 0.78	1.00(0.47,2.12) 1.00	0.86
Healthy eating index score					0.23
Quarter 1	1	1.28(0.68,2.44) 0.45	0.85(0.43,1.68) 0.64	1.63(0.65,4.08) 0.30	0.58
Quarter 2	1	0.93(0.53,1.64) 0.80	1.06(0.54,2.06) 0.87	0.67(0.28,1.58) 0.36	0.49
Quarter 3	1	0.76(0.44,1.31) 0.32	1.06(0.61,1.85) 0.84	1.38(0.65,2.93) 0.40	0.33
Quarter 4	1	1.13(0.69,1.85) 0.63	0.81(0.48,1.35) 0.41	0.76(0.41,1.40) 0.38	0.22
Total energy intake from diet, kcal					0.76
[0,1445.5]	1	0.96(0.62,1.50) 0.86	1.07(0.67,1.72) 0.77	1.12(0.48,2.60) 0.79	0.78
(1445.5,1908]	1	1.19(0.72,1.94) 0.50	1.21(0.72,2.03) 0.47	0.91(0.52,1.60) 0.75	0.93
(1908,2494.5]	1	0.84(0.46,1.54) 0.57	0.69(0.36,1.33) 0.27	0.89(0.45,1.76) 0.73	0.72
(2494.5,15594]	1	0.50(0.10,2.42) 0.39	0.88(0.30,2.55) 0.81	0.76(0.26,2.19) 0.61	1
Self reported health					0.01
Very good to excellent	1	1.45(0.91,2.31) 0.12	1.00(0.55,1.79) 0.99	1.73(1.03,2.92) 0.04	0.15
Good	1	1.04(0.64,1.68) 0.88	1.09(0.67,1.79) 0.72	0.79(0.39,1.59) 0.51	0.63
Poor to fair	1	0.68(0.41,1.13) 0.14	0.78(0.44,1.38) 0.39	0.70(0.34,1.41) 0.32	0.36
Family history of cardiovascular disease					0.01
No	1	0.96(0.70,1.32) 0.80	0.86(0.60,1.23) 0.41	1.17(0.76,1.80) 0.47	0.67
Yes	1	1.19(0.73,1.94) 0.48	1.23(0.73,2.08) 0.43	0.54(0.25,1.18) 0.12	0.24
Cardiovascular disease					0.29
No	1	0.83(0.58,1.18) 0.30	0.86(0.60,1.24) 0.43	0.85(0.50,1.44) 0.55	0.56
Yes	1	1.53(0.98,2.40) 0.06	1.16(0.70,1.92) 0.57	1.42(0.78,2.58) 0.25	0.38
Chronic obstructive pulmonary diseases					0.05
No	1	0.90(0.66,1.23) 0.50	0.95(0.68,1.31) 0.74	0.96(0.65,1.42) 0.83	0.87
Yes	1	3.24(1.25,8.40) 0.02	1.13(0.37,3.47) 0.83	1.27(0.42,3.87) 0.68	0.89
History of chronic kidney disease					0.36
No	1	1.06(0.78,1.43) 0.73	0.95(0.67,1.34) 0.77	1.04(0.70,1.56) 0.84	1
Yes	1	0.75(0.21,2.72) 0.66	0.90(0.13,6.27) 0.92	0.56(0.06,5.51) 0.62	0.72
Cancer					0.24
No	1	1.03(0.74,1.44) 0.85	0.89(0.63,1.25) 0.49	0.89(0.56,1.41) 0.62	0.50
Yes	1	1.10(0.56,2.17) 0.77	1.42(0.68,2.94) 0.35	1.64(0.77,3.47) 0.20	0.16
Cancer mortality					
Sex					0.93
Male	1	0.90(0.58,1.40) 0.64	0.87(0.55,1.38) 0.56	0.77(0.51,1.17) 0.22	0.24
Female	1	0.81(0.52,1.24) 0.33	0.73(0.46,1.18) 0.20	0.63(0.32,1.23) 0.17	0.09
Age, years					0.56
<60	1	0.75(0.39,1.46) 0.40	0.96(0.51,1.81) 0.90	0.60(0.32,1.10) 0.10	0.19
≥60	1	0.91(0.68,1.22) 0.53	0.75(0.52,1.09) 0.13	0.83(0.55,1.24) 0.35	0.23
BMI, kg/m2					0.59
Normal weight (<25)	1	0.71(0.42,1.20) 0.20	0.74(0.43,1.29) 0.29	0.76(0.39,1.46) 0.41	0.43
Overweight (25-30)	1	1.12(0.64,1.94) 0.69	1.12(0.66,1.92) 0.67	0.90(0.48,1.70) 0.75	0.78
Obesity (≥30)	1	0.82(0.50,1.35) 0.43	0.65(0.37,1.13) 0.13	0.52(0.28,0.95) 0.03	0.02
Race					0.90
Non-Hispanic White	1	0.88(0.61,1.26) 0.49	0.84(0.59,1.21) 0.35	0.74(0.50,1.10) 0.13	0.13
Non-Hispanic Black	1	0.75(0.43,1.33) 0.33	0.86(0.45,1.63) 0.64	0.55(0.26,1.20) 0.13	0.17
Mexican American	1	0.39(0.16,0.96) 0.04	0.34(0.10,1.18) 0.09	0.20(0.06,0.67) 0.01	0.01
Others	1	1.28(0.44,3.69) 0.65	1.30(0.41,4.11) 0.65	1.52(0.47,4.86) 0.48	0.52

Education level							0.02	
Less than high school	1	0.93(0.56,1.52)	0.76	0.91(0.56,1.49)	0.71	0.57(0.34,0.95)	0.03	0.04
High school or equivalent	1	0.85(0.45,1.62)	0.63	1.59(0.81,3.12)	0.18	1.32(0.72,2.40)	0.37	0.15
College or above	1	0.75(0.47,1.20)	0.22	0.46(0.29,0.74)		0.49(0.28,0.86)	0.01	0.002
Family income-poverty ratio							0.84	
<1.0	1	0.86(0.48,1.54)	0.61	0.66(0.34,1.29)	0.23	0.38(0.13,1.04)	0.06	0.04
1.0-3.0	1	0.91(0.58,1.42)	0.67	1.00(0.63,1.59)	0.99	0.97(0.64,1.46)	0.87	1
>3.0	1	0.82(0.48,1.41)	0.48	0.74(0.43,1.28)	0.28	0.65(0.35,1.22)	0.18	0.16
Smoking status							0.28	
Never	1	0.53(0.31,0.89)	0.02	0.77(0.43,1.39)	0.39	0.60(0.32,1.12)	0.11	0.22
Former	1	1.15(0.75,1.77)	0.53	0.82(0.49,1.36)	0.45	1.05(0.61,1.81)	0.86	0.81
Current	1	0.90(0.48,1.69)	0.74	0.97(0.51,1.87)	0.93	0.51(0.24,1.10)	0.09	0.10
Alcohol drinking							0.11	
Never	1	0.66(0.40,1.09)	0.10	1.24(0.72,2.14)	0.45	0.78(0.39,1.56)	0.48	1
Low to moderate	1	1.07(0.68,1.70)	0.76	0.57(0.35,0.94)	0.03	0.64(0.40,1.04)	0.07	0.01
Heavy	1	0.61(0.29,1.28)	0.19	0.92(0.46,1.84)	0.82	0.58(0.28,1.23)	0.15	0.29
Healthy eating index score							0.98	
Quarter 1	1	0.71(0.42,1.19)	0.20	0.60(0.30,1.21)	0.16	0.42(0.19,0.92)	0.03	0.02
Quarter 2	1	0.71(0.37,1.38)	0.31	0.70(0.38,1.28)	0.24	0.63(0.35,1.14)	0.13	0.12
Quarter 3	1	1.00(0.55,1.83)	0.99	1.16(0.55,2.44)	0.69	0.91(0.49,1.71)	0.78	0.94
Quarter 4	1	0.97(0.51,1.84)	0.92	0.86(0.48,1.54)	0.61	0.87(0.44,1.73)	0.70	0.62
Total energy intake from diet, kcal							0.66	
[0,1445.5]	1	0.84(0.51,1.39)	0.50	0.69(0.34,1.38)	0.29	0.56(0.19,1.60)	0.28	0.14
(1445.5,1908]	1	1.00(0.62,1.62)	1.00	0.59(0.28,1.25)	0.17	0.74(0.42,1.31)	0.30	0.11
(1908,2494.5]	1	0.86(0.43,1.74)	0.68	1.09(0.53,2.24)	0.82	0.71(0.33,1.51)	0.37	0.56
(2494.5,15594]	1	0.65(0.24,1.77)	0.40	0.98(0.39,2.45)	0.96	0.79(0.32,1.92)	0.60	0.78
Self reported health							0.87	
Very good to excellent	1	0.68(0.37,1.26)	0.23	0.56(0.29,1.08)	0.09	0.54(0.27,1.06)	0.07	0.05
Good	1	1.01(0.58,1.75)	0.97	0.92(0.53,1.60)	0.77	0.64(0.32,1.26)	0.20	0.20
Poor to fair	1	0.88(0.53,1.48)	0.63	0.87(0.52,1.47)	0.61	0.79(0.45,1.40)	0.43	0.45
Family history of cardiovascular disease							0.24	
No	1	0.92(0.64,1.33)	0.66	0.87(0.60,1.26)	0.46	0.63(0.41,0.96)	0.03	0.04
Yes	1	0.70(0.39,1.25)	0.23	0.68(0.36,1.30)	0.24	0.91(0.54,1.55)	0.73	0.67
Cardiovascular disease							0.58	
No	1	0.88(0.61,1.27)	0.49	0.79(0.54,1.15)	0.21	0.73(0.49,1.10)	0.14	0.10
Yes	1	0.68(0.37,1.25)	0.22	0.90(0.47,1.72)	0.75	0.61(0.29,1.29)	0.20	0.33
Chronic obstructive pulmonary diseases							0.24	
No	1	0.87(0.63,1.22)	0.42	0.93(0.68,1.28)	0.66	0.78(0.54,1.13)	0.19	0.24
Yes	1	0.55(0.19,1.60)	0.27	0.11(0.03,0.40)		0.20(0.06,0.69)	0.01	0.002
History of chronic kidney disease							0.23	
No	1	0.89(0.65,1.22)	0.48	0.86(0.63,1.19)	0.37	0.74(0.51,1.07)	0.11	0.10
Yes	1	0.06(0.00,1.10)	0.06	0.04(0.00,0.60)	0.02	0.07(0.01,0.91)	0.04	0.05
Cancer							0.65	
No	1	0.81(0.55,1.18)	0.28	0.87(0.60,1.28)	0.49	0.68(0.45,1.04)	0.07	0.10
Yes	1	0.90(0.51,1.57)	0.70	0.69(0.39,1.21)	0.20	0.80(0.40,1.61)	0.53	0.37
Other mortality								

Sex							0.46
Male	1	1.18(0.82,1.69) 0.37	1.04(0.68,1.58) 0.86	0.85(0.59,1.23) 0.39	0.20		
Female	1	1.20(0.92,1.57) 0.18	1.00(0.67,1.50) 0.98	1.20(0.76,1.90) 0.44	0.59		
Age, years							0.29
<60	1	1.49(0.83,2.66) 0.18	1.48(0.80,2.74) 0.21	1.46(0.86,2.48) 0.16	0.27		
≥60	1	1.14(0.87,1.49) 0.35	0.88(0.63,1.21) 0.42	0.79(0.54,1.17) 0.24	0.16		
BMI, kg/m2							0.55
Normal weight (<25)	1	1.41(0.94,2.13) 0.10	0.88(0.54,1.44) 0.61	0.90(0.52,1.55) 0.69	0.51		
Overweight (25-30)	1	1.20(0.80,1.81) 0.37	1.09(0.72,1.65) 0.68	1.06(0.65,1.72) 0.82	0.90		
Obesity (≥30)	1	1.00(0.73,1.38) 0.98	0.97(0.62,1.51) 0.88	0.84(0.50,1.43) 0.52	0.53		
Race							0.86
Non-Hispanic White	1	1.24(0.93,1.65) 0.15	1.04(0.72,1.48) 0.85	0.99(0.69,1.43) 0.97	0.79		
Non-Hispanic Black	1	1.03(0.66,1.60) 0.90	0.81(0.39,1.68) 0.57	0.63(0.29,1.36) 0.24	0.27		
Mexican American	1	2.09(0.91,4.80) 0.08	0.96(0.36,2.57) 0.93	1.08(0.39,3.01) 0.89	0.85		
Others	1	0.59(0.30,1.17) 0.13	0.78(0.32,1.88) 0.58	0.98(0.41,2.36) 0.96	0.99		
Education level							0.71
Less than high school	1	1.25(0.86,1.82) 0.24	0.91(0.53,1.54) 0.72	0.80(0.44,1.44) 0.45	0.46		
High school or equivalent	1	1.31(0.89,1.92) 0.17	0.84(0.51,1.39) 0.51	1.00(0.60,1.69) 0.99	0.62		
College or above	1	1.02(0.74,1.40) 0.91	1.04(0.71,1.53) 0.82	0.95(0.61,1.49) 0.83	0.87		
Family income-poverty ratio							0.8
<1.0	1	1.56(0.99,2.46) 0.06	1.13(0.67,1.92) 0.64	1.90(1.10,3.29) 0.02	0.07		
1.0-3.0	1	1.12(0.82,1.51) 0.48	0.81(0.54,1.23) 0.33	0.74(0.49,1.11) 0.14	0.10		
>3.0	1	1.08(0.66,1.78) 0.76	1.18(0.68,2.05) 0.55	1.09(0.62,1.92) 0.77	0.70		
Smoking status							0.06
Never	1	1.46(1.00,2.12) 0.05	1.40(0.93,2.09) 0.10	1.09(0.61,1.94) 0.78	0.58		
Former	1	0.98(0.72,1.34) 0.92	0.66(0.45,0.98) 0.04	0.74(0.47,1.16) 0.20	0.06		
Current	1	1.17(0.69,1.99) 0.56	1.19(0.67,2.14) 0.55	1.11(0.60,2.07) 0.73	0.74		
Alcohol drinking							0.56
Never	1	1.26(0.90,1.76) 0.19	1.25(0.83,1.90) 0.29	0.97(0.55,1.71) 0.91	0.82		
Low to moderate	1	1.06(0.74,1.51) 0.76	0.77(0.53,1.13) 0.19	0.86(0.54,1.38) 0.54	0.28		
Heavy	1	1.23(0.69,2.20) 0.48	1.10(0.54,2.24) 0.79	0.97(0.54,1.75) 0.93	0.69		
Healthy eating index score							0.02
Quarter 1	1	1.01(0.63,1.63) 0.97	1.36(0.73,2.56) 0.34	1.86(0.96,3.63) 0.07	0.06		
Quarter 2	1	0.93(0.62,1.41) 0.74	0.83(0.50,1.38) 0.46	0.48(0.27,0.86) 0.01	0.02		
Quarter 3	1	1.73(1.15,2.60) 0.01	0.94(0.57,1.54) 0.79	0.83(0.48,1.42) 0.49	0.24		
Quarter 4	1	1.29(0.85,1.98) 0.24	1.15(0.73,1.83) 0.54	1.28(0.72,2.28) 0.40	0.52		
Total energy intake from diet, kcal							0.94
[0,1445.5]	1	1.35(1.00,1.83) 0.05	1.05(0.64,1.72) 0.85	0.62(0.28,1.39) 0.25	0.87		
(1445.5,1908]	1	1.11(0.75,1.65) 0.60	1.08(0.71,1.64) 0.72	0.98(0.53,1.83) 0.95	1		
(1908,2494.5]	1	1.02(0.57,1.85) 0.94	0.88(0.48,1.61) 0.68	0.78(0.40,1.51) 0.46	0.30		
(2494.5,15594]	1	1.06(0.45,2.49) 0.90	0.96(0.44,2.14) 0.93	1.14(0.52,2.46) 0.75	0.67		
Self reported health							0.49
Very good to excellent	1	1.31(0.93,1.85) 0.12	0.80(0.50,1.30) 0.37	1.04(0.64,1.69) 0.86	0.73		
Good	1	1.15(0.79,1.67) 0.46	1.07(0.70,1.64) 0.74	0.85(0.50,1.44) 0.55	0.56		
Poor to fair	1	1.12(0.75,1.67) 0.57	1.12(0.66,1.91) 0.67	1.01(0.57,1.78) 0.97	0.95		
Family history of cardiovascular disease							0.94
No	1	1.25(0.96,1.64) 0.10	1.03(0.75,1.41) 0.85	1.04(0.74,1.48) 0.81	0.96		

Yes	1	0.96(0.60,1.55) 0.87	0.89(0.50,1.59) 0.70	0.72(0.43,1.20) 0.21	0.23
Cardiovascular disease					0.59
No	1	1.06(0.81,1.37) 0.68	0.95(0.70,1.28) 0.72	0.90(0.63,1.29) 0.58	0.48
Yes	1	1.54(1.07,2.20) 0.02	1.17(0.68,2.00) 0.57	1.03(0.59,1.78) 0.93	0.98
Chronic obstructive pulmonary diseases					0.42
No	1	1.17(0.93,1.46) 0.18	0.98(0.72,1.32) 0.88	0.92(0.66,1.27) 0.60	0.47
Yes	1	1.53(0.85,2.74) 0.15	1.40(0.77,2.53) 0.27	1.55(0.72,3.37) 0.26	0.28
History of chronic kidney disease					0.27
No	1	1.16(0.90,1.51) 0.26	1.02(0.74,1.41) 0.91	0.96(0.69,1.33) 0.81	0.70
Yes	1	2.27(0.79,6.51) 0.13	0.91(0.26,3.17) 0.88	1.11(0.21,6.02) 0.90	0.95
Cancer					0.18
No	1	1.18(0.91,1.53) 0.22	0.93(0.66,1.30) 0.66	1.02(0.74,1.41) 0.90	0.76
Yes	1	1.42(0.86,2.35) 0.17	1.47(0.78,2.78) 0.23	0.88(0.45,1.75) 0.72	0.97

Adjusted for sex, age, race, BMI, educational level, smoking status, drinking status, family income poverty ratio, healthy eating index-2015, total energy intake from the diet, self-reported health status, family history of cardiovascular diseases, self-reported cardiovascular disease, self-reported chronic obstructive pulmonary disease, self-reported chronic kidney disease, and self-reported cancer.

Supplementary Table 2.5 Subgroup analysis of hazard ratios for vitamin B6 levels with all-cause and CVD mortality in participants with prediabetes from NHANES 1999-2018

	Q1	Q2	Q3	Q4	<i>P</i> _{trend}	<i>P</i> _{interaction}
All-cause mortality						
Sex						0.69
Male	1	1.09(0.86,1.37) 0.49	1.11(0.86,1.43) 0.42	1.09(0.84,1.42) 0.51	0.56	
Female	1	1.09(0.92,1.30) 0.32	1.19(0.95,1.49) 0.13	0.99(0.76,1.31) 0.96	0.56	
Age, years						0.48
<60	1	0.85(0.58,1.25) 0.40	1.13(0.75,1.69) 0.56	0.87(0.58,1.31) 0.51	0.86	
≥60	1	1.11(0.96,1.28) 0.16	1.11(0.90,1.36) 0.34	1.11(0.89,1.39) 0.35	0.40	
BMI, kg/m ²						0.36
Normal weight (<25)	1	1.07(0.82,1.40) 0.62	1.04(0.77,1.42) 0.79	1.05(0.75,1.48) 0.76	0.81	
Overweight (25-30)	1	1.05(0.80,1.38) 0.70	1.42(1.05,1.92) 0.02	1.13(0.80,1.60) 0.50	0.25	
Obesity (≥30)	1	1.06(0.82,1.36) 0.67	0.94(0.69,1.28) 0.69	0.94(0.68,1.30) 0.71	0.54	
Race						0.25
Non-Hispanic White	1	1.08(0.92,1.27) 0.35	1.12(0.91,1.38) 0.28	1.06(0.86,1.31) 0.58	0.55	
Non-Hispanic Black	1	1.11(0.78,1.56) 0.57	0.83(0.55,1.26) 0.38	0.92(0.63,1.35) 0.69	0.42	
Mexican American	1	0.97(0.57,1.63) 0.90	1.04(0.56,1.93) 0.90	1.13(0.57,2.21) 0.73	0.69	
Others	1	0.89(0.45,1.75) 0.73	1.62(0.84,3.13) 0.15	1.05(0.52,2.11) 0.90	0.39	
Education level						0.57
Less than high school	1	1.13(0.87,1.46) 0.35	0.98(0.67,1.42) 0.91	0.98(0.69,1.37) 0.89	0.77	
High school or equivalent	1	1.10(0.82,1.48) 0.53	1.24(0.91,1.70) 0.17	1.17(0.79,1.71) 0.43	0.32	
College or above	1	0.94(0.73,1.20) 0.62	1.08(0.81,1.44) 0.59	0.98(0.73,1.33) 0.92	0.82	
Family income-poverty ratio						0.88
<1.0	1	1.02(0.76,1.38) 0.89	1.19(0.81,1.75) 0.37	0.96(0.64,1.45) 0.86	0.80	
1.0-3.0	1	1.07(0.87,1.32) 0.49	1.00(0.79,1.26) 0.97	1.00(0.74,1.36) 0.98	0.87	
>3.0	1	1.02(0.77,1.37) 0.87	1.20(0.88,1.64) 0.26	1.13(0.81,1.57) 0.48	0.32	
Smoking status						0.06
Never	1	1.16(0.93,1.45) 0.19	1.28(1.00,1.64) 0.05	1.02(0.77,1.34) 0.89	0.63	
Former	1	1.04(0.83,1.29) 0.75	0.95(0.73,1.24) 0.72	1.07(0.81,1.42) 0.64	0.82	
Current	1	0.90(0.62,1.30) 0.56	1.13(0.76,1.68) 0.56	0.97(0.63,1.49) 0.90	0.79	
Alcohol drinking						0.19
Never	1	1.30(1.05,1.61) 0.02	1.43(1.13,1.82) 0.003	1.14(0.83,1.58) 0.42	0.18	
Low to moderate	1	0.96(0.77,1.20) 0.72	0.93(0.71,1.23) 0.62	0.91(0.68,1.20) 0.49	0.50	
Heavy	1	0.92(0.66,1.30) 0.65	1.16(0.76,1.76) 0.49	1.16(0.79,1.70) 0.46	0.28	
Healthy eating index score						0.94
Quarter 1	1	1.10(0.78,1.54) 0.58	1.09(0.72,1.64) 0.69	1.00(0.65,1.55) 1.00	0.85	
Quarter 2	1	0.96(0.74,1.25) 0.75	0.98(0.69,1.38) 0.89	1.05(0.72,1.53) 0.78	0.82	
Quarter 3	1	1.14(0.82,1.59) 0.42	1.32(0.95,1.83) 0.10	1.07(0.77,1.50) 0.67	0.48	
Quarter 4	1	1.05(0.70,1.57) 0.82	1.06(0.70,1.58) 0.79	1.03(0.66,1.60) 0.91	0.96	
Total energy intake from diet, kcal						0.09
[0,1445.5]	1	1.19(0.94,1.50) 0.14	1.21(0.89,1.65) 0.22	1.16(0.80,1.66) 0.44	0.17	
(1445.5,1908]	1	1.20(0.86,1.68) 0.29	1.13(0.81,1.57) 0.48	1.04(0.72,1.50) 0.85	0.83	
(1908,2494.5]	1	0.56(0.41,0.78) <0.001	0.85(0.60,1.19) 0.34	0.75(0.53,1.05) 0.09	0.89	
(2494.5,15594]	1	1.12(0.63,2.00) 0.70	1.08(0.60,1.95) 0.80	1.08(0.63,1.85) 0.78	0.97	
Self reported health						0.16
Very good to excellent	1	1.01(0.78,1.31) 0.93	1.17(0.90,1.53) 0.25	0.99(0.72,1.36) 0.96	0.67	

Good	1	1.08(0.85,1.39) 0.52	1.22(0.91,1.63) 0.18	1.19(0.90,1.57) 0.22	0.16
Poor to fair	1	0.98(0.75,1.27) 0.87	0.93(0.68,1.27) 0.65	0.90(0.64,1.25) 0.52	0.50
Family history of cardiovascular disease					0.87
No	1	1.08(0.91,1.29) 0.36	1.12(0.91,1.38) 0.28	1.09(0.88,1.35) 0.43	0.41
Yes	1	1.05(0.76,1.45) 0.76	1.15(0.82,1.61) 0.42	1.03(0.72,1.47) 0.89	0.72
Cardiovascular disease					0.48
No	1	1.00(0.85,1.18) 0.96	1.05(0.85,1.30) 0.62	0.99(0.80,1.24) 0.96	0.91
Yes	1	1.24(0.98,1.56) 0.07	1.32(1.00,1.73) 0.05	1.24(0.90,1.71) 0.19	0.18
Chronic obstructive pulmonary diseases					0.04
No	1	1.02(0.89,1.18) 0.74	1.05(0.88,1.27) 0.59	1.03(0.85,1.25) 0.75	0.70
Yes	1	1.18(0.71,1.97) 0.51	1.66(0.97,2.86) 0.07	1.00(0.56,1.78) 1.00	0.64
History of chronic kidney disease					0.21
No	1	1.05(0.92,1.20) 0.50	1.12(0.93,1.34) 0.23	1.03(0.85,1.24) 0.76	0.60
Yes	1	1.84(0.81,4.16) 0.14	0.83(0.37,1.89) 0.66	1.74(0.73,4.14) 0.21	0.50
Cancer					0.58
No	1	1.04(0.90,1.21) 0.59	1.09(0.88,1.33) 0.43	0.97(0.79,1.19) 0.79	0.96
Yes	1	1.22(0.86,1.72) 0.26	1.30(0.90,1.88) 0.16	1.44(0.99,2.11) 0.06	0.08
CVD mortality					
Sex					0.01
Male	1	0.91(0.59,1.40) 0.68	1.25(0.83,1.87) 0.28	1.47(0.92,2.36) 0.11	0.03
Female	1	1.28(0.95,1.73) 0.11	1.00(0.63,1.60) 0.99	0.82(0.47,1.43) 0.49	0.55
Age, years					0.55
<60	1	0.65(0.32,1.34) 0.25	1.02(0.46,2.27) 0.97	0.82(0.35,1.92) 0.65	0.96
≥60	1	1.14(0.89,1.46) 0.31	1.09(0.81,1.48) 0.57	1.33(0.93,1.90) 0.12	0.18
BMI, kg/m2					0.36
Normal weight (<25)	1	0.96(0.63,1.48) 0.87	0.72(0.39,1.35) 0.31	1.20(0.65,2.20) 0.56	0.86
Overweight (25-30)	1	0.84(0.49,1.42) 0.51	1.24(0.83,1.85) 0.30	1.22(0.70,2.10) 0.48	0.21
Obesity (≥30)	1	1.48(0.85,2.58) 0.17	1.40(0.83,2.34) 0.21	1.39(0.71,2.71) 0.34	0.32
Race					0.69
Non-Hispanic White	1	1.11(0.83,1.47) 0.49	1.08(0.78,1.50) 0.63	1.24(0.85,1.82) 0.27	0.32
Non-Hispanic Black	1	1.05(0.53,2.08) 0.89	0.90(0.41,1.98) 0.79	1.02(0.45,2.33) 0.96	0.93
Mexican American	1	1.01(0.38,2.73) 0.98	0.67(0.17,2.69) 0.57	1.98(0.73,5.34) 0.18	0.30
Others	1	0.63(0.18,2.22) 0.47	1.23(0.33,4.66) 0.76	0.73(0.16,3.34) 0.68	0.94
Education level					0.13
Less than high school	1	1.44(0.94,2.18) 0.09	0.84(0.47,1.50) 0.55	1.37(0.76,2.46) 0.29	0.69
High school or equivalent	1	0.86(0.50,1.49) 0.60	1.71(0.97,3.00) 0.06	1.42(0.68,2.98) 0.35	0.12
College or above	1	0.99(0.64,1.53) 0.97	0.95(0.59,1.53) 0.85	1.06(0.65,1.72) 0.82	0.85
Family income-poverty ratio					0.84
<1.0	1	1.14(0.64,2.03) 0.65	1.00(0.55,1.80) 0.99	1.14(0.59,2.20) 0.69	0.78
1.0-3.0	1	1.10(0.78,1.56) 0.57	1.00(0.67,1.51) 0.99	1.24(0.78,1.98) 0.36	0.51
>3.0	1	0.82(0.49,1.38) 0.46	1.04(0.58,1.85) 0.89	1.10(0.61,1.98) 0.76	0.48
Smoking status					0.15
Never	1	1.20(0.87,1.64) 0.26	1.20(0.82,1.76) 0.35	1.00(0.63,1.59) 0.99	0.94
Former	1	0.87(0.52,1.45) 0.58	0.94(0.56,1.59) 0.82	1.13(0.65,1.97) 0.66	0.54
Current	1	1.18(0.65,2.14) 0.60	1.18(0.62,2.25) 0.62	2.05(1.04,4.03) 0.04	0.07
Alcohol drinking					0.11
Never	1	1.34(0.92,1.97) 0.13	1.53(0.99,2.35) 0.05	1.05(0.58,1.88) 0.88	0.55

Low to moderate	1	0.97(0.64,1.47)	0.88	0.83(0.49,1.42)	0.50	1.11(0.65,1.90)	0.71	0.86
Heavy	1	0.67(0.31,1.43)	0.30	1.20(0.63,2.31)	0.58	1.60(0.73,3.48)	0.24	0.07
Healthy eating index score								0.95
Quarter 1	1	0.76(0.42,1.36)	0.36	0.88(0.39,1.98)	0.75	1.69(0.69,4.17)	0.25	0.59
Quarter 2	1	1.21(0.72,2.02)	0.48	1.21(0.63,2.34)	0.56	1.23(0.73,2.07)	0.43	0.46
Quarter 3	1	0.92(0.56,1.53)	0.76	1.09(0.64,1.86)	0.76	1.17(0.65,2.11)	0.61	0.47
Quarter 4	1	1.41(0.79,2.52)	0.25	1.24(0.65,2.40)	0.51	1.37(0.68,2.78)	0.38	0.60
Total energy intake from diet, kcal								0.37
[0,1445.5]	1	1.45(1.01,2.09)	0.05	1.05(0.65,1.70)	0.83	1.23(0.67,2.26)	0.50	0.43
(1445.5,1908]	1	0.86(0.55,1.34)	0.50	0.93(0.54,1.58)	0.78	1.25(0.71,2.19)	0.43	0.53
(1908,2494.5]	1	0.57(0.27,1.20)	0.14	0.93(0.52,1.67)	0.80	0.99(0.51,1.91)	0.97	0.39
(2494.5,15594]	1	1.21(0.36,4.08)	0.76	1.44(0.47,4.44)	0.52	1.20(0.40,3.63)	0.75	0.99
Self reported health								0.09
Very good to excellent	1	1.02(0.60,1.72)	0.94	1.29(0.79,2.10)	0.30	1.45(0.78,2.72)	0.24	0.13
Good	1	0.83(0.53,1.29)	0.41	0.94(0.58,1.52)	0.79	1.02(0.60,1.74)	0.95	0.80
Poor to fair	1	1.10(0.69,1.76)	0.69	0.96(0.56,1.65)	0.88	1.03(0.55,1.91)	0.93	0.95
Family history of cardiovascular disease								0.23
No	1	1.16(0.85,1.59)	0.36	1.04(0.73,1.48)	0.84	1.40(0.98,2.00)	0.07	0.13
Yes	1	0.85(0.55,1.31)	0.46	1.17(0.66,2.06)	0.59	0.84(0.41,1.74)	0.65	1
Cardiovascular disease								0.39
No	1	0.98(0.69,1.39)	0.90	0.84(0.56,1.26)	0.40	1.03(0.66,1.60)	0.90	0.89
Yes	1	1.29(0.81,2.05)	0.29	1.67(1.08,2.58)	0.02	1.78(1.07,2.97)	0.03	0.01
Chronic obstructive pulmonary diseases								0.83
No	1	1.04(0.80,1.35)	0.78	1.08(0.80,1.45)	0.62	1.18(0.85,1.65)	0.32	0.31
Yes	1	1.76(0.57,5.45)	0.33	1.55(0.51,4.73)	0.44	2.36(0.73,7.60)	0.15	0.21
History of chronic kidney disease								0.09
No	1	1.03(0.80,1.33)	0.81	1.03(0.75,1.42)	0.86	1.18(0.83,1.70)	0.36	0.40
Yes	1	2.24(0.46,10.80)	0.31	1.89(0.32,11.03)	0.48	1.89(0.40,8.99)	0.42	0.60
Cancer								0.07
No	1	1.05(0.79,1.38)	0.75	1.12(0.79,1.59)	0.53	1.08(0.71,1.64)	0.72	0.63
Yes	1	1.39(0.71,2.70)	0.33	0.98(0.50,1.93)	0.96	2.09(1.04,4.22)	0.04	0.09
Cancer mortality								
Sex								0.74
Male	1	0.80(0.51,1.26)	0.34	0.75(0.48,1.19)	0.23	0.68(0.41,1.13)	0.14	0.15
Female	1	0.67(0.43,1.04)	0.07	0.91(0.59,1.40)	0.66	0.83(0.47,1.45)	0.52	0.64
Age, years								0.32
<60	1	0.50(0.25,0.99)	0.05	0.51(0.27,0.97)	0.04	0.42(0.20,0.90)	0.03	0.04
≥60	1	0.92(0.67,1.26)	0.61	1.06(0.74,1.52)	0.74	0.99(0.70,1.41)	0.97	0.79
BMI, kg/m2								0.14
Normal weight (<25)	1	0.63(0.35,1.14)	0.13	1.11(0.62,1.98)	0.73	0.74(0.37,1.48)	0.39	0.75
Overweight (25-30)	1	1.26(0.73,2.17)	0.41	1.14(0.60,2.15)	0.69	1.21(0.60,2.44)	0.60	0.76
Obesity (≥30)	1	0.52(0.31,0.89)	0.02	0.50(0.30,0.85)	0.01	0.42(0.23,0.80)	0.01	0.01
Race								0.52
Non-Hispanic White	1	0.79(0.55,1.14)	0.21	0.84(0.59,1.20)	0.34	0.71(0.46,1.08)	0.11	0.16
Non-Hispanic Black	1	0.59(0.28,1.23)	0.16	0.55(0.25,1.21)	0.14	0.80(0.32,1.96)	0.62	0.51
Mexican American	1	0.46(0.19,1.11)	0.08	0.50(0.22,1.14)	0.10	0.30(0.08,1.08)	0.07	0.06
Others	1	0.75(0.19,2.95)	0.68	2.42(0.80,7.38)	0.12	1.70(0.51,5.71)	0.39	0.14

Male	1	1.47(1.01,2.14) 0.05	1.35(0.90,2.02) 0.15	1.20(0.79,1.82) 0.40	0.79
Female	1	1.26(0.93,1.72) 0.14	1.55(1.10,2.19) 0.01	1.19(0.80,1.77) 0.38	0.09
Age, years					0.38
<60	1	1.58(0.89,2.80) 0.12	2.31(1.23,4.36) 0.01	1.69(0.97,2.94) 0.06	0.05
≥60	1	1.18(0.92,1.53) 0.20	1.16(0.85,1.58) 0.35	1.02(0.72,1.44) 0.93	0.91
BMI, kg/m ²					0.08
Normal weight (<25)	1	1.44(0.98,2.12) 0.06	1.27(0.87,1.86) 0.21	1.15(0.71,1.84) 0.57	0.60
Overweight (25-30)	1	1.07(0.70,1.62) 0.76	1.72(1.10,2.69) 0.02	1.01(0.63,1.62) 0.97	0.44
Obesity (≥30)	1	1.45(1.00,2.09) 0.05	1.15(0.71,1.85) 0.57	1.31(0.83,2.05) 0.24	0.53
Race					0.83
Non-Hispanic White	1	1.27(0.96,1.69) 0.09	1.39(1.00,1.92) 0.05	1.20(0.86,1.68) 0.28	0.23
Non-Hispanic Black	1	1.61(0.99,2.62) 0.05	1.06(0.55,2.05) 0.86	0.94(0.50,1.77) 0.84	0.63
Mexican American	1	1.49(0.66,3.36) 0.34	1.89(0.68,5.28) 0.23	1.89(0.64,5.64) 0.25	0.21
Others	1	1.09(0.46,2.56) 0.84	1.40(0.56,3.49) 0.47	0.87(0.37,2.05) 0.74	0.97
Education level					0.64
Less than high school	1	1.35(0.92,1.96) 0.12	1.21(0.75,1.96) 0.43	0.91(0.57,1.44) 0.68	0.91
High school or equivalent	1	1.39(0.93,2.08) 0.11	1.10(0.69,1.77) 0.69	1.14(0.69,1.89) 0.60	0.85
College or above	1	1.18(0.76,1.83) 0.47	1.69(1.09,2.61) 0.02	1.37(0.85,2.20) 0.20	0.11
Family income-poverty ratio					0.79
<1.0	1	1.38(0.88,2.16) 0.17	1.78(1.01,3.16) 0.05	1.42(0.77,2.61) 0.26	0.09
1.0-3.0	1	1.23(0.91,1.66) 0.18	1.06(0.74,1.51) 0.77	0.95(0.60,1.51) 0.83	0.66
>3.0	1	1.35(0.79,2.30) 0.28	1.82(1.08,3.06) 0.03	1.55(0.88,2.72) 0.13	0.07
Smoking status					0.05
Never	1	1.30(0.90,1.87) 0.17	1.54(1.01,2.34) 0.04	1.21(0.81,1.82) 0.35	0.24
Former	1	1.20(0.85,1.68) 0.30	1.02(0.71,1.46) 0.93	1.09(0.75,1.59) 0.66	0.94
Current	1	1.42(0.89,2.27) 0.14	1.89(1.00,3.55) 0.05	1.18(0.64,2.15) 0.60	0.38
Alcohol drinking					0.23
Never	1	1.84(1.27,2.66) 0.001	1.78(1.17,2.70) 0.01	1.34(0.84,2.14) 0.22	0.16
Low to moderate	1	0.95(0.67,1.34) 0.76	1.09(0.75,1.59) 0.64	0.98(0.66,1.45) 0.91	0.88
Heavy	1	1.25(0.67,2.31) 0.49	1.53(0.74,3.15) 0.25	1.26(0.66,2.41) 0.49	0.45
Healthy eating index score					0.76
Quarter 1	1	1.53(0.91,2.57) 0.11	1.57(0.90,2.75) 0.12	1.45(0.73,2.86) 0.28	0.16
Quarter 2	1	1.24(0.85,1.80) 0.26	1.22(0.80,1.85) 0.35	0.98(0.54,1.76) 0.94	0.91
Quarter 3	1	1.48(0.90,2.44) 0.12	1.63(0.98,2.71) 0.06	0.99(0.54,1.79) 0.96	0.85
Quarter 4	1	1.12(0.65,1.92) 0.69	1.24(0.77,1.99) 0.38	1.29(0.73,2.26) 0.38	0.33
Total energy intake from diet, kcal					0.06
[0,1445.5]	1	1.20(0.87,1.66) 0.27	1.74(1.14,2.65) 0.01	0.96(0.51,1.84) 0.91	0.09
(1445.5,1908]	1	2.31(1.50,3.58) <0.001	1.71(1.08,2.68) 0.02	1.22(0.68,2.17) 0.51	0.52
(1908,2494.5]	1	0.54(0.32,0.91) 0.02	0.80(0.45,1.42) 0.44	0.67(0.40,1.15) 0.15	0.68
(2494.5,15594]	1	0.95(0.41,2.18) 0.90	1.00(0.41,2.47) 1.00	1.15(0.52,2.56) 0.73	0.53
Self reported health					0.32
Very good to excellent	1	1.24(0.86,1.78) 0.25	1.30(0.87,1.94) 0.20	0.89(0.55,1.45) 0.65	0.97
Good	1	1.50(1.06,2.13) 0.02	1.96(1.25,3.08) 0.003	1.67(1.10,2.52) 0.02	0.01
Poor to fair	1	1.11(0.74,1.68) 0.61	1.02(0.63,1.63) 0.94	1.04(0.62,1.75) 0.88	0.99
Family history of cardiovascular disease					0.99
No	1	1.34(1.01,1.77) 0.04	1.43(1.04,1.98) 0.03	1.25(0.88,1.78) 0.21	0.18
Yes	1	1.25(0.76,2.06) 0.38	1.34(0.80,2.27) 0.27	1.08(0.64,1.82) 0.77	0.65

Cardiovascular disease							0.90
No	1	1.31(0.99,1.72) 0.06	1.45(1.05,2.00) 0.02	1.23(0.91,1.65) 0.18	0.16		
Yes	1	1.34(0.91,1.97) 0.13	1.31(0.84,2.06) 0.24	1.05(0.63,1.77) 0.85	0.81		
Chronic obstructive pulmonary diseases							0.01
No	1	1.21(0.95,1.55) 0.13	1.21(0.91,1.63) 0.19	1.11(0.82,1.51) 0.50	0.52		
Yes	1	2.01(1.00,4.02) 0.05	3.12(1.52,6.42) 0.002	1.59(0.75,3.38) 0.23	0.07		
History of chronic kidney disease							0.18
No	1	1.27(1.00,1.61) 0.05	1.40(1.06,1.86) 0.02	1.14(0.85,1.52) 0.39	0.28		
Yes	1	2.93(0.77,11.21) 0.12	0.89(0.25,3.15) 0.86	3.09(0.58,16.29) 0.18	0.38		
Cancer							0.99
No	1	1.30(1.03,1.65) 0.03	1.34(0.99,1.82) 0.06	1.16(0.85,1.58) 0.34	0.32		
Yes	1	1.39(0.78,2.48) 0.26	1.54(0.90,2.64) 0.12	1.28(0.70,2.33) 0.42	0.39		

Adjusted for sex, age, race, BMI, educational level, smoking status, drinking status, family income poverty ratio, healthy eating index-2015, total energy intake from the diet, self-reported health status, family history of cardiovascular diseases, self-reported cardiovascular disease, self-reported chronic obstructive pulmonary disease, self-reported chronic kidney disease, and self-reported cancer.

Supplementary Table 2.6 Subgroup analysis of hazard ratios for folate levels with all-cause and CVD mortality in participants with prediabetes from NHANES 1999-2018

	Q1	Q2	Q3	Q4	<i>P</i> _{trend}	<i>P</i> _{interaction}
All-cause mortality						
Sex						0.99
Male	1	1.03(0.81,1.29) 0.83	1.11(0.88,1.40) 0.39	1.00(0.78,1.29) 0.99	0.87	
Female	1	1.07(0.88,1.30) 0.49	1.15(0.91,1.45) 0.25	1.02(0.76,1.36) 0.91	0.64	
Age, years						0.02
<60	1	0.82(0.55,1.21) 0.31	1.43(0.99,2.07) 0.06	0.98(0.67,1.45) 0.93	0.37	
≥60	1	1.07(0.91,1.26) 0.41	0.98(0.83,1.17) 0.83	0.98(0.80,1.21) 0.88	0.63	
BMI, kg/m ²						0.40
Normal weight (<25)	1	1.32(1.01,1.73) 0.04	1.31(0.98,1.75) 0.07	1.32(0.92,1.87) 0.13	0.14	
Overweight (25-30)	1	1.00(0.80,1.27) 0.97	1.14(0.88,1.48) 0.33	1.10(0.80,1.51) 0.55	0.43	
Obesity (≥30)	1	0.90(0.70,1.17) 0.43	0.96(0.72,1.29) 0.78	0.72(0.52,1.01) 0.06	0.11	
Race						0.95
Non-Hispanic White	1	1.05(0.89,1.24) 0.54	1.10(0.93,1.31) 0.27	1.02(0.82,1.26) 0.86	0.75	
Non-Hispanic Black	1	1.10(0.74,1.64) 0.64	1.24(0.86,1.80) 0.25	1.05(0.70,1.56) 0.83	0.51	
Mexican American	1	0.95(0.54,1.65) 0.85	0.91(0.50,1.66) 0.77	0.61(0.35,1.06) 0.08	0.08	
Others	1	0.80(0.44,1.43) 0.45	0.88(0.46,1.69) 0.70	0.82(0.38,1.79) 0.62	0.73	
Education level						0.66
Less than high school	1	1.02(0.81,1.29) 0.86	1.11(0.82,1.49) 0.50	0.98(0.72,1.35) 0.92	0.88	
High school or equivalent	1	1.12(0.82,1.53) 0.49	1.18(0.86,1.60) 0.30	1.20(0.78,1.86) 0.40	0.33	
College or above	1	0.99(0.77,1.28) 0.94	1.03(0.80,1.32) 0.84	0.86(0.64,1.17) 0.34	0.35	
Family income-poverty ratio						0.33
<1.0	1	1.40(0.97,2.04) 0.07	0.99(0.67,1.46) 0.96	1.29(0.91,1.82) 0.16	0.43	
1.0-3.0	1	0.93(0.75,1.14) 0.47	1.04(0.83,1.31) 0.70	0.88(0.66,1.17) 0.37	0.62	
>3.0	1	1.06(0.77,1.45) 0.74	1.23(0.90,1.67) 0.20	1.08(0.79,1.48) 0.64	0.47	
Smoking status						0.02
Never	1	0.98(0.76,1.26) 0.87	1.13(0.87,1.46) 0.37	0.93(0.71,1.22) 0.60	0.91	
Former	1	1.14(0.91,1.44) 0.26	0.95(0.75,1.19) 0.65	0.97(0.75,1.25) 0.81	0.38	
Current	1	0.92(0.65,1.30) 0.64	1.32(0.92,1.90) 0.13	1.09(0.71,1.69) 0.68	0.33	
Alcohol drinking						0.87
Never	1	0.95(0.76,1.18) 0.62	1.12(0.85,1.46) 0.42	0.95(0.70,1.27) 0.72	0.88	
Low to moderate	1	1.05(0.82,1.36) 0.68	1.11(0.85,1.44) 0.45	1.02(0.75,1.38) 0.91	0.85	
Heavy	1	1.14(0.77,1.68) 0.51	1.14(0.79,1.65) 0.48	1.02(0.71,1.48) 0.90	0.93	
Healthy eating index score						0.65
Quarter 1	1	1.06(0.77,1.46) 0.70	1.01(0.71,1.44) 0.96	1.10(0.76,1.61) 0.61	0.71	
Quarter 2	1	1.21(0.88,1.67) 0.24	1.14(0.81,1.59) 0.46	0.99(0.64,1.54) 0.97	0.96	
Quarter 3	1	1.07(0.80,1.43) 0.65	1.17(0.83,1.64) 0.37	1.19(0.83,1.70) 0.34	0.29	
Quarter 4	1	0.84(0.60,1.16) 0.29	0.99(0.69,1.40) 0.94	0.76(0.54,1.08) 0.13	0.21	
Total energy intake from diet, kcal						0.92
[0,1445.5]	1	1.03(0.82,1.28) 0.82	0.98(0.74,1.31) 0.91	0.95(0.70,1.30) 0.76	0.82	
(1445.5,1908]	1	1.03(0.75,1.40) 0.86	1.09(0.81,1.48) 0.56	1.04(0.74,1.46) 0.82	0.69	
(1908,2494.5]	1	1.14(0.80,1.65) 0.47	1.47(1.02,2.13) 0.04	1.28(0.85,1.93) 0.24	0.18	
(2494.5,15594]	1	0.93(0.50,1.75) 0.83	0.94(0.50,1.77) 0.85	0.87(0.52,1.45) 0.58	0.50	
Self reported health						0.02
Very good to excellent	1	1.26(0.96,1.65) 0.09	1.40(1.02,1.91) 0.04	1.00(0.71,1.40) 0.98	0.62	

Good	1	1.04(0.80,1.37) 0.75	1.09(0.82,1.44) 0.55	1.01(0.73,1.40) 0.93	0.84
Poor to fair	1	0.84(0.62,1.13) 0.25	0.89(0.67,1.17) 0.39	0.93(0.67,1.29) 0.66	0.81
Family history of cardiovascular disease					0.46
No	1	1.09(0.91,1.30) 0.33	1.12(0.92,1.35) 0.25	1.11(0.87,1.40) 0.39	0.38
Yes	1	0.90(0.67,1.21) 0.50	1.06(0.74,1.53) 0.74	0.75(0.53,1.07) 0.11	0.28
Cardiovascular disease					0.22
No	1	0.94(0.80,1.11) 0.48	0.99(0.82,1.19) 0.88	0.90(0.74,1.11) 0.32	0.46
Yes	1	1.19(0.92,1.54) 0.17	1.42(1.09,1.86) 0.01	1.27(0.94,1.71) 0.13	0.06
Chronic obstructive pulmonary diseases					0.28
No	1	1.04(0.89,1.20) 0.63	1.14(0.97,1.34) 0.10	0.99(0.82,1.20) 0.94	0.73
Yes	1	0.89(0.57,1.39) 0.60	0.73(0.43,1.23) 0.24	0.97(0.58,1.63) 0.90	0.69
History of chronic kidney disease					0.46
No	1	1.04(0.89,1.20) 0.65	1.11(0.94,1.31) 0.21	1.02(0.84,1.24) 0.81	0.62
Yes	1	1.08(0.36,3.24) 0.89	0.87(0.31,2.40) 0.78	0.39(0.10,1.54) 0.18	0.13
Cancer					0.01
No	1	0.92(0.79,1.07) 0.27	1.06(0.89,1.28) 0.51	0.90(0.72,1.12) 0.34	0.72
Yes	1	1.82(1.25,2.65) 0.002	1.53(1.03,2.27) 0.04	1.73(1.17,2.57) 0.01	0.06
CVD mortality					
Sex					0.74
Male	1	1.23(0.82,1.84) 0.33	1.32(0.86,2.02) 0.20	1.29(0.82,2.01) 0.27	0.30
Female	1	1.03(0.72,1.46) 0.88	1.23(0.83,1.83) 0.30	0.87(0.53,1.43) 0.58	1
Age, years					0.58
<60	1	0.73(0.30,1.78) 0.49	1.20(0.57,2.53) 0.62	0.93(0.39,2.19) 0.87	0.80
≥60	1	1.16(0.89,1.51) 0.28	1.22(0.89,1.68) 0.22	1.16(0.83,1.62) 0.39	0.37
BMI, kg/m2					0.93
Normal weight (<25)	1	1.24(0.74,2.08) 0.42	1.41(0.82,2.45) 0.22	1.49(0.72,3.07) 0.28	0.22
Overweight (25-30)	1	0.89(0.56,1.43) 0.64	0.98(0.67,1.42) 0.91	0.97(0.60,1.55) 0.89	0.99
Obesity (≥30)	1	1.15(0.71,1.86) 0.56	1.33(0.81,2.18) 0.27	1.01(0.57,1.80) 0.96	0.71
Race					0.80
Non-Hispanic White	1	1.12(0.80,1.56) 0.52	1.23(0.87,1.72) 0.24	1.10(0.75,1.63) 0.62	0.53
Non-Hispanic Black	1	0.80(0.39,1.65) 0.55	1.35(0.70,2.62) 0.37	1.07(0.53,2.17)0.84	0.51
Mexican American	1	1.53(0.55,4.20) 0.41	1.80(0.65,4.97) 0.26	1.15(0.37,3.57)0.80	0.73
Others	1	1.50(0.53,4.27) 0.45	0.73(0.18,2.91) 0.65	1.48(0.24,9.11) 0.67	0.92
Education level					0.23
Less than high school	1	1.03(0.69,1.54) 0.89	1.22(0.80,1.85) 0.37	1.23(0.72,2.11) 0.45	0.35
High school or equivalent	1	1.49(0.81,2.74) 0.19	2.22(1.25,3.95) 0.01	1.89(0.86,4.15) 0.11	0.02
College or above	1	0.94(0.61,1.47) 0.80	0.84(0.51,1.38) 0.49	0.76(0.46,1.27) 0.29	0.24
Family income-poverty ratio					0.16
<1.0	1	1.50(0.96,2.35) 0.08	0.92(0.52,1.64) 0.78	1.43(0.78,2.63) 0.25	0.56
1.0-3.0	1	1.06(0.73,1.54) 0.76	1.49(1.05,2.11) 0.03	1.30(0.83,2.04) 0.25	0.06
>3.0	1	0.88(0.50,1.53) 0.64	0.93(0.50,1.73) 0.82	0.71(0.40,1.29) 0.26	0.35
Smoking status					0.53
Never	1	1.13(0.83,1.53) 0.44	1.34(0.93,1.92) 0.11	0.91(0.60,1.38) 0.65	0.97
Former	1	1.03(0.62,1.71) 0.90	0.92(0.55,1.55) 0.76	1.07(0.62,1.84) 0.82	0.96
Current	1	1.02(0.48,2.20) 0.95	1.51(0.78,2.92) 0.22	1.53(0.66,3.54) 0.32	0.20
Alcohol drinking					0.91
Never	1	1.09(0.75,1.60) 0.64	1.28(0.83,1.99) 0.27	1.10(0.65,1.83) 0.73	0.54

Low to moderate	1	0.96(0.63,1.46) 0.86	1.22(0.76,1.96) 0.42	0.99(0.59,1.67) 0.98	0.75
Heavy	1	1.52(0.67,3.44) 0.31	1.35(0.67,2.73) 0.39	1.28(0.56,2.92) 0.56	0.7
Healthy eating index score					0.64
Quarter 1	1	0.97(0.55,1.70) 0.91	1.43(0.84,2.45) 0.19	1.06(0.41,2.75) 0.91	0.45
Quarter 2	1	1.45(0.79,2.64) 0.23	1.26(0.70,2.28) 0.44	1.10(0.54,2.24) 0.79	0.87
Quarter 3	1	1.04(0.66,1.65) 0.85	1.04(0.58,1.87) 0.90	1.39(0.79,2.45) 0.26	0.33
Quarter 4	1	0.92(0.51,1.66) 0.79	1.35(0.72,2.51) 0.35	0.89(0.47,1.68) 0.71	0.91
Total energy intake from diet, kcal					0.08
[0,1445.5]	1	0.79(0.57,1.10) 0.16	0.86(0.53,1.40) 0.55	1.17(0.64,2.14) 0.61	0.94
(1445.5,1908]	1	1.03(0.57,1.86) 0.92	1.35(0.80,2.29) 0.26	1.27(0.73,2.20) 0.39	0.22
(1908,2494.5]	1	1.57(0.68,3.59) 0.29	2.54(1.29,5.01) 0.01	1.78(0.83,3.81) 0.14	0.09
(2494.5,15594]	1	2.80(0.89,8.85) 0.08	1.08(0.35,3.30) 0.90	1.41(0.43,4.61) 0.57	0.39
Self reported health					0.3
Very good to excellent	1	1.12(0.71,1.77) 0.62	1.46(0.94,2.26) 0.09	1.11(0.62,1.98) 0.72	0.38
Good	1	1.04(0.67,1.63) 0.86	0.99(0.61,1.60) 0.96	1.24(0.73,2.09) 0.42	0.53
Poor to fair	1	1.01(0.61,1.68) 0.96	1.19(0.70,2.04) 0.52	0.96(0.51,1.79) 0.89	0.95
Family history of cardiovascular disease					0.81
No	1	1.10(0.79,1.54) 0.56	1.19(0.84,1.70) 0.33	1.15(0.77,1.72) 0.50	0.43
Yes	1	0.97(0.53,1.75) 0.91	1.33(0.72,2.47) 0.37	0.95(0.45,2.01) 0.89	0.84
Cardiovascular disease					0.65
No	1	0.95(0.68,1.32) 0.76	1.14(0.79,1.64) 0.49	0.98(0.65,1.50) 0.94	0.79
Yes	1	1.38(0.89,2.15) 0.15	1.39(0.89,2.19) 0.15	1.35(0.84,2.19) 0.21	0.27
Chronic obstructive pulmonary diseases					0.11
No	1	1.20(0.91,1.58) 0.20	1.32(0.96,1.80) 0.08	1.10(0.78,1.56) 0.59	0.47
Yes	1	0.23(0.08,0.71) 0.01	0.47(0.16,1.40) 0.17	1.06(0.44,2.56) 0.90	0.96
History of chronic kidney disease					0.73
No	1	1.09(0.82,1.45) 0.54	1.24(0.92,1.67) 0.16	1.13(0.81,1.60) 0.47	0.34
Yes	1	0.51(0.04,6.63) 0.61	0.39(0.06,2.55) 0.32	0.26(0.03,2.27) 0.22	0.12
Cancer					0.44
No	1	1.09(0.82,1.46) 0.55	1.21(0.89,1.66) 0.23	1.01(0.67,1.53) 0.95	0.72
Yes	1	1.38(0.58,3.30) 0.47	1.48(0.58,3.81) 0.41	1.73(0.64,4.71) 0.28	0.28
Cancer mortality					
Sex					0.43
Male	1	0.85(0.54,1.34) 0.48	0.92(0.59,1.44) 0.71	0.94(0.55,1.59) 0.81	0.97
Female	1	1.24(0.76,2.00) 0.39	0.88(0.52,1.48) 0.62	0.81(0.47,1.39) 0.44	0.27
Age, years					0.04
<60	1	0.68(0.30,1.55) 0.36	1.41(0.68,2.90) 0.35	0.99(0.46,2.16) 0.99	0.60
≥60	1	1.16(0.83,1.62) 0.38	0.76(0.51,1.12) 0.16	0.86(0.57,1.30) 0.48	0.15
BMI, kg/m2					0.17
Normal weight (<25)	1	1.70(0.95,3.04) 0.07	1.51(0.79,2.90) 0.21	1.03(0.48,2.18) 0.95	0.73
Overweight (25-30)	1	0.88(0.53,1.48) 0.64	0.77(0.41,1.43) 0.40	1.17(0.61,2.22) 0.64	0.67
Obesity (≥30)	1	0.86(0.49,1.53) 0.61	0.83(0.42,1.65) 0.60	0.65(0.32,1.30) 0.22	0.25
Race					0.56
Non-Hispanic White	1	1.11(0.78,1.58) 0.57	0.96(0.65,1.42) 0.85	0.98(0.63,1.52) 0.92	0.73
Non-Hispanic Black	1	1.13(0.53,2.41) 0.76	1.20(0.58,2.50) 0.62	0.83(0.32,2.13) 0.69	0.86
Mexican American	1	0.33(0.14,0.76) 0.01	0.12(0.03,0.42)	0.23(0.08,0.62)	0.02
Others	1	1.03(0.33,3.19) 0.96	<0.001 1.50(0.47,4.76) 0.49	0.004 1.13(0.28,4.55) 0.87	0.72

Male	1	1.01(0.73,1.41) 0.94	1.09(0.76,1.58) 0.64	0.87(0.60,1.28) 0.48	0.56
Female	1	1.00(0.76,1.32) 0.99	1.26(0.89,1.78) 0.19	1.18(0.78,1.79) 0.42	0.20
Age, years					0.26
<60	1	0.97(0.58,1.63) 0.92	1.56(0.92,2.65) 0.10	0.99(0.56,1.73) 0.97	0.55
≥60	1	0.97(0.76,1.24) 0.82	0.96(0.74,1.26) 0.79	0.96(0.68,1.34) 0.79	0.78
BMI, kg/m ²					0.34
Normal weight (<25)	1	1.20(0.85,1.69) 0.30	1.19(0.78,1.80) 0.42	1.43(0.89,2.29) 0.14	0.18
Overweight (25-30)	1	1.15(0.80,1.64) 0.45	1.47(1.00,2.15) 0.05	1.15(0.72,1.83) 0.57	0.39
Obesity (≥30)	1	0.78(0.54,1.14) 0.20	0.86(0.56,1.31) 0.47	0.60(0.37,0.97) 0.04	0.07
Race					0.91
Non-Hispanic White	1	0.99(0.78,1.27) 0.96	1.12(0.85,1.47) 0.42	1.00(0.72,1.38) 0.98	0.78
Non-Hispanic Black	1	1.28(0.68,2.42) 0.44	1.29(0.69,2.40) 0.42	1.09(0.54,2.18) 0.81	0.67
Mexican American	1	1.47(0.58,3.76) 0.42	1.80(0.75,4.30) 0.19	0.79(0.34,1.84) 0.59	0.75
Others	1	0.47(0.15,1.48) 0.20	0.63(0.20,2.00) 0.43	0.49(0.15,1.65) 0.25	0.38
Education level					0.68
Less than high school	1	1.06(0.73,1.53) 0.78	1.04(0.63,1.72) 0.87	0.79(0.45,1.40) 0.42	0.53
High school or equivalent	1	0.95(0.60,1.52) 0.84	0.90(0.57,1.42) 0.66	1.03(0.60,1.75) 0.92	0.94
College or above	1	1.07(0.73,1.56) 0.74	1.38(0.99,1.91) 0.06	1.07(0.69,1.67) 0.77	0.56
Family income-poverty ratio					0.81
<1.0	1	1.29(0.79,2.12) 0.31	1.22(0.70,2.11) 0.48	1.47(0.94,2.29) 0.09	0.14
1.0-3.0	1	0.94(0.70,1.26) 0.68	0.96(0.69,1.35) 0.83	0.74(0.50,1.10) 0.13	0.20
>3.0	1	0.97(0.61,1.54) 0.90	1.38(0.85,2.23) 0.19	1.34(0.82,2.19) 0.24	0.11
Smoking status					0.08
Never	1	0.93(0.63,1.38) 0.73	1.12(0.72,1.74) 0.62	0.94(0.60,1.46) 0.77	0.98
Former	1	1.13(0.80,1.58) 0.49	0.94(0.66,1.33) 0.71	1.03(0.70,1.52) 0.88	0.79
Current	1	0.91(0.56,1.49) 0.72	1.52(0.93,2.48) 0.10	0.90(0.48,1.68) 0.74	0.70
Alcohol drinking					0.72
Never	1	0.83(0.59,1.16) 0.28	1.04(0.70,1.54) 0.86	0.93(0.57,1.50) 0.76	0.96
Low to moderate	1	1.05(0.74,1.50) 0.78	1.21(0.82,1.78) 0.33	1.16(0.79,1.70) 0.46	0.34
Heavy	1	1.21(0.71,2.06) 0.47	1.21(0.68,2.17) 0.52	0.80(0.42,1.50) 0.48	0.49
Healthy eating index score					0.88
Quarter 1	1	1.14(0.66,1.98) 0.64	1.05(0.61,1.81) 0.85	1.16(0.63,2.13) 0.63	0.67
Quarter 2	1	0.85(0.58,1.25) 0.42	0.96(0.62,1.50) 0.86	0.65(0.33,1.27) 0.21	0.31
Quarter 3	1	1.29(0.81,2.06) 0.28	1.45(0.91,2.31) 0.12	1.34(0.80,2.25) 0.27	0.21
Quarter 4	1	0.85(0.52,1.37) 0.50	1.02(0.59,1.76) 0.94	0.86(0.51,1.45) 0.57	0.77
Total energy intake from diet, kcal					0.87
[0,1445.5]	1	1.08(0.76,1.55) 0.67	1.10(0.73,1.66) 0.64	0.90(0.54,1.48) 0.67	0.91
(1445.5,1908]	1	1.05(0.70,1.60) 0.80	1.09(0.67,1.77) 0.72	0.97(0.59,1.61) 0.91	0.97
(1908,2494.5]	1	1.13(0.64,1.98) 0.68	1.49(0.88,2.51) 0.13	1.32(0.67,2.61) 0.42	0.31
(2494.5,15594]	1	0.60(0.23,1.55) 0.29	0.91(0.34,2.46) 0.85	0.77(0.34,1.74) 0.53	0.96
Self reported health					0.39
Very good to excellent	1	1.11(0.75,1.64) 0.62	1.26(0.78,2.02) 0.35	0.94(0.58,1.51) 0.79	0.91
Good	1	0.99(0.66,1.49) 0.96	1.23(0.78,1.94) 0.38	0.91(0.53,1.59) 0.75	0.95
Poor to fair	1	0.85(0.53,1.35) 0.48	0.90(0.60,1.37) 0.63	1.01(0.60,1.68) 0.97	0.87
Family history of cardiovascular disease					0.7
No	1	1.05(0.82,1.35) 0.68	1.13(0.87,1.48) 0.37	1.07(0.76,1.51) 0.71	0.61
Yes	1	0.90(0.55,1.45) 0.65	1.16(0.69,1.95) 0.58	0.78(0.47,1.30) 0.35	0.64

Cardiovascular disease							0.52
No	1	0.93(0.73,1.20) 0.59	1.00(0.77,1.31) 0.99	0.86(0.62,1.19) 0.37	0.50		
Yes	1	1.03(0.68,1.55) 0.90	1.45(0.96,2.18) 0.08	1.31(0.81,2.12) 0.27	0.11		
Chronic obstructive pulmonary diseases							0.11
No	1	0.94(0.74,1.20) 0.63	1.12(0.85,1.47) 0.42	0.93(0.67,1.29) 0.66	1		
Yes	1	1.24(0.70,2.21) 0.46	1.07(0.56,2.07) 0.83	1.27(0.65,2.49) 0.48	0.63		
History of chronic kidney disease							0.44
No	1	0.99(0.79,1.24) 0.95	1.15(0.90,1.48) 0.27	1.00(0.74,1.35) 1.00	0.69		
Yes	1	1.17(0.26,5.22) 0.84	0.76(0.16,3.70) 0.74	0.42(0.04,4.13) 0.46	0.41		
Cancer							0.37
No	1	0.91(0.71,1.18) 0.50	1.13(0.86,1.48) 0.39	0.94(0.67,1.31) 0.71	0.87		
Yes	1	1.48(0.80,2.74) 0.22	1.34(0.72,2.47) 0.36	1.34(0.72,2.49) 0.36	0.53		

Adjusted for sex, age, race, BMI, educational level, smoking status, drinking status, family income poverty ratio, healthy eating index-2015, total energy intake from the diet, self-reported health status, family history of cardiovascular diseases, self-reported cardiovascular disease, self-reported chronic obstructive pulmonary disease, self-reported chronic kidney disease, and self-reported cancer.

Supplementary Table 2.7 Subgroup analysis of hazard ratios for vitamin B12 levels with all-cause and CVD mortality in participants with prediabetes from NHANES 1999-2018

	Q1	Q2	Q3	Q4	<i>P</i> _{trend}	<i>P</i> _{interaction}
All-cause mortality						
Sex						0.14
Male	1	1.01(0.82,1.26) 0.90	1.23(0.96,1.56) 0.10	1.15(0.89,1.48) 0.28	0.14	
Female	1	1.26(1.03,1.55) 0.03	1.09(0.85,1.40) 0.49	1.03(0.81,1.31) 0.81	0.98	
Age, years						0.32
<60	1	1.15(0.75,1.78) 0.52	1.45(0.91,2.30) 0.12	1.09(0.68,1.76) 0.72	0.57	
≥60	1	1.12(0.95,1.33) 0.18	1.07(0.90,1.26) 0.45	1.12(0.93,1.34) 0.24	0.38	
BMI, kg/m ²						0.82
Normal weight (<25)	1	1.21(0.89,1.64) 0.22	1.07(0.82,1.41) 0.61	1.17(0.86,1.60) 0.31	0.46	
Overweight (25-30)	1	1.08(0.86,1.36) 0.51	1.13(0.83,1.53) 0.45	1.12(0.82,1.52) 0.47	0.50	
Obesity (≥30)	1	1.12(0.85,1.48) 0.40	1.26(0.94,1.69) 0.12	1.02(0.74,1.40) 0.92	0.79	
Race						0.40
Non-Hispanic White	1	1.09(0.91,1.31) 0.34	1.08(0.88,1.34) 0.45	1.05(0.86,1.29) 0.62	0.74	
Non-Hispanic Black	1	1.25(0.86,1.82) 0.24	1.21(0.87,1.68) 0.26	0.92(0.63,1.34) 0.66	0.84	
Mexican American	1	0.86(0.47,1.56) 0.63	1.32(0.81,2.13) 0.26	1.31(0.75,2.32) 0.35	0.17	
Others	1	1.21(0.65,2.22) 0.55	1.55(0.96,2.51) 0.07	2.01(1.16,3.49) 0.01	0.01	
Education level						0.60
Less than high school	1	1.26(0.97,1.63) 0.09	1.28(1.00,1.65) 0.05	1.13(0.88,1.47) 0.34	0.30	
High school or equivalent	1	1.11(0.80,1.53) 0.54	0.98(0.69,1.41) 0.92	1.14(0.77,1.67) 0.52	0.71	
College or above	1	1.04(0.81,1.34) 0.74	1.17(0.86,1.59) 0.31	1.03(0.77,1.38) 0.82	0.7	
Family income-poverty ratio						0.8
<1.0	1	1.02(0.72,1.45) 0.89	1.16(0.79,1.69) 0.45	1.31(0.93,1.87) 0.13	0.11	
1.0-3.0	1	1.16(0.96,1.41) 0.13	1.08(0.87,1.34) 0.50	1.06(0.84,1.33) 0.63	0.86	
>3.0	1	1.17(0.86,1.59) 0.31	1.26(0.90,1.76) 0.18	1.10(0.80,1.52) 0.55	0.59	
Smoking status						0.47
Never	1	1.37(1.10,1.70) 0.005	1.37(1.07,1.76) 0.01	1.38(1.04,1.82) 0.03	0.03	
Former	1	1.09(0.87,1.38) 0.46	1.06(0.84,1.33) 0.65	0.99(0.77,1.27) 0.91	0.76	
Current	1	0.92(0.62,1.36) 0.67	1.02(0.69,1.52) 0.92	0.93(0.61,1.40) 0.72	0.86	
Alcohol drinking						0.75
Never	1	1.35(1.05,1.72) 0.02	1.29(0.99,1.70) 0.06	1.28(0.99,1.65) 0.06	0.10	
Low to moderate	1	1.01(0.80,1.29) 0.91	1.02(0.75,1.39) 0.89	1.05(0.79,1.40) 0.73	0.73	
Heavy	1	0.95(0.63,1.44) 0.81	1.23(0.81,1.87) 0.33	0.93(0.60,1.46) 0.77	0.98	
Healthy eating index score						0.18
Quarter 1	1	0.96(0.69,1.35) 0.83	0.82(0.58,1.16) 0.26	0.86(0.59,1.27) 0.45	0.30	
Quarter 2	1	1.07(0.78,1.48) 0.67	1.11(0.78,1.59) 0.55	1.25(0.86,1.81) 0.25	0.26	
Quarter 3	1	1.34(0.98,1.83) 0.07	1.69(1.22,2.33) 0.002	1.50(1.09,2.06) 0.01	0.01	
Quarter 4	1	1.17(0.84,1.61) 0.35	1.09(0.79,1.50) 0.60	0.85(0.59,1.22) 0.37	0.24	
Total energy intake from diet, kcal						0.65
[0,1445.5]	1	1.29(1.05,1.58) 0.01	0.97(0.76,1.25) 0.82	1.09(0.82,1.46) 0.56	0.72	
(1445.5,1908]	1	1.14(0.84,1.55) 0.41	1.17(0.86,1.57) 0.32	1.17(0.82,1.67) 0.38	0.40	
(1908,2494.5]	1	0.95(0.61,1.47) 0.82	1.15(0.68,1.94) 0.61	0.96(0.61,1.51) 0.86	0.94	
(2494.5,15594]	1	0.78(0.44,1.37) 0.38	1.04(0.62,1.74) 0.88	0.93(0.59,1.48) 0.77	0.79	
Self reported health						0.08
Very good to excellent	1	1.02(0.81,1.29) 0.84	1.23(0.94,1.60) 0.13	0.95(0.70,1.28) 0.73	0.83	

Good	1	1.22(0.96,1.57) 0.11	0.89(0.67,1.19) 0.44	1.21(0.90,1.63) 0.21	0.65
Poor to fair	1	1.18(0.90,1.56) 0.23	1.38(1.03,1.84) 0.03	1.18(0.85,1.64) 0.33	0.28
Family history of cardiovascular disease					0.68
No	1	1.17(0.98,1.40) 0.08	1.22(1.00,1.48) 0.05	1.24(1.02,1.51) 0.03	0.05
Yes	1	1.02(0.74,1.39) 0.91	0.99(0.70,1.38) 0.93	0.86(0.61,1.21) 0.38	0.34
Cardiovascular disease					0.12
No	1	1.08(0.88,1.32) 0.46	1.23(0.99,1.54) 0.06	1.15(0.93,1.44) 0.20	0.12
Yes	1	1.19(0.91,1.57) 0.21	0.99(0.73,1.33) 0.94	0.95(0.71,1.27) 0.72	0.42
Chronic obstructive pulmonary diseases					0.01
No	1	1.05(0.89,1.24) 0.55	1.17(0.96,1.43) 0.11	1.09(0.91,1.31) 0.36	0.24
Yes	1	1.82(1.10,3.02) 0.02	0.99(0.61,1.62) 0.97	1.01(0.55,1.84) 0.98	0.34
History of chronic kidney disease					0.78
No	1	1.14(0.97,1.33) 0.11	1.14(0.95,1.37) 0.16	1.09(0.91,1.30) 0.34	0.44
Yes	1	1.02(0.42,2.52) 0.96	1.23(0.62,2.46) 0.55	1.45(0.70,3.02) 0.32	0.27
Cancer					0.38
No	1	1.06(0.91,1.25) 0.45	1.14(0.94,1.38) 0.19	1.04(0.86,1.26) 0.70	0.57
Yes	1	1.39(0.96,2.04) 0.08	1.23(0.87,1.75) 0.24	1.35(0.95,1.91) 0.09	0.19
CVD mortality					
Sex					0.004
Male	1	0.95(0.60,1.51) 0.83	1.51(1.01,2.23) 0.04	1.55(0.99,2.42) 0.06	0.01
Female	1	1.23(0.82,1.82) 0.32	0.81(0.55,1.20) 0.30	0.91(0.56,1.50) 0.72	0.38
Age, years					0.70
<60	1	1.04(0.43,2.53) 0.92	1.80(0.72,4.52) 0.21	1.39(0.57,3.38) 0.47	0.26
≥60	1	1.09(0.79,1.49) 0.61	1.04(0.80,1.36) 0.74	1.21(0.89,1.64) 0.23	0.29
BMI, kg/m ²					0.64
Normal weight (<25)	1	1.22(0.76,1.93) 0.41	1.16(0.71,1.89) 0.56	1.72(1.04,2.86) 0.04	0.06
Overweight (25-30)	1	1.59(0.95,2.66) 0.08	1.55(0.99,2.41) 0.05	1.58(0.94,2.68) 0.09	0.17
Obesity (≥30)	1	0.75(0.45,1.27) 0.29	1.00(0.62,1.62) 1.00	0.93(0.57,1.54) 0.79	0.85
Race					0.35
Non-Hispanic White	1	0.99(0.67,1.46) 0.95	1.03(0.74,1.44) 0.85	1.09(0.75,1.59) 0.63	0.57
Non-Hispanic Black	1	1.27(0.61,2.63) 0.52	1.18(0.61,2.31) 0.62	1.03(0.46,2.30) 0.94	0.88
Mexican American	1	1.72(0.65,4.55) 0.28	2.14(0.75,6.13) 0.16	3.60(1.49,8.65)	0.004
Others	1	1.47(0.46,4.72) 0.52	1.35(0.43,4.18) 0.61	5.41(1.71,17.07)	0.01
Education level					0.16
Less than high school	1	1.45(0.93,2.26) 0.10	1.26(0.84,1.87) 0.26	1.50(0.90,2.52) 0.12	0.21
High school or equivalent	1	1.01(0.53,1.96) 0.97	1.42(0.77,2.60) 0.26	1.89(1.03,3.49) 0.04	0.02
College or above	1	0.89(0.57,1.37) 0.59	0.90(0.58,1.41) 0.65	0.84(0.53,1.35) 0.47	0.52
Family income-poverty ratio					0.42
<1.0	1	0.93(0.51,1.71) 0.82	1.17(0.60,2.29) 0.64	1.26(0.60,2.67) 0.54	0.46
1.0-3.0	1	1.14(0.80,1.62) 0.47	0.87(0.62,1.22) 0.41	1.13(0.77,1.66) 0.55	0.91
>3.0	1	1.21(0.67,2.18) 0.54	1.68(0.92,3.05) 0.09	1.48(0.85,2.57) 0.16	0.13
Smoking status					0.52
Never	1	0.98(0.65,1.48) 0.92	1.16(0.80,1.68) 0.43	0.98(0.60,1.61) 0.95	0.81
Former	1	1.11(0.68,1.80) 0.68	0.95(0.61,1.49) 0.83	1.49(1.00,2.24) 0.05	0.09
Current	1	1.19(0.52,2.72) 0.67	1.26(0.69,2.31) 0.45	1.27(0.59,2.73) 0.54	0.53
Alcohol drinking					0.86
Never	1	1.23(0.80,1.89) 0.35	1.23(0.84,1.81) 0.28	1.32(0.86,2.03) 0.21	0.24

Low to moderate	1	0.84(0.51,1.39) 0.49	0.89(0.51,1.54) 0.67	1.06(0.65,1.73) 0.81	0.67
Heavy	1	1.56(0.67,3.62) 0.31	1.87(0.98,3.56) 0.06	1.74(0.78,3.91) 0.18	0.19
Healthy eating index score					0.54
Quarter 1	1	1.15(0.59,2.26) 0.68	0.92(0.48,1.73) 0.79	1.50(0.77,2.92) 0.23	0.38
Quarter 2	1	1.20(0.60,2.38) 0.61	1.26(0.68,2.35) 0.46	1.72(0.88,3.36) 0.11	0.11
Quarter 3	1	0.90(0.55,1.49) 0.69	1.24(0.71,2.14) 0.45	1.35(0.78,2.34) 0.28	0.16
Quarter 4	1	1.14(0.67,1.93) 0.64	1.02(0.61,1.71) 0.93	0.84(0.46,1.53) 0.57	0.46
Total energy intake from diet, kcal					0.51
[0,1445.5]	1	1.26(0.82,1.92) 0.29	0.70(0.46,1.07) 0.10	1.16(0.70,1.91) 0.57	0.76
(1445.5,1908]	1	1.08(0.63,1.83) 0.79	1.18(0.77,1.81) 0.44	1.28(0.75,2.18) 0.38	0.33
(1908,2494.5]	1	0.68(0.33,1.37) 0.28	1.16(0.51,2.63) 0.72	1.13(0.56,2.25) 0.74	0.21
(2494.5,15594]	1	0.78(0.21,2.88) 0.71	1.37(0.37,5.15) 0.64	1.26(0.38,4.17) 0.71	0.42
Self reported health					0.01
Very good to excellent	1	1.26(0.74,2.14) 0.39	1.81(1.12,2.91) 0.02	1.62(0.90,2.92) 0.11	0.03
Good	1	1.13(0.73,1.75) 0.59	0.66(0.42,1.05) 0.08	1.47(0.92,2.36) 0.11	0.31
Poor to fair	1	0.98(0.57,1.70) 0.95	1.22(0.75,1.97) 0.42	0.88(0.48,1.60) 0.67	0.88
Family history of cardiovascular disease					1
No	1	1.14(0.80,1.62) 0.47	1.21(0.85,1.72) 0.29	1.35(0.93,1.98) 0.12	0.12
Yes	1	0.94(0.51,1.74) 0.84	0.93(0.56,1.52) 0.76	1.05(0.61,1.81) 0.85	0.82
Cardiovascular disease					0.11
No	1	0.83(0.56,1.22) 0.34	1.05(0.73,1.52) 0.78	1.17(0.81,1.69) 0.40	0.21
Yes	1	1.66(1.02,2.71) 0.04	1.26(0.80,1.98) 0.32	1.36(0.82,2.27) 0.24	0.5
Chronic obstructive pulmonary diseases					0.25
No	1	0.99(0.71,1.37) 0.94	1.08(0.80,1.46) 0.62	1.17(0.84,1.64) 0.35	0.27
Yes	1	4.48(1.35,14.84) 0.01	2.98(0.90,9.91) 0.07	3.68(0.99,13.74) 0.05	0.14
History of chronic kidney disease					0.73
No	1	1.11(0.78,1.56) 0.57	1.12(0.83,1.51) 0.45	1.27(0.92,1.76) 0.15	0.16
Yes	1	0.38(0.10,1.51) 0.17	0.39(0.14,1.07) 0.07	0.61(0.15,2.53) 0.49	0.53
Cancer					0.48
No	1	1.08(0.76,1.52) 0.66	1.17(0.84,1.63) 0.34	1.19(0.83,1.71) 0.35	0.29
Yes	1	1.14(0.54,2.42) 0.73	0.91(0.50,1.65) 0.75	1.47(0.80,2.69) 0.21	0.32
Cancer mortality					
Sex					0.33
Male	1	0.84(0.53,1.33) 0.46	0.97(0.63,1.49) 0.90	1.06(0.63,1.79) 0.83	0.58
Female	1	1.13(0.74,1.73) 0.56	0.78(0.49,1.25) 0.31	0.82(0.48,1.39) 0.46	0.25
Age, years					0.85
<60	1	1.20(0.62,2.34) 0.59	1.18(0.62,2.26) 0.62	1.22(0.60,2.49) 0.58	0.65
≥60	1	0.89(0.61,1.29) 0.53	0.79(0.55,1.14) 0.21	0.91(0.61,1.38) 0.66	0.60
BMI, kg/m2					0.72
Normal weight (<25)	1	1.29(0.73,2.29) 0.39	1.03(0.56,1.86) 0.93	0.99(0.51,1.93) 0.98	0.78
Overweight (25-30)	1	0.85(0.51,1.43) 0.54	0.67(0.37,1.20) 0.18	1.03(0.57,1.85) 0.93	0.96
Obesity (≥30)	1	0.91(0.55,1.48) 0.70	1.01(0.62,1.67) 0.95	0.88(0.44,1.74) 0.71	0.81
Race					0.71
Non-Hispanic White	1	0.89(0.62,1.27) 0.53	0.87(0.59,1.27) 0.47	0.97(0.65,1.45) 0.87	0.93
Non-Hispanic Black	1	1.67(0.97,2.88) 0.07	1.05(0.62,1.79) 0.84	0.75(0.33,1.73) 0.50	0.36
Mexican American	1	0.66(0.24,1.78) 0.41	0.82(0.35,1.89) 0.64	0.47(0.15,1.54) 0.21	0.21

Others	1	1.47(0.53,4.09) 0.46	0.99(0.34,2.85) 0.98	1.82(0.55,5.95) 0.32	0.48	
Education level						0.85
Less than high school	1	1.17(0.69,1.98) 0.56	0.99(0.57,1.71) 0.97	0.75(0.45,1.25) 0.27	0.22	
High school or equivalent	1	0.86(0.48,1.54) 0.62	0.72(0.42,1.23) 0.23	0.76(0.38,1.53) 0.45	0.40	
College or above	1	0.93(0.55,1.59) 0.80	1.00(0.59,1.69) 0.99	1.16(0.68,2.00) 0.58	0.50	
Family income-poverty ratio						0.71
<1.0	1	0.78(0.37,1.64) 0.51	0.52(0.26,1.03) 0.06	0.66(0.27,1.65) 0.38	0.23	
1.0-3.0	1	1.01(0.63,1.63) 0.95	0.75(0.46,1.23) 0.26	1.03(0.57,1.85) 0.93	0.83	
>3.0	1	1.05(0.59,1.85) 0.87	1.20(0.73,1.98) 0.47	1.13(0.68,1.88) 0.63	0.54	
Smoking status						0.12
Never	1	1.39(0.87,2.22) 0.17	0.83(0.47,1.46) 0.53	1.24(0.63,2.44) 0.53	0.93	
Former	1	0.77(0.47,1.27) 0.31	0.96(0.61,1.53) 0.88	0.71(0.42,1.21) 0.21	0.37	
Current	1	0.93(0.51,1.66) 0.79	0.83(0.44,1.57) 0.56	1.09(0.62,1.93) 0.76	0.80	
Alcohol drinking						0.09
Never	1	1.25(0.82,1.92) 0.30	0.69(0.41,1.18) 0.18	1.03(0.52,2.05) 0.93	0.60	
Low to moderate	1	0.94(0.57,1.58) 0.83	0.89(0.53,1.48) 0.65	1.01(0.58,1.76) 0.96	0.96	
Heavy	1	0.48(0.23,1.04) 0.06	1.01(0.55,1.87) 0.97	0.68(0.35,1.34) 0.27	0.75	
Healthy eating index score						0.29
Quarter 1	1	0.89(0.45,1.74) 0.73	0.89(0.48,1.64) 0.70	0.52(0.25,1.08) 0.08	0.08	
Quarter 2	1	0.64(0.36,1.12) 0.12	0.61(0.31,1.19) 0.15	0.95(0.51,1.75) 0.87	0.98	
Quarter 3	1	1.49(0.79,2.80) 0.22	1.62(0.89,2.93) 0.11	1.70(0.80,3.62) 0.17	0.21	
Quarter 4	1	1.13(0.63,2.03) 0.69	0.88(0.50,1.55) 0.66	0.94(0.51,1.72) 0.84	0.65	
Total energy intake from diet, kcal						0.18
[0,1445.5]	1	1.13(0.72,1.77) 0.59	0.47(0.26,0.84) 0.01	0.74(0.35,1.57) 0.43	0.10	
(1445.5,1908]	1	0.99(0.52,1.86) 0.97	0.80(0.43,1.50) 0.49	1.45(0.69,3.07) 0.33	0.47	
(1908,2494.5]	1	0.81(0.40,1.63) 0.55	0.91(0.45,1.83) 0.79	0.65(0.33,1.31) 0.23	0.29	
(2494.5,15594]	1	1.47(0.56,3.87) 0.43	2.08(0.89,4.84) 0.09	1.65(0.76,3.56) 0.20	0.49	
Self reported health						0.01
Very good to excellent	1	0.46(0.27,0.80) 0.01	0.45(0.26,0.77) 0.004	0.37(0.21,0.65) <0.001	0.001	
Good	1	1.04(0.60,1.80) 0.89	0.83(0.47,1.47) 0.53	0.76(0.43,1.33) 0.33	0.24	
Poor to fair	1	1.62(0.99,2.64) 0.05	1.57(0.93,2.67) 0.09	1.97(1.14,3.39) 0.02	0.03	
Family history of cardiovascular disease						0.58
No	1	0.84(0.61,1.17) 0.31	0.89(0.62,1.27) 0.51	0.90(0.57,1.41) 0.65	0.76	
Yes	1	1.35(0.81,2.23) 0.25	0.92(0.52,1.64) 0.78	1.17(0.70,1.94) 0.55	0.96	
Cardiovascular disease						0.18
No	1	1.12(0.78,1.61) 0.54	1.02(0.70,1.48) 0.93	1.20(0.79,1.84) 0.39	0.50	
Yes	1	0.57(0.28,1.17) 0.13	0.63(0.34,1.17) 0.14	0.42(0.19,0.92) 0.03	0.04	
Chronic obstructive pulmonary diseases						0.11
No	1	0.94(0.68,1.31) 0.71	0.96(0.69,1.34) 0.81	1.07(0.73,1.55) 0.74	0.69	
Yes	1	0.95(0.31,2.90) 0.93	0.32(0.09,1.23) 0.10	0.19(0.05,0.78) 0.02	0.01	
History of chronic kidney disease						0.47
No	1	0.93(0.68,1.27) 0.65	0.89(0.65,1.24) 0.50	0.95(0.66,1.38) 0.79	0.80	
Yes	1	2.09(0.57,7.64) 0.27	0.40(0.04,3.62) 0.41	1.68(0.33,8.54) 0.53	0.90	
Cancer						0.95
No	1	0.90(0.61,1.31) 0.57	0.86(0.59,1.27) 0.46	0.92(0.60,1.41) 0.70	0.71	
Yes	1	1.18(0.65,2.13) 0.59	0.96(0.54,1.69) 0.88	1.13(0.63,2.01) 0.68	0.88	
Other mortality						

Sex							0.86
Male	1	1.15(0.77,1.70) 0.50	1.24(0.82,1.87) 0.32	0.96(0.64,1.43) 0.83	0.73		
Female	1	1.35(1.01,1.82) 0.04	1.51(1.05,2.17) 0.03	1.24(0.90,1.72) 0.19	0.08		
Age, years							0.39
<60	1	1.22(0.66,2.25) 0.52	1.58(0.80,3.10) 0.18	0.89(0.45,1.75) 0.74	0.91		
≥60	1	1.26(0.97,1.64) 0.08	1.26(0.97,1.62) 0.08	1.16(0.88,1.54) 0.29	0.34		
BMI, kg/m2							0.44
Normal weight (<25)	1	1.17(0.72,1.89) 0.53	1.11(0.75,1.65) 0.59	1.02(0.66,1.59) 0.92	0.93		
Overweight (25-30)	1	0.95(0.67,1.35) 0.77	1.22(0.75,2.00) 0.42	0.93(0.60,1.45) 0.76	0.94		
Obesity (≥30)	1	1.80(1.16,2.79) 0.01	1.84(1.09,3.11) 0.02	1.27(0.73,2.20) 0.40	0.55		
Race							0.72
Non-Hispanic White	1	1.30(0.99,1.72) 0.06	1.29(0.95,1.77) 0.11	1.07(0.79,1.44) 0.65	0.82		
Non-Hispanic Black	1	1.07(0.54,2.11) 0.84	1.25(0.76,2.05) 0.39	0.98(0.55,1.75) 0.94	0.85		
Mexican American	1	0.63(0.19,2.11) 0.46	1.25(0.53,2.95) 0.61	1.30(0.49,3.47) 0.60	0.43		
Others	1	1.02(0.37,2.79) 0.97	1.83(0.96,3.48) 0.07	1.21(0.54,2.67) 0.64	0.25		
Education level							0.62
Less than high school	1	1.20(0.76,1.89) 0.44	1.44(0.95,2.18) 0.09	1.10(0.70,1.73) 0.69	0.44		
High school or equivalent	1	1.26(0.79,2.02) 0.33	0.94(0.58,1.52) 0.80	0.99(0.54,1.82) 0.99	0.63		
College or above	1	1.24(0.80,1.92) 0.33	1.59(0.97,2.62) 0.07	1.12(0.68,1.85) 0.65	0.54		
Family income-poverty ratio							0.58
<1.0	1	1.18(0.67,2.08) 0.57	1.64(0.95,2.85) 0.08	1.82(1.09,3.07) 0.02	0.01		
1.0-3.0	1	1.28(0.92,1.76) 0.14	1.46(1.06,2.00) 0.02	1.04(0.74,1.46) 0.81	0.63		
>3.0	1	1.24(0.77,1.99) 0.38	1.07(0.62,1.83) 0.82	0.89(0.55,1.42) 0.62	0.37		
Smoking status							0.23
Never	1	1.79(1.17,2.76) 0.01	1.95(1.29,2.95) 0.001	1.88(1.24,2.86) 0.003	0.003		
Former	1	1.24(0.88,1.75) 0.21	1.16(0.84,1.60) 0.37	0.88(0.61,1.27) 0.50	0.32		
Current	1	0.79(0.45,1.39) 0.42	1.04(0.56,1.92) 0.91	0.68(0.35,1.33) 0.26	0.43		
Alcohol drinking							0.77
Never	1	1.45(0.99,2.14) 0.06	1.73(1.15,2.60) 0.01	1.40(0.92,2.14) 0.12	0.06		
Low to moderate	1	1.16(0.83,1.62) 0.38	1.24(0.83,1.84) 0.29	1.03(0.70,1.50) 0.89	0.86		
Heavy	1	1.08(0.59,1.97) 0.79	1.12(0.60,2.08) 0.71	0.81(0.42,1.56) 0.53	0.50		
Healthy eating index score							0.48
Quarter 1	1	0.93(0.56,1.52) 0.76	0.70(0.40,1.23) 0.22	0.88(0.48,1.63) 0.69	0.48		
Quarter 2	1	1.34(0.83,2.15) 0.23	1.47(0.87,2.48) 0.15	1.20(0.74,1.96) 0.47	0.49		
Quarter 3	1	1.59(0.91,2.78) 0.11	2.10(1.29,3.41) 0.003	1.45(0.85,2.49) 0.17	0.08		
Quarter 4	1	1.23(0.69,2.18) 0.49	1.31(0.73,2.34) 0.37	0.84(0.44,1.58) 0.58	0.55		
Total energy intake from diet, kcal							0.76
[0,1445.5]	1	1.40(1.00,1.96) 0.05	1.47(1.01,2.14) 0.04	1.26(0.82,1.96) 0.29	0.05		
(1445.5,1908]	1	1.21(0.78,1.88) 0.39	1.40(0.88,2.24) 0.16	0.93(0.56,1.54) 0.77	0.95		
(1908,2494.5]	1	1.30(0.52,3.28) 0.58	1.39(0.55,3.52) 0.48	1.06(0.42,2.66) 0.90	0.81		
(2494.5,15594]	1	0.59(0.26,1.35) 0.21	0.67(0.31,1.45) 0.31	0.66(0.35,1.26) 0.21	0.57		
Self reported health							0.17
Very good to excellent	1	1.33(0.95,1.86) 0.10	1.56(1.03,2.35) 0.03	1.06(0.68,1.63) 0.81	0.50		
Good	1	1.48(0.97,2.25) 0.07	1.10(0.68,1.77) 0.70	1.36(0.85,2.17) 0.20	0.48		
Poor to fair	1	1.05(0.70,1.58) 0.82	1.43(0.91,2.24) 0.12	0.91(0.60,1.40) 0.68	0.96		
Family history of cardiovascular disease							0.11
No	1	1.45(1.08,1.95) 0.01	1.50(1.13,2.00) 0.01	1.43(1.05,1.95) 0.02	0.04		

Yes	1	0.88(0.54,1.43) 0.61	1.02(0.59,1.78) 0.94	0.58(0.34,0.99) 0.04	0.10
Cardiovascular disease					0.08
No	1	1.23(0.90,1.69) 0.19	1.54(1.14,2.06) 0.005	1.11(0.81,1.51) 0.52	0.27
Yes	1	1.22(0.81,1.82) 0.34	1.00(0.63,1.61) 0.99	1.00(0.63,1.57) 0.99	0.77
Chronic obstructive pulmonary diseases					0.09
No	1	1.18(0.89,1.56) 0.26	1.40(1.03,1.90) 0.03	1.04(0.79,1.38) 0.77	0.48
Yes	1	1.88(0.98,3.58) 0.06	0.93(0.54,1.61) 0.79	1.12(0.55,2.28) 0.76	0.61
History of chronic kidney disease					0.55
No	1	1.28(1.01,1.62) 0.04	1.32(1.00,1.74) 0.05	1.05(0.81,1.36) 0.73	0.75
Yes	1	1.05(0.26,4.14) 0.95	2.70(0.80,9.06) 0.11	3.19(0.77,13.16) 0.11	0.06
Cancer					0.24
No	1	1.13(0.88,1.46) 0.35	1.28(0.98,1.67) 0.07	0.99(0.75,1.31) 0.94	0.79
Yes	1	2.04(1.13,3.69) 0.02	1.82(1.10,3.02) 0.02	1.59(0.88,2.88) 0.13	0.22

Adjusted for sex, age, race, BMI, educational level, smoking status, drinking status, family income poverty ratio, healthy eating index-2015, total energy intake from the diet, self-reported health status, family history of cardiovascular diseases, self-reported cardiovascular disease, self-reported chronic obstructive pulmonary disease, self-reported chronic kidney disease, and self-reported cancer.

Supplementary Table 2.8 Subgroup analysis of hazard ratios for vitamin C levels with all-cause and CVD mortality in participants with prediabetes from NHANES 1999-2018

	Q1	Q2	Q3	Q4	<i>P</i> _{trend}	<i>P</i> _{interaction}
All-cause mortality						
Sex						0.75
Male	1	0.86(0.69,1.07) 0.18	1.03(0.80,1.32) 0.85	0.98(0.74,1.29) 0.88	0.76	
Female	1	0.85(0.67,1.07) 0.17	0.87(0.68,1.12) 0.27	1.01(0.78,1.31) 0.96	0.93	
Age, years						0.55
<60	1	0.71(0.47,1.08) 0.11	0.86(0.60,1.23) 0.40	0.91(0.61,1.37) 0.66	0.77	
≥60	1	0.90(0.74,1.08) 0.24	0.96(0.80,1.16) 0.71	1.00(0.81,1.24) 0.98	0.76	
BMI, kg/m ²						0.33
Normal weight (<25)	1	1.02(0.75,1.41) 0.88	1.05(0.73,1.51) 0.79	1.45(1.00,2.10) 0.05	0.04	
Overweight (25-30)	1	0.78(0.60,1.02) 0.07	0.94(0.72,1.23) 0.64	0.92(0.65,1.29) 0.62	0.92	
Obesity (≥30)	1	0.82(0.62,1.09) 0.17	0.90(0.70,1.16) 0.42	0.80(0.58,1.09) 0.16	0.27	
Race						0.36
Non-Hispanic White	1	0.83(0.68,1.02) 0.08	0.95(0.79,1.14) 0.56	0.97(0.78,1.20) 0.77	0.88	
Non-Hispanic Black	1	0.95(0.63,1.42) 0.80	0.91(0.59,1.42) 0.69	1.00(0.66,1.51) 1.00	0.96	
Mexican American	1	0.74(0.42,1.30) 0.29	0.45(0.23,0.86) 0.02	0.89(0.46,1.71) 0.72	0.43	
Others	1	0.96(0.52,1.76) 0.90	1.43(0.65,3.12) 0.38	1.30(0.66,2.55) 0.45	0.23	
Education level						0.01
Less than high school	1	1.01(0.78,1.30) 0.96	1.07(0.82,1.38) 0.63	0.93(0.67,1.29) 0.68	0.83	
High school or equivalent	1	0.93(0.67,1.29) 0.65	0.74(0.53,1.04) 0.08	1.14(0.82,1.57) 0.44	0.77	
College or above	1	0.67(0.51,0.88) 0.004	0.95(0.74,1.21) 0.65	0.87(0.64,1.19) 0.39	0.91	
Family income-poverty ratio						0.24
<1.0	1	0.96(0.66,1.39) 0.82	0.76(0.54,1.07) 0.12	0.87(0.59,1.30) 0.51	0.31	
1.0-3.0	1	0.92(0.73,1.15) 0.47	0.92(0.76,1.12) 0.42	0.94(0.72,1.23) 0.66	0.68	
>3.0	1	0.68(0.50,0.92) 0.01	1.03(0.78,1.36) 0.85	1.09(0.78,1.51) 0.61	0.13	
Smoking status						0.96
Never	1	0.79(0.59,1.05) 0.10	0.84(0.63,1.10) 0.20	0.92(0.69,1.22) 0.54	0.79	
Former	1	0.90(0.69,1.18) 0.46	1.10(0.85,1.42) 0.47	1.12(0.84,1.51) 0.44	0.20	
Current	1	0.75(0.53,1.06) 0.11	0.77(0.53,1.13) 0.19	0.82(0.51,1.31) 0.41	0.37	
Alcohol drinking						0.28
Never	1	0.96(0.71,1.28) 0.77	0.95(0.72,1.26) 0.73	0.89(0.65,1.21) 0.46	0.50	
Low to moderate	1	0.75(0.58,0.99) 0.04	0.82(0.64,1.07) 0.15	1.06(0.79,1.43) 0.69	0.46	
Heavy	1	0.85(0.59,1.21) 0.37	1.19(0.79,1.81) 0.41	0.91(0.61,1.34) 0.62	0.89	
Healthy eating index score						0.27
Quarter 1	1	0.64(0.48,0.86) 0.003	0.98(0.71,1.37) 0.92	0.84(0.56,1.26) 0.40	0.45	
Quarter 2	1	0.77(0.56,1.05) 0.09	0.83(0.59,1.18) 0.30	1.09(0.72,1.63) 0.69	0.76	
Quarter 3	1	1.32(0.91,1.92) 0.14	1.12(0.79,1.59) 0.51	1.18(0.81,1.74) 0.39	0.74	
Quarter 4	1	0.85(0.54,1.35) 0.50	1.02(0.62,1.65) 0.95	0.99(0.64,1.54) 0.97	0.65	
Total energy intake from diet, kcal						0.22
[0,1445.5]	1	0.88(0.69,1.13) 0.32	0.94(0.74,1.20) 0.64	0.99(0.74,1.32) 0.94	0.91	
(1445.5,1908]	1	0.77(0.52,1.12) 0.17	0.74(0.53,1.04) 0.09	1.09(0.78,1.53) 0.62	0.59	
(1908,2494.5]	1	1.06(0.73,1.53) 0.77	1.31(0.89,1.93) 0.17	1.11(0.72,1.72) 0.63	0.47	
(2494.5,15594]	1	0.65(0.40,1.06) 0.08	0.85(0.53,1.37) 0.52	0.83(0.52,1.33) 0.43	0.85	
Self reported health						0.28
Very good to excellent	1	0.96(0.75,1.21) 0.71	0.98(0.76,1.28) 0.91	1.22(0.88,1.69) 0.24	0.29	

Good	1	0.81(0.60,1.08) 0.15	0.92(0.69,1.22) 0.54	0.86(0.62,1.19) 0.35	0.55
Poor to fair	1	0.80(0.61,1.03) 0.09	0.90(0.67,1.21) 0.49	0.92(0.71,1.20) 0.54	0.91
Family history of cardiovascular disease					0.06
No	1	0.85(0.70,1.04) 0.11	0.87(0.71,1.05) 0.15	1.02(0.82,1.28) 0.84	0.76
Yes	1	0.84(0.60,1.17) 0.30	1.16(0.84,1.61) 0.36	0.88(0.58,1.33) 0.55	0.93
Cardiovascular disease					0.44
No	1	0.80(0.64,0.99) 0.04	0.90(0.74,1.11) 0.33	0.98(0.78,1.24) 0.90	0.81
Yes	1	0.92(0.70,1.23) 0.58	1.05(0.79,1.39) 0.75	1.00(0.71,1.40) 0.99	0.78
Chronic obstructive pulmonary diseases					0.06
No	1	0.84(0.71,1.00) 0.05	0.95(0.80,1.13) 0.59	0.95(0.78,1.15) 0.59	0.99
Yes	1	0.73(0.51,1.04) 0.08	0.78(0.49,1.26) 0.31	1.30(0.85,2.00) 0.23	0.43
History of chronic kidney disease					0.54
No	1	0.85(0.71,1.00) 0.06	0.93(0.79,1.09) 0.38	0.98(0.81,1.19) 0.82	0.88
Yes	1	1.01(0.51,2.01) 0.97	1.50(0.65,3.46) 0.34	1.00(0.40,2.47) 0.99	0.71
Cancer					0.41
No	1	0.87(0.72,1.06) 0.17	1.01(0.84,1.23) 0.88	1.01(0.81,1.26) 0.90	0.56
Yes	1	0.80(0.57,1.14) 0.22	0.78(0.53,1.14) 0.20	0.93(0.63,1.35) 0.69	0.71
CVD mortality					
Sex					0.53
Male	1	0.80(0.49,1.28) 0.35	1.03(0.67,1.60) 0.88	1.17(0.70,1.96) 0.55	0.36
Female	1	0.93(0.61,1.42) 0.73	0.88(0.55,1.42) 0.60	0.90(0.54,1.47) 0.66	0.64
Age, years					0.45
<60	1	0.84(0.30,2.33) 0.74	0.52(0.23,1.21) 0.13	1.21(0.50,2.95) 0.67	0.87
≥60	1	0.83(0.61,1.12) 0.23	1.01(0.72,1.43) 0.95	0.99(0.69,1.44) 0.98	0.68
BMI, kg/m2					0.26
Normal weight (<25)	1	1.04(0.62,1.77) 0.87	1.12(0.63,2.01) 0.70	1.67(0.87,3.19) 0.12	0.11
Overweight (25-30)	1	0.72(0.44,1.18) 0.20	0.97(0.58,1.63) 0.91	1.12(0.65,1.93) 0.68	0.44
Obesity (≥30)	1	0.82(0.46,1.44) 0.48	0.85(0.51,1.43) 0.55	0.63(0.34,1.18) 0.15	0.22
Race					0.93
Non-Hispanic White	1	0.86(0.59,1.26) 0.44	0.95(0.66,1.36) 0.78	1.00(0.62,1.60) 1.00	0.85
Non-Hispanic Black	1	0.97(0.49,1.95) 0.94	1.10(0.59,2.04) 0.76	1.17(0.62,2.24) 0.62	0.58
Mexican American	1	0.52(0.18,1.48) 0.22	0.71(0.21,2.36) 0.58	1.41(0.45,4.41) 0.55	0.59
Others	1	0.64(0.17,2.45) 0.51	1.20(0.40,3.58) 0.74	1.15(0.40,3.34) 0.80	0.44
Education level					0.02
Less than high school	1	1.31(0.85,2.00) 0.22	1.20(0.77,1.87) 0.41	1.00(0.57,1.73) 0.99	0.99
High school or equivalent	1	1.06(0.55,2.06) 0.86	0.84(0.45,1.55) 0.57	1.46(0.67,3.19) 0.35	0.51
College or above	1	0.44(0.26,0.76) 0.003	0.81(0.50,1.33) 0.41	0.83(0.46,1.51) 0.54	0.72
Family income-poverty ratio					0.53
<1.0	1	0.96(0.56,1.63) 0.87	0.49(0.29,0.82) 0.01	0.61(0.34,1.11) 0.10	0.03
1.0-3.0	1	0.93(0.63,1.37) 0.71	1.13(0.77,1.65) 0.53	1.26(0.79,2.02) 0.33	0.24
>3.0	1	0.70(0.30,1.66) 0.42	0.95(0.51,1.76) 0.87	1.01(0.51,2.03) 0.97	0.63
Smoking status					0.66
Never	1	0.85(0.52,1.41) 0.54	0.94(0.61,1.47) 0.80	0.85(0.51,1.40) 0.52	0.69
Former	1	0.75(0.45,1.25) 0.27	0.96(0.57,1.59) 0.87	1.17(0.69,2.00) 0.56	0.34
Current	1	1.01(0.56,1.83) 0.96	0.74(0.36,1.52) 0.41	1.33(0.55,3.20) 0.52	0.75
Alcohol drinking					0.15
Never	1	0.73(0.47,1.13) 0.16	0.83(0.52,1.32) 0.43	0.65(0.38,1.09) 0.10	0.18

Low to moderate	1	0.83(0.47,1.47) 0.53	1.02(0.61,1.69) 0.94	1.12(0.64,1.94) 0.69	0.51
Heavy	1	1.06(0.47,2.35) 0.90	0.92(0.35,2.40) 0.86	1.98(0.83,4.72) 0.12	0.19
Healthy eating index score					0.67
Quarter 1	1	0.76(0.45,1.27) 0.29	0.87(0.45,1.66) 0.67	0.83(0.37,1.88) 0.66	0.56
Quarter 2	1	0.68(0.38,1.23) 0.20	0.95(0.52,1.71) 0.85	1.24(0.54,2.85) 0.61	0.50
Quarter 3	1	1.10(0.51,2.35) 0.82	1.02(0.54,1.91) 0.96	0.74(0.39,1.43) 0.37	0.30
Quarter 4	1	1.32(0.67,2.61) 0.42	1.45(0.74,2.84) 0.28	2.05(1.06,3.98) 0.03	0.02
Total energy intake from diet, kcal					0.2
[0,1445.5]	1	0.90(0.59,1.37) 0.62	1.04(0.70,1.53) 0.85	0.92(0.57,1.49) 0.74	0.94
(1445.5,1908]	1	0.86(0.48,1.55) 0.62	0.92(0.51,1.67) 0.79	1.60(0.86,2.99) 0.14	0.10
(1908,2494.5]	1	1.14(0.56,2.30) 0.71	1.27(0.64,2.50) 0.50	0.97(0.43,2.20) 0.94	0.98
(2494.5,15594]	1	0.36(0.14,0.92) 0.03	0.38(0.16,0.91) 0.03	0.50(0.18,1.38) 0.18	0.40
Self reported health					0.76
Very good to excellent	1	0.96(0.58,1.59) 0.88	0.89(0.53,1.49) 0.66	1.02(0.60,1.75) 0.94	0.96
Good	1	0.75(0.46,1.23) 0.26	0.81(0.48,1.35) 0.42	0.96(0.53,1.74) 0.89	1
Poor to fair	1	0.71(0.40,1.25) 0.23	1.06(0.61,1.86) 0.84	1.09(0.61,1.95) 0.76	0.36
Family history of cardiovascular disease					0.62
No	1	0.83(0.56,1.23) 0.36	0.95(0.67,1.35) 0.79	1.10(0.72,1.67) 0.67	0.50
Yes	1	0.83(0.43,1.59) 0.57	0.87(0.48,1.58) 0.64	0.77(0.37,1.62) 0.49	0.55
Cardiovascular disease					0.09
No	1	0.71(0.45,1.11) 0.14	0.74(0.49,1.14) 0.17	0.87(0.53,1.44) 0.59	0.69
Yes	1	1.20(0.78,1.86) 0.41	1.59(1.03,2.45) 0.04	1.60(0.94,2.71) 0.08	0.04
Chronic obstructive pulmonary diseases					0.57
No	1	0.86(0.63,1.18) 0.36	1.02(0.74,1.41) 0.91	1.07(0.74,1.56) 0.71	0.50
Yes	1	0.72(0.28,1.83) 0.49	0.41(0.15,1.09) 0.07	1.33(0.48,3.68) 0.58	0.70
History of chronic kidney disease					0.68
No	1	0.86(0.62,1.19) 0.37	0.96(0.69,1.32) 0.79	1.03(0.69,1.53) 0.90	0.74
Yes	1	0.46(0.20,1.09) 0.08	0.62(0.19,2.03) 0.43	1.08(0.27,4.25) 0.92	0.99
Cancer					0.69
No	1	0.91(0.64,1.28) 0.59	1.07(0.76,1.50) 0.71	1.21(0.79,1.85) 0.38	0.28
Yes	1	0.59(0.29,1.18) 0.14	0.62(0.30,1.32) 0.22	0.51(0.23,1.16) 0.11	0.19
Cancer mortality					
Sex					0.24
Male	1	0.95(0.62,1.44) 0.80	1.34(0.90,1.98) 0.15	1.06(0.66,1.70) 0.81	0.45
Female	1	0.63(0.41,0.98) 0.04	0.68(0.43,1.06) 0.08	0.52(0.32,0.85) 0.01	0.02
Age, years					0.62
<60	1	0.74(0.37,1.50) 0.40	1.12(0.67,1.88) 0.66	0.56(0.26,1.20) 0.13	0.25
≥60	1	0.84(0.60,1.17) 0.30	0.98(0.70,1.36) 0.89	0.89(0.60,1.33) 0.57	0.83
BMI, kg/m2					0.61
Normal weight (<25)	1	1.25(0.72,2.18) 0.43	1.38(0.74,2.59) 0.31	1.14(0.57,2.25) 0.71	0.71
Overweight (25-30)	1	0.80(0.45,1.43) 0.45	1.11(0.65,1.88) 0.71	0.81(0.41,1.60) 0.54	0.82
Obesity (≥30)	1	0.63(0.39,1.00) 0.05	0.76(0.48,1.21) 0.25	0.59(0.35,1.01) 0.05	0.12
Race					0.56
Non-Hispanic White	1	0.75(0.53,1.06) 0.11	0.96(0.70,1.33) 0.82	0.80(0.52,1.22) 0.29	0.57
Non-Hispanic Black	1	1.04(0.50,2.19) 0.91	0.94(0.46,1.92) 0.86	0.64(0.31,1.31) 0.22	0.24
Mexican American	1	0.97(0.40,2.31) 0.94	0.61(0.21,1.80) 0.37	0.73(0.34,1.56) 0.42	0.20
Others	1	0.87(0.29,2.68) 0.81	2.51(0.64,9.88) 0.19	0.89(0.17,4.52) 0.89	0.69

Male	1	0.83(0.59,1.18) 0.30	0.84(0.56,1.26) 0.40	0.81(0.53,1.23) 0.32	0.38
Female	1	0.92(0.62,1.34) 0.65	0.98(0.68,1.41) 0.92	1.44(1.00,2.08) 0.05	0.04
Age, years					0.35
<60	1	0.63(0.35,1.13) 0.12	0.79(0.43,1.45) 0.44	1.11(0.63,1.98) 0.72	0.70
≥60	1	0.97(0.71,1.32) 0.83	0.92(0.67,1.25) 0.59	1.06(0.77,1.46) 0.71	0.78
BMI, kg/m ²					0.93
Normal weight (<25)	1	0.91(0.54,1.50) 0.70	0.80(0.48,1.34) 0.39	1.40(0.85,2.31) 0.19	0.22
Overweight (25-30)	1	0.80(0.52,1.21) 0.28	0.84(0.54,1.30) 0.44	0.86(0.53,1.42) 0.56	0.64
Obesity (≥30)	1	0.97(0.65,1.45) 0.89	1.03(0.67,1.57) 0.90	1.11(0.70,1.76) 0.65	0.60
Race					0.49
Non-Hispanic White	1	0.86(0.63,1.17) 0.33	0.92(0.66,1.28) 0.64	1.05(0.76,1.45) 0.76	0.64
Non-Hispanic Black	1	0.88(0.47,1.64) 0.69	0.80(0.39,1.67) 0.56	1.15(0.63,2.08) 0.65	0.71
Mexican American	1	0.66(0.27,1.59) 0.35	0.24(0.11,0.55) <0.001	0.80(0.30,2.18) 0.67	0.36
Others	1	1.22(0.46,3.25) 0.69	1.01(0.29,3.53) 0.99	1.43(0.49,4.19) 0.51	0.56
Education level					0.51
Less than high school	1	0.94(0.64,1.39) 0.76	1.00(0.69,1.44) 0.99	0.94(0.61,1.44) 0.78	0.85
High school or equivalent	1	0.77(0.50,1.19) 0.24	0.56(0.34,0.92) 0.02	0.98(0.64,1.50) 0.93	0.56
College or above	1	0.85(0.54,1.34) 0.49	1.04(0.66,1.63) 0.88	1.12(0.70,1.80) 0.62	0.39
Family income-poverty ratio					0.16
<1.0	1	1.31(0.75,2.28) 0.35	1.21(0.76,1.92) 0.43	1.30(0.80,2.11) 0.28	0.32
1.0-3.0	1	0.93(0.66,1.30) 0.67	0.89(0.64,1.22) 0.46	0.95(0.68,1.34) 0.78	0.72
>3.0	1	0.54(0.33,0.88) 0.01	0.72(0.46,1.13) 0.15	1.06(0.60,1.85) 0.85	0.46
Smoking status					0.97
Never	1	0.80(0.52,1.23) 0.30	0.74(0.47,1.14) 0.17	0.94(0.62,1.41) 0.76	0.80
Former	1	0.91(0.63,1.31) 0.60	1.04(0.73,1.48) 0.82	1.26(0.82,1.93) 0.29	0.19
Current	1	0.77(0.46,1.31) 0.33	0.76(0.40,1.42) 0.39	0.94(0.50,1.80) 0.86	0.77
Alcohol drinking					0.78
Never	1	0.99(0.63,1.55) 0.96	0.89(0.59,1.33) 0.56	1.09(0.73,1.62) 0.67	0.82
Low to moderate	1	0.84(0.57,1.23) 0.36	0.84(0.57,1.23) 0.36	1.22(0.81,1.82) 0.34	0.31
Heavy	1	0.71(0.43,1.17) 0.17	1.01(0.54,1.89) 0.98	0.70(0.40,1.25) 0.23	0.49
Healthy eating index score					0.36
Quarter 1	1	0.53(0.33,0.87) 0.01	0.90(0.56,1.44) 0.67	0.69(0.33,1.48) 0.34	0.29
Quarter 2	1	1.12(0.71,1.78) 0.63	1.03(0.58,1.82) 0.92	1.28(0.73,2.26) 0.38	0.51
Quarter 3	1	1.26(0.76,2.10) 0.36	1.04(0.58,1.87) 0.88	1.64(0.94,2.86) 0.08	0.13
Quarter 4	1	0.73(0.36,1.48) 0.38	0.81(0.37,1.76) 0.59	0.81(0.39,1.68) 0.57	0.80
Total energy intake from diet, kcal					0.71
[0,1445.5]	1	0.91(0.64,1.30) 0.60	0.87(0.61,1.23) 0.42	1.19(0.77,1.83) 0.44	0.72
(1445.5,1908]	1	0.79(0.47,1.35) 0.39	0.84(0.52,1.35) 0.47	1.10(0.65,1.84) 0.72	0.66
(1908,2494.5]	1	0.94(0.50,1.75) 0.84	0.75(0.36,1.58) 0.45	1.06(0.49,2.30) 0.88	0.93
(2494.5,15594]	1	0.80(0.37,1.73) 0.57	1.34(0.63,2.86) 0.45	1.02(0.55,1.90) 0.95	0.58
Self reported health					0.04
Very good to excellent	1	1.13(0.82,1.57) 0.45	1.05(0.71,1.55) 0.82	1.51(0.95,2.40) 0.08	0.15
Good	1	0.71(0.45,1.13) 0.15	0.84(0.53,1.33) 0.45	0.72(0.43,1.20) 0.21	0.35
Poor to fair	1	0.76(0.50,1.16) 0.20	0.71(0.45,1.13) 0.15	1.01(0.67,1.52) 0.96	0.84
Family history of cardiovascular disease					0.33
No	1	0.93(0.67,1.28) 0.64	0.84(0.60,1.18) 0.31	1.17(0.86,1.60) 0.31	0.41
Yes	1	0.72(0.43,1.21) 0.21	1.05(0.61,1.79) 0.86	0.87(0.47,1.61) 0.65	0.99

Cardiovascular disease							0.21
No	1	0.81(0.60,1.09) 0.16	0.97(0.70,1.35) 0.86	1.19(0.88,1.61) 0.25	0.13		
Yes	1	0.92(0.57,1.49) 0.75	0.71(0.45,1.12) 0.14	0.75(0.46,1.22) 0.25	0.12		
Chronic obstructive pulmonary diseases							0.02
No	1	0.83(0.62,1.13) 0.23	0.84(0.60,1.17) 0.31	0.97(0.72,1.30) 0.83	0.90		
Yes	1	0.84(0.52,1.35) 0.46	1.17(0.62,2.22) 0.63	1.75(0.92,3.35) 0.09	0.09		
History of chronic kidney disease							0.10
No	1	0.85(0.65,1.12) 0.25	0.85(0.63,1.13) 0.27	1.05(0.80,1.37) 0.74	0.75		
Yes	1	2.25(0.52,9.62) 0.28	5.26(1.30,21.20) 0.02	2.57(0.51,12.87) 0.25	0.13		
Cancer							0.81
No	1	0.87(0.64,1.17) 0.35	0.92(0.65,1.29) 0.63	1.04(0.76,1.42) 0.80	0.71		
Yes	1	0.91(0.54,1.56) 0.74	0.85(0.51,1.42) 0.54	1.36(0.79,2.33) 0.27	0.35		

Adjusted for sex, age, race, BMI, educational level, smoking status, drinking status, family income poverty ratio, healthy eating index-2015, total energy intake from the diet, self-reported health status, family history of cardiovascular diseases, self-reported cardiovascular disease, self-reported chronic obstructive pulmonary disease, self-reported chronic kidney disease, and self-reported cancer.

Supplementary Table 2.9 Subgroup analysis of hazard ratios for vitamin D levels with all-cause and CVD mortality in participants with prediabetes from NHANES 1999-2018

	Q1	Q2	Q3	Q4	<i>P</i> _{trend}	<i>P</i> _{interaction}
All-cause mortality						
Sex						0.24
Male	1	1.20(0.85,1.71) 0.30	1.48(1.01,2.19) 0.05	1.84(1.35,2.50) <0.001	<0.0001	
Female	1	1.17(0.82,1.66) 0.39	0.95(0.70,1.30) 0.76	1.42(0.98,2.06) 0.07	0.16	
Age, years						0.73
<60	1	1.01(0.59,1.70) 0.98	1.29(0.72,2.32) 0.39	1.74(1.02,2.97) 0.04	0.03	
≥60	1	1.21(0.93,1.57) 0.16	1.14(0.87,1.49) 0.34	1.54(1.19,2.01) 0.001	0.002	
BMI, kg/m ²						0.58
Normal weight (<25)	1	0.88(0.57,1.36) 0.57	0.92(0.58,1.45) 0.72	1.54(1.03,2.31) 0.03	0.02	
Overweight (25-30)	1	1.62(1.03,2.55) 0.04	1.51(1.00,2.28) 0.05	1.91(1.28,2.85) 0.001	0.002	
Obesity (≥30)	1	1.08(0.74,1.57) 0.69	1.15(0.74,1.77) 0.54	1.47(0.99,2.18) 0.05	0.07	
Race						0.92
Non-Hispanic White	1	1.12(0.82,1.52) 0.47	1.16(0.85,1.56) 0.35	1.55(1.14,2.11) 0.005	0.004	
Non-Hispanic Black	1	1.34(0.81,2.23) 0.26	1.54(0.96,2.46) 0.07	1.83(1.01,3.31) 0.05	0.02	
Mexican American	1	0.99(0.39,2.56) 0.99	1.13(0.48,2.69) 0.78	1.81(0.81,4.03) 0.15	0.20	
Others	1	1.74(0.77,3.93) 0.18	1.36(0.65,2.82) 0.42	2.21(1.00,4.88) 0.05	0.08	
Education level						0.67
Less than high school	1	1.57(0.92,2.68) 0.10	1.22(0.80,1.85) 0.35	2.00(1.29,3.10) 0.002	0.004	
High school or equivalent	1	1.11(0.68,1.80) 0.69	1.02(0.64,1.63) 0.94	1.14(0.69,1.91) 0.60	0.72	
College or above	1	0.98(0.66,1.44) 0.92	1.21(0.82,1.78) 0.33	1.63(1.13,2.36) 0.01	0.004	
Family income-poverty ratio						0.65
<1.0	1	1.10(0.60,2.01) 0.77	1.25(0.84,1.86) 0.28	1.30(0.85,2.00) 0.23	0.17	
1.0-3.0	1	1.09(0.78,1.51) 0.62	1.13(0.75,1.70) 0.57	1.46(1.01,2.12) 0.05	0.05	
>3.0	1	1.53(0.92,2.54) 0.10	1.31(0.80,2.16) 0.28	2.17(1.27,3.73) 0.005	0.01	
Smoking status						0.53
Never	1	1.26(0.82,1.94) 0.30	1.28(0.85,1.94) 0.23	1.97(1.28,3.03) 0.002	0.002	
Former	1	1.14(0.79,1.64) 0.48	1.02(0.67,1.56) 0.93	1.31(0.93,1.83) 0.12	0.23	
Current	1	1.04(0.62,1.73) 0.88	1.42(0.75,2.67) 0.28	1.58(0.93,2.67) 0.09	0.06	
Alcohol drinking						0.98
Never	1	1.28(0.78,2.11) 0.33	1.06(0.68,1.66) 0.79	1.49(0.97,2.27) 0.07	0.17	
Low to moderate	1	1.19(0.83,1.70) 0.34	1.33(0.92,1.90) 0.12	1.78(1.24,2.55) 0.002	0.001	
Heavy	1	1.05(0.62,1.77) 0.85	1.10(0.62,1.95) 0.75	1.47(0.89,2.41) 0.13	0.13	
Healthy eating index score						0.30
Quarter 1	1	0.88(0.59,1.32) 0.54	0.90(0.52,1.56) 0.72	0.81(0.46,1.45) 0.48	0.51	
Quarter 2	1	1.12(0.69,1.81) 0.64	1.36(0.82,2.24) 0.23	1.58(0.99,2.52) 0.05	0.04	
Quarter 3	1	1.33(0.79,2.23) 0.28	1.57(0.88,2.82) 0.13	2.29(1.28,4.08) 0.005	0.004	
Quarter 4	1	1.86(1.07,3.24) 0.03	1.44(0.90,2.32) 0.13	2.12(1.21,3.73) 0.01	0.03	
Total energy intake from diet, kcal						0.01
[0,1445.5]	1	1.25(0.84,1.88) 0.27	0.63(0.40,1.00) 0.05	1.02(0.67,1.56) 0.92	0.35	
(1445.5,1908]	1	1.31(0.81,2.12) 0.28	1.42(0.92,2.19) 0.12	2.03(1.18,3.49) 0.01	0.01	
(1908,2494.5]	1	1.23(0.71,2.15) 0.46	1.36(0.80,2.32) 0.26	2.17(1.29,3.64) 0.003	0.002	
(2494.5,15594]	1	0.79(0.37,1.70) 0.55	1.95(0.97,3.95) 0.06	1.54(0.84,2.84) 0.16	0.01	
Self reported health						0.07
Very good to excellent	1	0.78(0.50,1.22) 0.28	1.02(0.71,1.46) 0.91	1.33(0.87,2.03) 0.19	0.08	

Good	1	1.60(1.17,2.19) 0.003	0.98(0.66,1.44) 0.90	1.38(0.93,2.03) 0.11	0.71
Poor to fair	1	1.30(0.76,2.23) 0.33	1.61(0.96,2.72) 0.07	2.20(1.41,3.43) <0.001	<0.001
Family history of cardiovascular disease					0.35
No	1	1.28(0.96,1.72) 0.10	1.36(1.00,1.84) 0.05	1.84(1.39,2.43) <0.0001	<0.0001
Yes	1	0.93(0.53,1.62) 0.79	0.82(0.50,1.33) 0.42	1.10(0.58,2.10) 0.77	0.91
Cardiovascular disease					0.73
No	1	1.24(0.93,1.65) 0.14	1.18(0.90,1.55) 0.23	1.73(1.31,2.30) <0.001	<0.001
Yes	1	0.97(0.61,1.53) 0.88	1.08(0.63,1.85) 0.78	1.21(0.71,2.04) 0.48	0.39
Chronic obstructive pulmonary diseases					0.96
No	1	1.20(0.92,1.56) 0.17	1.19(0.92,1.55) 0.18	1.68(1.30,2.15) <0.0001	<0.0001
Yes	1	0.90(0.41,1.97) 0.79	0.90(0.45,1.79) 0.76	1.16(0.58,2.30) 0.67	0.67
History of chronic kidney disease					0.81
No	1	1.21(0.93,1.59) 0.16	1.23(0.96,1.58) 0.10	1.64(1.28,2.10) <0.0001	<0.001
Yes	1	0.60(0.22,1.63) 0.32	0.80(0.30,2.14) 0.66	1.44(0.62,3.30) 0.40	0.20
Cancer					0.60
No	1	1.31(0.99,1.74) 0.06	1.30(0.93,1.80) 0.12	1.73(1.29,2.30) <0.001	<0.001
Yes	1	0.80(0.43,1.49) 0.48	0.90(0.56,1.44) 0.65	1.30(0.74,2.26) 0.36	0.26
CVD mortality					
Sex					0.01
Male	1	2.08(1.00,4.30) 0.05	2.74(1.20,6.29) 0.02	3.33(1.40,7.91) 0.01	0.003
Female	1	1.24(0.69,2.23) 0.48	0.69(0.36,1.33) 0.27	1.15(0.56,2.34) 0.70	0.88
Age, years					0.29
<60	1	1.94(0.61,6.15) 0.26	0.92(0.27,3.08) 0.89	3.52(0.96,12.88) 0.06	0.08
≥60	1	1.40(0.86,2.30) 0.18	1.52(0.88,2.64) 0.13	1.74(0.96,3.16) 0.07	0.07
BMI, kg/m2					0.85
Normal weight (<25)	1	0.95(0.47,1.92) 0.89	1.35(0.57,3.18) 0.50	1.70(0.70,4.14) 0.24	0.16
Overweight (25-30)	1	2.33(1.03,5.25) 0.04	2.40(1.01,5.72) 0.05	3.95(1.82,8.56) <0.001	0.001
Obesity (≥30)	1	1.38(0.74,2.60) 0.31	1.10(0.44,2.73) 0.84	1.48(0.63,3.48) 0.37	0.50
Race					0.83
Non-Hispanic White	1	1.47(0.82,2.65) 0.20	1.53(0.79,2.96) 0.20	1.85(0.86,3.95) 0.11	0.11
Non-Hispanic Black	1	1.74(0.55,5.47) 0.34	1.69(0.58,4.95) 0.34	2.18(0.60,7.93) 0.24	0.23
Mexican American	1	1.58(0.24,10.55) 0.64	1.44(0.30,6.97) 0.65	12.37(1.84,82.99) 0.01	0.003
Others	1	2.01(0.38,10.54) 0.41	0.98(0.30,3.17) 0.97	3.19(0.69,14.79) 0.14	0.22
Education level					0.32
Less than high school	1	2.51(1.17,5.39) 0.02	1.54(0.65,3.63) 0.32	3.13(1.32,7.40) 0.01	0.04
High school or equivalent	1	1.67(0.72,3.87) 0.23	1.06(0.44,2.59) 0.89	2.50(0.87,7.20) 0.09	0.18
College or above	1	0.96(0.46,2.01) 0.91	1.44(0.72,2.86) 0.30	1.36(0.66,2.79) 0.40	0.22
Family income-poverty ratio					0.11
<1.0	1	1.37(0.60,3.13) 0.45	1.55(0.75,3.21) 0.24	1.08(0.41,2.84) 0.87	0.82
1.0-3.0	1	1.80(0.96,3.38) 0.07	1.35(0.76,2.42) 0.30	1.67(0.84,3.34) 0.14	0.35
>3.0	1	1.28(0.46,3.51) 0.64	1.38(0.50,3.82) 0.54	3.20(1.00,10.21) 0.05	0.02
Smoking status					0.31
Never	1	1.49(0.65,3.45) 0.35	1.31(0.66,2.59) 0.44	3.01(1.27,7.13) 0.01	0.01
Former	1	1.23(0.58,2.61) 0.59	1.49(0.73,3.02) 0.27	1.25(0.63,2.49) 0.52	0.44
Current	1	2.52(0.90,7.06) 0.08	2.01(0.73,5.49) 0.18	1.78(0.58,5.49) 0.32	0.44
Alcohol drinking					0.73
Never	1	1.98(0.84,4.68) 0.12	1.22(0.57,2.65) 0.61	1.87(0.72,4.85) 0.20	0.46

Low to moderate	1	1.42(0.75,2.69) 0.28	1.82(0.81,4.07) 0.15	2.53(1.25,5.11) 0.01	0.004
Heavy	1	1.16(0.43,3.13) 0.76	1.19(0.44,3.19) 0.73	1.28(0.49,3.38) 0.61	0.64
Healthy eating index score					0.79
Quarter 1	1	1.02(0.44,2.39) 0.97	1.33(0.53,3.32) 0.54	1.50(0.54,4.14) 0.43	0.35
Quarter 2	1	1.85(0.67,5.12) 0.23	2.65(1.03,6.84) 0.04	3.81(1.47,9.93) 0.01	0.01
Quarter 3	1	1.43(0.62,3.30) 0.40	1.04(0.38,2.85) 0.95	2.16(0.71,6.60) 0.17	0.21
Quarter 4	1	1.45(0.51,4.11) 0.48	1.26(0.50,3.15) 0.62	1.16(0.44,3.05) 0.76	0.98
Total energy intake from diet, kcal					0.04
[0,1445.5]	1	1.65(0.90,3.01) 0.10	0.40(0.18,0.91) 0.03	1.21(0.56,2.63) 0.63	0.55
(1445.5,1908]	1	1.66(0.65,4.26) 0.29	2.28(1.00,5.18) 0.05	2.89(1.15,7.28) 0.02	0.01
(1908,2494.5]	1	1.99(0.54,7.38) 0.30	1.66(0.45,6.04) 0.44	3.15(0.93,10.63) 0.06	0.05
(2494.5,15594]	1	0.51(0.11,2.28) 0.38	2.02(0.72,5.68) 0.18	1.70(0.63,4.63) 0.30	0.10
Self reported health					0.26
Very good to excellent	1	1.42(0.66,3.06) 0.37	2.13(1.08,4.18) 0.03	2.17(1.04,4.53) 0.04	0.03
Good	1	1.22(0.59,2.50) 0.59	0.69(0.28,1.71) 0.42	1.04(0.41,2.65) 0.93	0.80
Poor to fair	1	2.00(0.78,5.09) 0.15	1.97(0.83,4.66) 0.12	3.59(1.39,9.29) 0.01	0.01
Family history of cardiovascular disease					0.13
No	1	1.61(0.98,2.62) 0.06	1.89(1.17,3.07) 0.01	2.45(1.38,4.36) 0.002	0.001
Yes	1	0.99(0.37,2.64) 0.99	0.59(0.21,1.62) 0.30	0.93(0.33,2.62) 0.89	0.67
Cardiovascular disease					0.40
No	1	1.65(0.93,2.91) 0.09	1.23(0.69,2.19) 0.48	2.13(1.11,4.08) 0.02	0.05
Yes	1	1.12(0.51,2.44) 0.79	1.55(0.58,4.12) 0.38	1.57(0.62,3.94) 0.34	0.24
Chronic obstructive pulmonary diseases					0.30
No	1	1.47(0.89,2.43) 0.13	1.29(0.79,2.11) 0.31	1.97(1.07,3.61) 0.03	0.04
Yes	1	0.84(0.12,5.90) 0.86	2.75(0.49,15.60) 0.25	5.52(0.56,54.11) 0.14	0.12
History of chronic kidney disease					0.06
No	1	1.76(1.11,2.81) 0.02	1.61(0.97,2.69) 0.07	2.17(1.22,3.88) 0.01	0.02
Yes	1	1.04(1.01,1.60) 0.01	1.29(1.14,1.59)<0.001	3.88(1.90,7.91) <0.001	<0.0001
Cancer					0.42
No	1	1.60(0.97,2.65) 0.07	1.25(0.74,2.11) 0.41	2.17(1.15,4.10) 0.02	0.03
Yes	1	0.97(0.26,3.59) 0.96	1.39(0.45,4.32) 0.57	1.29(0.38,4.36) 0.68	0.60
Cancer mortality					
Sex					0.71
Male	1	1.05(0.54,2.03) 0.89	1.08(0.49,2.37) 0.85	1.39(0.68,2.84) 0.37	0.37
Female	1	1.45(0.77,2.73) 0.25	0.96(0.48,1.89) 0.90	1.20(0.59,2.44) 0.62	0.93
Age, years					0.19
<60	1	0.73(0.31,1.77) 0.49	1.44(0.54,3.88) 0.47	1.38(0.54,3.58) 0.50	0.33
≥60	1	1.43(0.86,2.39) 0.17	0.86(0.49,1.50) 0.60	1.28(0.76,2.16) 0.36	0.84
BMI, kg/m2					0.59
Normal weight (<25)	1	1.10(0.44,2.73) 0.84	0.67(0.23,1.94) 0.46	1.44(0.57,3.66) 0.44	0.57
Overweight (25-30)	1	1.81(0.75,4.37) 0.19	1.94(0.87,4.34) 0.11	1.46(0.56,3.80) 0.44	0.60
Obesity (≥30)	1	1.03(0.49,2.16) 0.93	0.73(0.28,1.87) 0.51	1.22(0.60,2.50) 0.58	0.82
Race					0.35
Non-Hispanic White	1	1.13(0.64,1.99) 0.68	1.01(0.52,1.93) 0.99	1.31(0.75,2.30) 0.34	0.45
Non-Hispanic Black	1	1.19(0.38,3.70) 0.76	1.15(0.36,3.73) 0.81	1.25(0.33,4.75) 0.75	0.75
Mexican American	1	0.37(0.06,2.22) 0.28	0.48(0.12,1.84) 0.28	0.59(0.12,2.95) 0.52	0.61
Others	1	7.62(2.40,24.19) <0.001	3.26(0.98,10.85) 0.05	3.87(1.12,13.41) 0.03	0.42

Male	1	0.99(0.62,1.59) 0.97	1.28(0.77,2.11) 0.34	1.45(0.88,2.41) 0.15	0.09
Female	1	0.96(0.54,1.74) 0.90	1.10(0.68,1.77) 0.70	1.60(0.94,2.70) 0.08	0.06
Age, years					0.92
<60	1	0.98(0.41,2.34) 0.97	1.26(0.61,2.58) 0.53	1.42(0.71,2.86) 0.32	0.23
≥60	1	0.96(0.61,1.49) 0.84	1.12(0.78,1.61) 0.55	1.49(1.06,2.10) 0.02	0.005
BMI, kg/m ²					0.42
Normal weight (<25)	1	0.70(0.34,1.41) 0.32	0.86(0.49,1.52) 0.61	1.46(0.89,2.41) 0.14	0.06
Overweight (25-30)	1	1.32(0.71,2.47) 0.38	1.01(0.59,1.72) 0.98	1.56(0.78,3.14) 0.21	0.34
Obesity (≥30)	1	0.87(0.46,1.66) 0.67	1.56(0.82,2.96) 0.18	1.52(0.78,2.98) 0.22	0.09
Race					0.99
Non-Hispanic White	1	0.92(0.57,1.50) 0.74	1.06(0.70,1.61) 0.79	1.42(0.93,2.17) 0.10	0.06
Non-Hispanic Black	1	1.23(0.54,2.77) 0.62	1.70(0.78,3.72) 0.18	1.91(0.68,5.41) 0.22	0.16
Mexican American	1	1.89(0.38,9.42) 0.44	2.33(0.57, 9.49) 0.24	2.52(0.53,12.04) 0.25	0.24
Others	1	0.82(0.24,2.89) 0.76	1.28(0.52,3.16) 0.59	1.54(0.51,4.69) 0.44	0.32
Education level					0.81
Less than high school	1	1.45(0.64,3.28) 0.37	1.32(0.75,2.32) 0.34	1.75(1.02,2.99) 0.04	0.03
High school or equivalent	1	0.73(0.33,1.60) 0.44	0.70(0.38,1.27) 0.24	0.81(0.38,1.72) 0.58	0.65
College or above	1	0.88(0.53,1.47) 0.62	1.33(0.72,2.44) 0.36	1.77(0.97,3.22) 0.06	0.04
Family income-poverty ratio					0.46
<1.0	1	1.67(0.61,4.57) 0.32	1.87(0.96,3.62) 0.07	2.19(1.17,4.11) 0.01	0.01
1.0-3.0	1	0.63(0.38,1.05) 0.08	1.03(0.64,1.63) 0.91	1.12(0.68,1.84) 0.65	0.26
>3.0	1	1.45(0.68,3.12) 0.34	1.12(0.49,2.57) 0.79	1.88(0.84,4.21) 0.12	0.20
Smoking status					0.17
Never	1	1.36(0.66,2.79) 0.40	1.40(0.79,2.47) 0.25	2.15(1.21,3.82) 0.01	0.01
Former	1	0.86(0.51,1.46) 0.59	0.84(0.50,1.42) 0.52	1.06(0.67,1.70) 0.79	0.81
Current	1	0.75(0.33,1.69) 0.49	1.75(0.81,3.78) 0.15	1.61(0.76,3.41) 0.21	0.08
Alcohol drinking					0.62
Never	1	0.98(0.42,2.26) 0.96	1.00(0.51,1.95) 1.00	1.49(0.80,2.81) 0.21	0.18
Low to moderate	1	0.88(0.53,1.47) 0.63	1.37(0.85,2.20) 0.20	1.63(1.01,2.63) 0.05	0.01
Heavy	1	1.23(0.56,2.70) 0.60	0.94(0.38,2.34) 0.90	1.30(0.61,2.79) 0.50	0.64
Healthy eating index score					0.02
Quarter 1	1	0.55(0.30,0.99) 0.05	0.72(0.34,1.51) 0.39	0.60(0.31,1.16) 0.13	0.14
Quarter 2	1	1.05(0.57,1.93) 0.88	1.29(0.61,2.73) 0.51	1.19(0.60,2.36) 0.62	0.54
Quarter 3	1	2.28(0.99,5.27) 0.05	2.64(1.21,5.75) 0.01	2.74(1.04,7.25) 0.04	0.09
Quarter 4	1	2.39(1.27,4.51) 0.01	2.18(1.17,4.03) 0.01	4.25(2.20,8.22)<0.0001	<0.001
Total energy intake from diet, kcal					0.05
[0,1445.5]	1	1.18(0.60,2.31) 0.63	0.76(0.37,1.56) 0.45	1.30(0.73,2.32) 0.38	0.75
(1445.5,1908]	1	1.18(0.60,2.33) 0.63	1.01(0.48,2.12) 0.97	1.79(0.86,3.72) 0.12	0.20
(1908,2494.5]	1	0.90(0.39,2.08) 0.80	1.93(0.87,4.28) 0.11	2.19(1.09,4.41) 0.03	0.004
(2494.5,15594]	1	0.49(0.21,1.14) 0.10	1.51(0.64,3.58) 0.35	1.00(0.48,2.05) 0.99	0.37
Self reported health					0.16
Very good to excellent	1	0.76(0.34,1.74) 0.52	1.09(0.63,1.88) 0.76	1.48(0.79,2.75) 0.22	0.09
Good	1	1.71(0.85,3.44) 0.13	0.95(0.51,1.75) 0.86	1.89(1.01,3.54) 0.05	0.21
Poor to fair	1	0.69(0.31,1.54) 0.36	1.37(0.69,2.72) 0.36	1.21(0.61,2.41) 0.59	0.25
Family history of cardiovascular disease					0.73
No	1	1.13(0.69,1.85) 0.63	1.28(0.83,1.96) 0.26	1.72(1.11,2.66) 0.01	0.01
Yes	1	0.71(0.27,1.87) 0.49	0.97(0.46,2.05) 0.93	1.22(0.51,2.96) 0.65	0.52

Cardiovascular disease							0.95
No	1	1.06(0.64,1.75) 0.82	1.19(0.82,1.73) 0.36	1.68(1.09,2.59) 0.02	0.01		
Yes	1	0.81(0.37,1.77) 0.60	1.07(0.53,2.19) 0.85	1.16(0.56,2.37) 0.69	0.47		
Chronic obstructive pulmonary diseases							0.90
No	1	1.06(0.69,1.64) 0.78	1.19(0.79,1.79) 0.39	1.62(1.10,2.38) 0.01	0.01		
Yes	1	0.53(0.19,1.44) 0.21	0.80(0.33,1.94) 0.63	0.84(0.37,1.88) 0.67	0.96		
History of chronic kidney disease							0.84
No	1	0.98(0.62,1.55) 0.92	1.20(0.83,1.73) 0.34	1.50(1.02,2.20) 0.04	0.01		
Yes	1	1.56(0.21,2.37) 0.66	2.29(0.20,5.69) 0.50	5.65(0.44,7.48) 0.16	0.10		
Cancer							0.75
No	1	1.11(0.69,1.79) 0.66	1.37(0.87,2.15) 0.17	1.67(1.13,2.49) 0.01	0.005		
Yes	1	0.79(0.30,2.06) 0.63	0.92(0.39,2.13) 0.84	1.23(0.55,2.71) 0.62	0.56		

Adjusted for sex, age, race, BMI, educational level, smoking status, drinking status, family income poverty ratio, healthy eating index-2015, total energy intake from the diet, self-reported health status, family history of cardiovascular diseases, self-reported cardiovascular disease, self-reported chronic obstructive pulmonary disease, self-reported chronic kidney disease, and self-reported cancer.

Supplementary Table 2.10 Subgroup analysis of hazard ratios for vitamin E levels with all-cause and CVD mortality in participants with prediabetes from NHANES 1999-2018

	Q1	Q2	Q3	Q4	<i>P</i> _{trend}	<i>P</i> _{interaction}
All-cause mortality						
Sex						0.27
Male	1	0.98(0.77,1.26) 0.89	0.75(0.57,0.98) 0.04	0.75(0.55,1.00) 0.05	0.01	
Female	1	1.04(0.87,1.24) 0.69	1.08(0.85,1.37) 0.54	1.06(0.80,1.41) 0.67	0.57	
Age, years						1
<60	1	0.97(0.67,1.40) 0.87	0.85(0.56,1.30) 0.46	0.89(0.54,1.48) 0.66	0.57	
≥60	1	1.02(0.87,1.19) 0.83	0.87(0.72,1.04) 0.13	0.85(0.67,1.08) 0.17	0.09	
BMI, kg/m ²						0.8
Normal weight (<25)	1	1.18(0.87,1.61) 0.30	0.96(0.68,1.34) 0.79	1.02(0.70,1.50) 0.90	0.81	
Overweight (25-30)	1	0.81(0.61,1.07) 0.14	0.80(0.59,1.10) 0.17	0.71(0.49,1.03) 0.07	0.09	
Obesity (≥30)	1	1.06(0.83,1.37) 0.63	0.85(0.63,1.15) 0.30	0.85(0.60,1.21) 0.38	0.20	
Race						0.37
Non-Hispanic White	1	1.00(0.82,1.21) 0.98	0.85(0.68,1.06) 0.14	0.85(0.65,1.11) 0.24	0.14	
Non-Hispanic Black	1	1.07(0.77,1.49) 0.69	1.00(0.66,1.50) 0.98	1.07(0.66,1.74) 0.78	0.84	
Mexican American	1	0.83(0.50,1.37) 0.47	0.68(0.35,1.32) 0.26	0.75(0.33,1.68) 0.48	0.38	
Others	1	1.15(0.63,2.11) 0.66	1.52(0.82,2.81) 0.18	0.59(0.26,1.37) 0.22	0.56	
Education level						0.02
Less than high school	1	0.93(0.72,1.19) 0.56	0.95(0.71,1.28) 0.76	1.26(0.91,1.76) 0.17	0.28	
High school or equivalent	1	1.16(0.86,1.57) 0.33	0.90(0.67,1.19) 0.45	1.08(0.74,1.58) 0.69	0.95	
College or above	1	0.91(0.65,1.27) 0.58	0.72(0.52,0.99) 0.04	0.58(0.41,0.83) 0.002	<0.001	
Family income-poverty ratio						0.1
<1.0	1	0.84(0.62,1.13) 0.25	1.05(0.76,1.45) 0.77	1.22(0.76,1.96) 0.41	0.39	
1.0-3.0	1	1.02(0.84,1.23) 0.85	0.91(0.73,1.13) 0.38	0.91(0.68,1.22) 0.55	0.38	
>3.0	1	1.05(0.72,1.51) 0.81	0.76(0.53,1.10) 0.14	0.73(0.47,1.11) 0.14	0.04	
Smoking status						0.02
Never	1	1.15(0.91,1.44) 0.25	1.09(0.85,1.39) 0.50	1.03(0.73,1.44) 0.87	0.92	
Former	1	0.90(0.72,1.14) 0.38	0.64(0.50,0.83) <0.001	0.67(0.51,0.88) 0.004	<0.001	
Current	1	0.90(0.63,1.31) 0.60	0.99(0.65,1.51) 0.96	0.93(0.57,1.52) 0.77	0.84	
Alcohol drinking						0.36
Never	1	1.11(0.90,1.38) 0.32	1.16(0.89,1.51) 0.26	0.95(0.67,1.36) 0.78	0.98	
Low to moderate	1	0.93(0.74,1.17) 0.54	0.72(0.55,0.95) 0.02	0.74(0.53,1.03) 0.08	0.03	
Heavy	1	0.98(0.68,1.40) 0.89	0.86(0.59,1.24) 0.42	1.05(0.70,1.58) 0.81	1	
Healthy eating index score						0.03
Quarter 1	1	0.82(0.59,1.14) 0.24	1.09(0.78,1.51) 0.62	1.12(0.64,1.96) 0.68	0.60	
Quarter 2	1	1.17(0.91,1.51) 0.23	0.72(0.49,1.06) 0.10	0.87(0.59,1.29) 0.49	0.21	
Quarter 3	1	1.09(0.76,1.56) 0.63	0.90(0.66,1.23) 0.51	1.26(0.83,1.91) 0.27	0.46	
Quarter 4	1	1.00(0.70,1.42) 1.00	0.85(0.61,1.19) 0.34	0.59(0.39,0.89) 0.01	0.004	
Total energy intake from diet, kcal						0.52
[0,1445.5]	1	1.10(0.89,1.36) 0.38	0.86(0.63,1.17) 0.34	0.98(0.61,1.56) 0.92	0.69	
(1445.5,1908]	1	0.85(0.62,1.18) 0.34	0.92(0.68,1.25) 0.59	0.69(0.48,1.01) 0.06	0.12	
(1908,2494.5]	1	0.99(0.65,1.49) 0.94	0.71(0.49,1.05) 0.09	0.89(0.56,1.42) 0.63	0.37	
(2494.5,15594]	1	1.17(0.66,2.08) 0.59	1.04(0.61,1.79) 0.88	0.98(0.59,1.64) 0.94	0.55	
Self reported health						0.01
Very good to excellent	1	0.94(0.73,1.22) 0.64	0.84(0.61,1.15) 0.27	1.17(0.83,1.65) 0.36	0.61	

Good	1	0.89(0.67,1.20) 0.45	0.91(0.66,1.26) 0.57	0.75(0.50,1.12) 0.16	0.21
Poor to fair	1	1.12(0.86,1.46) 0.39	0.84(0.61,1.16) 0.29	0.77(0.57,1.05) 0.10	0.03
Family history of cardiovascular disease					0.90
No	1	1.02(0.84,1.24) 0.82	0.90(0.73,1.10) 0.31	0.91(0.70,1.18) 0.48	0.32
Yes	1	0.98(0.72,1.33) 0.90	0.87(0.63,1.20) 0.40	0.74(0.48,1.16) 0.19	0.12
Cardiovascular disease					0.11
No	1	0.92(0.75,1.13) 0.42	0.80(0.64,0.99) 0.04	0.86(0.66,1.13) 0.29	0.16
Yes	1	1.20(0.93,1.55) 0.17	1.11(0.80,1.53) 0.53	0.88(0.63,1.24) 0.47	0.42
Chronic obstructive pulmonary diseases					0.13
No	1	1.04(0.86,1.24) 0.71	0.87(0.70,1.07) 0.18	0.86(0.69,1.09) 0.22	0.10
Yes	1	0.76(0.50,1.15) 0.19	0.93(0.60,1.44) 0.73	0.76(0.44,1.32) 0.33	0.45
History of chronic kidney disease					0.63
No	1	1.01(0.85,1.20) 0.90	0.88(0.73,1.07) 0.20	0.85(0.67,1.07) 0.17	0.09
Yes	1	0.76(0.33,1.76) 0.52	0.54(0.21,1.39) 0.20	0.97(0.42,2.23) 0.94	0.73
Cancer					0.46
No	1	1.03(0.85,1.25) 0.77	0.92(0.75,1.14) 0.46	0.84(0.64,1.10) 0.21	0.16
Yes	1	0.96(0.71,1.30) 0.81	0.73(0.49,1.09) 0.13	0.95(0.64,1.39) 0.78	0.55
CVD mortality					
Sex					0.16
Male	1	0.97(0.66,1.42) 0.87	0.70(0.46,1.08) 0.11	1.10(0.68,1.77) 0.70	0.87
Female	1	1.18(0.82,1.69) 0.37	1.45(0.94,2.23) 0.09	1.30(0.72,2.32) 0.38	0.21
Age, years					0.58
<60	1	1.58(0.76,3.29) 0.22	1.49(0.71,3.14) 0.29	3.17(1.27,7.93) 0.01	0.04
≥60	1	0.99(0.76,1.28) 0.92	0.91(0.64,1.30) 0.61	1.04(0.68,1.58) 0.86	0.98
BMI, kg/m2					0.92
Normal weight (<25)	1	1.24(0.79,1.93) 0.35	1.04(0.56,1.91) 0.90	1.15(0.57,2.30) 0.70	0.85
Overweight (25-30)	1	1.01(0.67,1.51) 0.98	0.99(0.58,1.67) 0.96	1.02(0.59,1.75) 0.95	0.97
Obesity (≥30)	1	0.99(0.61,1.62) 0.98	1.02(0.56,1.88) 0.95	1.57(0.78,3.15) 0.20	0.24
Race					0.17
Non-Hispanic White	1	1.05(0.79,1.40) 0.72	0.95(0.67,1.36) 0.79	1.20(0.77,1.87) 0.42	0.56
Non-Hispanic Black	1	1.17(0.70,1.96) 0.56	0.63(0.28,1.40) 0.26	1.28(0.52,3.16) 0.59	0.89
Mexican American	1	0.87(0.34,2.22) 0.77	1.42(0.35,5.83) 0.63	3.94(0.81,19.19) 0.09	0.15
Others	1	0.96(0.34,2.72) 0.94	4.00(1.07,14.98) 0.04	1.30(0.32,5.38) 0.72	0.20
Education level					0.05
Less than high school	1	0.81(0.55,1.21) 0.31	1.16(0.70,1.90) 0.57	2.15(1.26,3.67) 0.005	0.01
High school or equivalent	1	1.21(0.72,2.03) 0.48	0.88(0.50,1.57) 0.67	1.74(0.85,3.59) 0.13	0.25
College or above	1	1.03(0.66,1.59) 0.91	0.80(0.48,1.35) 0.41	0.67(0.38,1.18) 0.17	0.10
Family income-poverty ratio					0.05
<1.0	1	1.00(0.55,1.81) 1.00	1.30(0.62,2.72) 0.49	2.54(1.35,4.78) 0.004	0.01
1.0-3.0	1	1.00(0.73,1.39) 0.98	1.08(0.71,1.66) 0.71	1.38(0.86,2.20) 0.18	0.20
>3.0	1	0.98(0.54,1.76) 0.94	0.71(0.40,1.27) 0.25	0.72(0.33,1.58) 0.41	0.32
Smoking status					0.08
Never	1	1.18(0.83,1.68) 0.35	1.43(0.98,2.11) 0.07	1.30(0.76,2.23) 0.34	0.23
Former	1	0.82(0.51,1.30) 0.40	0.50(0.30,0.82) 0.01	0.70(0.42,1.19) 0.19	0.10
Current	1	1.29(0.71,2.34) 0.40	1.14(0.53,2.48) 0.73	2.58(1.27,5.23) 0.01	0.02
Alcohol drinking					0.10
Never	1	0.95(0.66,1.38) 0.79	1.35(0.87,2.08) 0.18	1.11(0.62,1.99) 0.71	0.38

Low to moderate	1	1.15(0.79,1.67) 0.48	0.84(0.55,1.30) 0.44	1.08(0.55,2.09) 0.83	0.91
Heavy	1	1.05(0.54,2.05) 0.89	0.77(0.41,1.46) 0.42	2.03(1.06,3.89) 0.03	0.10
Healthy eating index score					0.11
Quarter 1	1	0.85(0.52,1.40) 0.52	1.23(0.64,2.36) 0.54	3.29(1.52,7.11) 0.002	0.02
Quarter 2	1	1.35(0.78,2.33) 0.29	1.03(0.57,1.89) 0.91	0.92(0.46,1.82) 0.80	0.73
Quarter 3	1	0.78(0.48,1.26) 0.31	0.83(0.46,1.50) 0.53	1.46(0.76,2.84) 0.26	0.26
Quarter 4	1	1.42(0.84,2.40) 0.19	1.08(0.62,1.89) 0.79	0.95(0.52,1.76) 0.88	0.45
Total energy intake from diet, kcal					0.01
[0,1445.5]	1	1.06(0.77,1.47) 0.73	1.07(0.64,1.77) 0.80	0.75(0.38,1.47) 0.41	0.70
(1445.5,1908]	1	0.90(0.56,1.47) 0.69	1.47(0.90,2.41) 0.12	1.03(0.54,1.97) 0.93	0.32
(1908,2494.5]	1	1.30(0.73,2.33) 0.38	1.15(0.65,2.03) 0.64	2.12(1.06,4.26) 0.03	0.06
(2494.5,15594]	1	1.18(0.37,3.71) 0.78	0.24(0.08,0.71) 0.01	0.76(0.26,2.19) 0.61	0.46
Self reported health					< 0.001
Very good to excellent	1	1.05(0.72,1.54) 0.80	0.74(0.46,1.19) 0.21	2.43(1.45,4.07) <0.001	0.01
Good	1	0.99(0.63,1.56) 0.98	0.91(0.57,1.47) 0.71	0.90(0.49,1.63) 0.72	0.65
Poor to fair	1	1.04(0.66,1.63) 0.87	1.27(0.78,2.06) 0.34	0.90(0.49,1.64) 0.73	0.98
Family history of cardiovascular disease					0.25
No	1	0.93(0.71,1.22) 0.61	0.91(0.65,1.26) 0.57	1.17(0.78,1.74) 0.45	0.52
Yes	1	1.55(1.03,2.33) 0.03	1.38(0.77,2.46) 0.27	1.49(0.67,3.33) 0.33	0.46
Cardiovascular disease					0.82
No	1	0.97(0.73,1.30) 0.85	1.00(0.69,1.46) 0.99	1.26(0.75,2.09) 0.38	0.42
Yes	1	1.16(0.77,1.75) 0.47	0.94(0.54,1.64) 0.83	1.16(0.72,1.89) 0.54	0.80
Chronic obstructive pulmonary diseases					0.81
No	1	1.07(0.83,1.38) 0.60	0.99(0.71,1.37) 0.93	1.18(0.81,1.73) 0.39	0.53
Yes	1	1.16(0.41,3.28) 0.78	1.18(0.34,4.08) 0.79	1.47(0.54,4.02) 0.45	0.47
History of chronic kidney disease					0.07
No	1	1.04(0.82,1.33) 0.74	1.03(0.76,1.41) 0.84	1.20(0.81,1.78) 0.37	0.44
Yes	1	0.92(0.26,3.32) 0.90	0.14(0.01,1.80) 0.13	1.33(0.21,8.31) 0.76	0.85
Cancer					0.80
No	1	1.05(0.79,1.40) 0.75	0.97(0.70,1.33) 0.83	1.22(0.79,1.89) 0.37	0.50
Yes	1	1.16(0.64,2.11) 0.62	1.31(0.61,2.79) 0.49	1.56(0.71,3.39) 0.27	0.30
Cancer mortality					
Sex					0.66
Male	1	0.86(0.58,1.28) 0.45	0.63(0.41,0.98) 0.04	0.61(0.38,0.96) 0.03	0.01
Female	1	1.17(0.80,1.72) 0.42	1.08(0.67,1.75) 0.75	0.89(0.53,1.49) 0.66	0.75
Age, years					0.66
<60	1	1.01(0.57,1.77) 0.98	0.85(0.43,1.67) 0.64	0.51(0.24,1.09) 0.08	0.06
≥60	1	1.02(0.74,1.40) 0.91	0.77(0.55,1.07) 0.12	0.82(0.57,1.19) 0.30	0.15
BMI, kg/m2					0.09
Normal weight (<25)	1	1.74(1.00,3.02) 0.05	1.07(0.59,1.96) 0.82	1.27(0.66,2.44) 0.47	0.97
Overweight (25-30)	1	0.56(0.32,0.97) 0.04	0.66(0.36,1.22) 0.18	0.46(0.23,0.90) 0.02	0.05
Obesity (≥30)	1	1.13(0.69,1.86) 0.63	0.74(0.39,1.42) 0.37	0.68(0.39,1.18) 0.17	0.10
Race					0.21
Non-Hispanic White	1	1.07(0.77,1.50) 0.68	0.76(0.50,1.16) 0.20	0.74(0.49,1.12) 0.15	0.05
Non-Hispanic Black	1	0.93(0.50,1.75) 0.83	1.33(0.68,2.62) 0.41	0.80(0.30,2.17) 0.67	0.93
Mexican American	1	0.46(0.19,1.11) 0.09	0.16(0.04,0.62) 0.01	0.30(0.07,1.36) 0.12	0.10
Others	1	1.03(0.29,3.71) 0.96	2.80(0.75,10.46) 0.13	1.01(0.27,3.84) 0.99	0.50

Male	1	1.07(0.70,1.64) 0.76	0.86(0.55,1.34) 0.50	0.61(0.39,0.98) 0.04	0.01
Female	1	0.90(0.67,1.22) 0.51	0.89(0.63,1.25) 0.49	1.01(0.66,1.54) 0.97	0.85
Age, years					0.73
<60	1	0.80(0.46,1.38) 0.43	0.68(0.36,1.30) 0.24	0.79(0.39,1.59) 0.51	0.44
≥60	1	1.04(0.80,1.35) 0.77	0.90(0.70,1.16) 0.41	0.72(0.52,1.00) 0.05	0.02
BMI, kg/m ²					0.83
Normal weight (<25)	1	0.96(0.60,1.53) 0.85	0.85(0.57,1.26) 0.42	0.88(0.54,1.44) 0.60	0.47
Overweight (25-30)	1	0.87(0.55,1.36) 0.54	0.80(0.49,1.31) 0.37	0.71(0.39,1.28) 0.25	0.24
Obesity (≥30)	1	1.06(0.73,1.54) 0.74	0.80(0.49,1.29) 0.36	0.58(0.34,0.98) 0.04	0.03
Race					0.81
Non-Hispanic White	1	0.92(0.67,1.27) 0.61	0.83(0.60,1.14) 0.24	0.72(0.50,1.05) 0.09	0.08
Non-Hispanic Black	1	1.11(0.68,1.80) 0.68	1.02(0.57,1.83) 0.94	1.12(0.59,2.13) 0.73	0.78
Mexican American	1	1.09(0.52,2.29) 0.81	0.95(0.40,2.24) 0.90	0.50(0.18,1.43) 0.20	0.30
Others	1	1.14(0.47,2.78) 0.77	0.54(0.25,1.17) 0.12	0.23(0.05,1.03) 0.05	0.01
Education level					0.63
Less than high school	1	1.14(0.77,1.67) 0.51	0.94(0.63,1.41) 0.77	0.84(0.45,1.58) 0.59	0.54
High school or equivalent	1	1.17(0.79,1.75) 0.44	0.84(0.57,1.25) 0.39	0.82(0.50,1.34) 0.43	0.25
College or above	1	0.75(0.45,1.26) 0.27	0.71(0.43,1.16) 0.17	0.60(0.34,1.07) 0.08	0.09
Family income-poverty ratio					0.19
<1.0	1	0.82(0.52,1.31) 0.41	1.04(0.69,1.58) 0.85	1.17(0.52,2.65) 0.70	0.68
1.0-3.0	1	1.12(0.81,1.55) 0.51	0.97(0.71,1.32) 0.84	0.80(0.54,1.20) 0.28	0.21
>3.0	1	0.80(0.46,1.39) 0.43	0.59(0.34,1.03) 0.06	0.56(0.30,1.05) 0.07	0.04
Smoking status					0.48
Never	1	1.20(0.83,1.72) 0.33	0.86(0.57,1.29) 0.47	1.03(0.61,1.75) 0.91	0.78
Former	1	1.01(0.74,1.36) 0.97	0.92(0.62,1.39) 0.70	0.71(0.47,1.07) 0.10	0.11
Current	1	0.69(0.39,1.23) 0.21	0.73(0.39,1.35) 0.31	0.52(0.26,1.03) 0.06	0.09
Alcohol drinking					0.78
Never	1	1.17(0.86,1.59) 0.32	1.08(0.73,1.60) 0.70	0.90(0.51,1.59) 0.71	0.78
Low to moderate	1	0.83(0.56,1.24) 0.36	0.70(0.48,1.03) 0.07	0.67(0.43,1.05) 0.08	0.04
Heavy	1	0.96(0.56,1.66) 0.88	0.84(0.46,1.55) 0.58	0.67(0.33,1.39) 0.29	0.29
Healthy eating index score					0.16
Quarter 1	1	0.86(0.48,1.56) 0.63	1.42(0.84,2.42) 0.19	1.07(0.51,2.26) 0.86	0.50
Quarter 2	1	1.17(0.83,1.66) 0.38	0.60(0.33,1.08) 0.09	0.72(0.40,1.30) 0.28	0.11
Quarter 3	1	1.24(0.72,2.12) 0.44	0.94(0.54,1.62) 0.82	1.18(0.63,2.20) 0.60	0.86
Quarter 4	1	0.76(0.43,1.33) 0.34	0.67(0.38,1.16) 0.15	0.41(0.22,0.79) 0.01	0.01
Total energy intake from diet, kcal					0.47
[0,1445.5]	1	1.23(0.86,1.76) 0.25	0.81(0.49,1.33) 0.40	1.10(0.50,2.38) 0.82	0.98
(1445.5,1908]	1	0.81(0.49,1.33) 0.40	0.62(0.40,0.96) 0.03	0.60(0.36,1.00) 0.05	0.01
(1908,2494.5]	1	0.89(0.45,1.73) 0.73	0.63(0.34,1.19) 0.15	0.65(0.31,1.37) 0.26	0.14
(2494.5,15594]	1	0.92(0.33,2.59) 0.88	1.35(0.60,3.00) 0.47	0.86(0.36,2.05) 0.74	0.71
Self reported health					0.42
Very good to excellent	1	1.00(0.65,1.55) 0.99	0.96(0.63,1.48) 0.87	0.77(0.46,1.28) 0.32	0.32
Good	1	0.85(0.53,1.38) 0.52	0.85(0.51,1.39) 0.51	0.70(0.37,1.29) 0.25	0.28
Poor to fair	1	0.99(0.64,1.52) 0.96	0.71(0.45,1.11) 0.13	0.72(0.44,1.17) 0.19	0.10
Family history of cardiovascular disease					0.47
No	1	1.12(0.82,1.53) 0.49	0.93(0.69,1.26) 0.65	0.84(0.58,1.22) 0.36	0.25
Yes	1	0.70(0.43,1.14) 0.15	0.73(0.44,1.22) 0.23	0.57(0.31,1.05) 0.07	0.07

Cardiovascular disease							0.03
No	1	0.82(0.60,1.13) 0.22	0.68(0.50,0.92) 0.01	0.70(0.49,1.02) 0.06	0.03		
Yes	1	1.49(0.92,2.39) 0.10	1.54(0.99,2.39) 0.05	0.91(0.53,1.56) 0.73	0.89		
Chronic obstructive pulmonary diseases							0.10
No	1	1.00(0.72,1.37) 0.99	0.82(0.61,1.10) 0.18	0.72(0.51,1.02) 0.06	0.03		
Yes	1	0.66(0.37,1.20) 0.18	0.96(0.57,1.64) 0.89	0.83(0.42,1.66) 0.61	0.79		
History of chronic kidney disease							0.95
No	1	0.97(0.74,1.29) 0.85	0.84(0.64,1.10) 0.20	0.73(0.53,1.00) 0.05	0.03		
Yes	1	1.06(0.26,4.31) 0.93	0.48(0.07,3.26) 0.45	0.55(0.06,4.81) 0.59	0.49		
Cancer							0.87
No	1	1.02(0.75,1.39) 0.91	0.88(0.66,1.18) 0.39	0.77(0.54,1.10) 0.16	0.11		
Yes	1	0.79(0.48,1.30) 0.35	0.64(0.35,1.16) 0.14	0.62(0.32,1.20) 0.15	0.12		

Adjusted for sex, age, race, BMI, educational level, smoking status, drinking status, family income poverty ratio, healthy eating index-2015, total energy intake from the diet, self-reported health status, family history of cardiovascular diseases, self-reported cardiovascular disease, self-reported chronic obstructive pulmonary disease, self-reported chronic kidney disease, and self-reported cancer.

Supplementary Table 2.11 Subgroup analysis of hazard ratios for vitamin K levels with all-cause and CVD mortality in participants with prediabetes from NHANES 1999-2018

	Q1	Q2	Q3	Q4	<i>P</i> _{trend}	<i>P</i> _{interaction}
All-cause mortality						
Sex						0.47
Male	1	1.06(0.85,1.33) 0.60	0.97(0.76,1.23) 0.79	0.81(0.61,1.09) 0.16	0.12	
Female	1	0.86(0.69,1.08) 0.19	0.74(0.58,0.93) 0.01	0.72(0.57,0.92) 0.01	0.003	
Age, years						0.73
<60	1	1.07(0.71,1.61) 0.76	0.78(0.51,1.20) 0.26	0.81(0.50,1.32) 0.40	0.20	
≥60	1	0.95(0.81,1.12) 0.53	0.89(0.75,1.05) 0.17	0.76(0.63,0.93) 0.01	0.01	
BMI, kg/m ²						0.91
Normal weight (<25)	1	0.97(0.73,1.30) 0.86	0.82(0.60,1.13) 0.23	0.76(0.54,1.07) 0.12	0.07	
Overweight (25-30)	1	0.95(0.73,1.24) 0.71	0.80(0.62,1.03) 0.08	0.78(0.56,1.09) 0.14	0.08	
Obesity (≥30)	1	1.01(0.76,1.34) 0.97	0.93(0.66,1.31) 0.69	0.71(0.50,1.02) 0.06	0.08	
Race						0.62
Non-Hispanic White	1	0.93(0.76,1.15) 0.51	0.83(0.67,1.02) 0.08	0.72(0.56,0.92) 0.01	0.003	
Non-Hispanic Black	1	1.13(0.78,1.63) 0.51	0.85(0.59,1.24) 0.40	1.05(0.68,1.61) 0.82	0.86	
Mexican American	1	1.70(0.94,3.06) 0.08	1.40(0.73,2.70) 0.32	0.75(0.30,1.84) 0.53	0.68	
Others	1	1.34(0.76,2.35) 0.31	1.15(0.65,2.06) 0.63	0.98(0.44,2.17) 0.96	0.85	
Education level						0.03
Less than high school	1	0.81(0.60,1.08) 0.15	0.75(0.57,0.98) 0.03	1.09(0.81,1.47) 0.57	0.95	
High school or equivalent	1	1.01(0.71,1.44) 0.97	0.76(0.52,1.11) 0.16	0.76(0.51,1.13) 0.18	0.08	
College or above	1	1.12(0.84,1.50) 0.43	0.93(0.70,1.24) 0.63	0.67(0.48,0.93) 0.02	0.003	
Family income-poverty ratio						0.12
<1.0	1	1.02(0.74,1.40) 0.92	0.59(0.40,0.87) 0.01	0.75(0.49,1.16) 0.20	0.06	
1.0-3.0	1	1.14(0.92,1.40) 0.23	0.99(0.80,1.24) 0.96	0.98(0.78,1.25) 0.90	0.66	
>3.0	1	0.82(0.59,1.14) 0.24	0.81(0.57,1.14) 0.22	0.60(0.42,0.86) 0.005	0.01	
Smoking status						0.19
Never	1	0.95(0.72,1.26) 0.74	0.97(0.71,1.31) 0.84	0.76(0.55,1.04) 0.08	0.11	
Former	1	1.07(0.85,1.35) 0.56	0.80(0.63,1.02) 0.08	0.69(0.52,0.93) 0.01	0.002	
Current	1	0.81(0.56,1.17) 0.26	0.65(0.42,1.00) 0.05	0.92(0.56,1.49) 0.73	0.43	
Alcohol drinking						0.49
Never	1	1.11(0.85,1.46) 0.43	0.86(0.68,1.10) 0.24	0.96(0.71,1.31) 0.81	0.40	
Low to moderate	1	0.89(0.69,1.16) 0.40	0.88(0.67,1.15) 0.34	0.65(0.47,0.91) 0.01	0.01	
Heavy	1	0.89(0.61,1.30) 0.56	0.78(0.55,1.09) 0.15	0.76(0.49,1.18) 0.22	0.15	
Healthy eating index score						0.13
Quarter 1	1	1.10(0.80,1.52) 0.57	0.81(0.59,1.12) 0.20	0.91(0.56,1.48) 0.71	0.37	
Quarter 2	1	0.68(0.48,0.98) 0.04	0.63(0.46,0.85) 0.003	0.78(0.53,1.15) 0.21	0.07	
Quarter 3	1	1.06(0.78,1.44) 0.69	0.98(0.68,1.42) 0.93	1.02(0.69,1.49) 0.94	0.92	
Quarter 4	1	1.12(0.78,1.62) 0.53	0.99(0.67,1.44) 0.94	0.64(0.44,0.93) 0.02	0.002	
Total energy intake from diet, kcal						0.98
[0,1445.5]	1	0.90(0.69,1.16) 0.41	0.70(0.53,0.94) 0.02	0.73(0.55,0.98) 0.03	0.01	
(1445.5,1908]	1	0.98(0.72,1.35) 0.92	0.88(0.63,1.23) 0.47	0.86(0.58,1.28) 0.45	0.36	
(1908,2494.5]	1	1.24(0.84,1.82) 0.29	1.09(0.74,1.62) 0.67	0.84(0.55,1.28) 0.41	0.28	
(2494.5,15594]	1	0.93(0.58,1.49) 0.76	0.83(0.52,1.33) 0.44	0.72(0.43,1.20) 0.20	0.16	
Self reported health						0.13
Very good to excellent	1	0.98(0.74,1.29) 0.89	0.84(0.61,1.14) 0.26	0.93(0.67,1.30) 0.67	0.46	
Good	1	1.10(0.85,1.42) 0.46	0.80(0.61,1.04) 0.10	0.78(0.55,1.13) 0.19	0.07	
Poor to fair	1	0.87(0.64,1.17) 0.34	0.92(0.66,1.27) 0.60	0.67(0.46,0.97) 0.03	0.05	
Family history of cardiovascular disease						0.69
No	1	1.00(0.81,1.22) 0.97	0.91(0.74,1.13) 0.42	0.78(0.60,1.01) 0.06	0.03	
Yes	1	0.99(0.71,1.38) 0.96	0.74(0.55,0.99) 0.04	0.77(0.56,1.06) 0.11	0.03	
Cardiovascular disease						0.89
No	1	0.96(0.79,1.17) 0.69	0.88(0.71,1.08) 0.21	0.77(0.60,0.99) 0.04	0.02	
Yes	1	1.10(0.86,1.42) 0.44	0.89(0.69,1.15) 0.37	0.82(0.57,1.18) 0.28	0.15	
Chronic obstructive pulmonary diseases						0.92

No	1	0.98(0.81,1.18)	0.80	0.87(0.73,1.04)	0.12	0.79(0.64,0.97)	0.02	0.01
Yes	1	0.85(0.54,1.32)	0.46	0.71(0.44,1.16)	0.17	0.65(0.36,1.15)	0.14	0.12
History of chronic kidney disease								0.17
No	1	0.99(0.83,1.17)	0.88	0.86(0.71,1.04)	0.11	0.75(0.61,0.92)	0.01	0.002
Yes	1	0.80(0.33,1.99)	0.64	1.10(0.40,3.04)	0.85	1.50(0.59,3.82)	0.40	0.37
Cancer								0.24
No	1	1.06(0.87,1.28)	0.56	0.86(0.69,1.07)	0.17	0.78(0.62,0.99)	0.04	0.01
Yes	1	0.77(0.55,1.08)	0.13	0.83(0.60,1.15)	0.26	0.72(0.49,1.05)	0.09	0.16
CVD mortality								
Sex								0.74
Male	1	1.13(0.73,1.75)	0.58	1.14(0.76,1.72)	0.54	0.97(0.58,1.62)	0.91	0.91
Female	1	0.77(0.52,1.15)	0.20	0.88(0.56,1.39)	0.58	0.73(0.42,1.26)	0.25	0.37
Age, years								0.60
<60	1	1.44(0.55,3.77)	0.45	1.93(0.69,5.41)	0.21	1.27(0.43,3.73)	0.66	0.46
≥60	1	0.95(0.70,1.30)	0.75	0.91(0.66,1.25)	0.57	0.83(0.57,1.21)	0.32	0.33
BMI, kg/m2								0.16
Normal weight (<25)	1	0.80(0.48,1.32)	0.37	0.55(0.30,1.02)	0.06	0.81(0.40,1.67)	0.57	0.43
Overweight (25-30)	1	0.70(0.42,1.16)	0.17	0.77(0.47,1.27)	0.31	0.63(0.34,1.19)	0.16	0.21
Obesity (≥30)	1	1.43(0.83,2.46)	0.20	1.79(0.96,3.35)	0.07	1.04(0.58,1.87)	0.90	0.52
Race								0.07
Non-Hispanic White	1	0.89(0.62,1.26)	0.51	1.01(0.71,1.44)	0.95	0.80(0.54,1.20)	0.28	0.46
Non-Hispanic Black	1	1.37(0.71,2.67)	0.35	1.32(0.60,2.91)	0.48	1.14(0.52,2.50)	0.74	0.67
Mexican American	1	2.41(0.70,8.34)	0.17	2.80(1.10,7.12)	0.03	1.93(0.43,8.71)	0.39	0.14
Others	1	1.83(0.61,5.53)	0.28	0.10(0.02,0.57)	0.01	1.44(0.25,8.45)	0.68	0.88
Education level								0.05
Less than high school	1	0.93(0.60,1.45)	0.75	0.67(0.40,1.12)	0.13	1.42(0.88,2.31)	0.15	0.49
High school or equivalent	1	0.89(0.48,1.63)	0.70	1.37(0.77,2.42)	0.28	0.85(0.43,1.70)	0.65	0.94
College or above	1	1.13(0.71,1.80)	0.61	0.93(0.61,1.44)	0.76	0.65(0.39,1.09)	0.10	0.05
Family income-poverty ratio								0.05
<1.0	1	1.30(0.73,2.33)	0.37	0.91(0.47,1.76)	0.79	1.01(0.47,2.14)	0.99	0.78
1.0-3.0	1	0.99(0.68,1.42)	0.94	0.96(0.65,1.42)	0.84	1.32(0.86,2.05)	0.21	0.29
>3.0	1	0.81(0.43,1.51)	0.50	0.99(0.52,1.89)	0.98	0.43(0.23,0.80)	0.01	0.03
Smoking status								0.05
Never	1	0.87(0.58,1.29)	0.49	1.25(0.75,2.07)	0.39	0.97(0.60,1.55)	0.89	0.65
Former	1	1.16(0.72,1.87)	0.53	0.85(0.56,1.32)	0.48	0.51(0.30,0.87)	0.01	0.004
Current	1	0.82(0.41,1.65)	0.59	0.47(0.21,1.08)	0.07	1.65(0.69,3.94)	0.26	0.55
Alcohol drinking								0.19
Never	1	0.88(0.56,1.38)	0.58	0.85(0.54,1.35)	0.50	0.89(0.52,1.52)	0.67	0.62
Low to moderate	1	1.03(0.68,1.58)	0.88	1.02(0.59,1.79)	0.93	0.57(0.32,1.02)	0.06	0.08
Heavy	1	0.95(0.46,1.99)	0.90	1.23(0.60,2.54)	0.57	1.74(0.76,3.99)	0.19	0.20
Healthy eating index score								0.72
Quarter 1	1	1.38(0.72,2.63)	0.33	1.53(0.81,2.92)	0.19	1.23(0.63,2.41)	0.55	0.26
Quarter 2	1	0.60(0.31,1.17)	0.14	0.97(0.58,1.62)	0.91	0.95(0.49,1.87)	0.89	0.85
Quarter 3	1	0.99(0.59,1.69)	0.99	0.96(0.49,1.89)	0.90	0.82(0.40,1.70)	0.60	0.61
Quarter 4	1	1.01(0.60,1.69)	0.98	0.83(0.46,1.49)	0.53	0.68(0.36,1.27)	0.22	0.16
Total energy intake from diet, kcal								0.35
[0,1445.5]	1	0.78(0.49,1.25)	0.30	0.52(0.30,0.91)	0.02	0.70(0.39,1.28)	0.25	0.11
(1445.5,1908]	1	1.12(0.66,1.90)	0.68	1.14(0.70,1.87)	0.60	0.95(0.58,1.57)	0.85	0.95
(1908,2494.5]	1	1.98(1.07,3.66)	0.03	2.61(1.28,5.31)	0.01	1.74(0.89,3.41)	0.11	0.11
(2494.5,15594]	1	0.63(0.26,1.51)	0.30	0.50(0.21,1.17)	0.11	0.50(0.18,1.38)	0.18	0.21
Self reported health								0.06
Very good to excellent	1	1.45(0.91,2.30)	0.12	1.28(0.69,2.38)	0.44	0.96(0.54,1.69)	0.88	0.84
Good	1	0.97(0.62,1.52)	0.90	0.70(0.42,1.18)	0.18	0.73(0.37,1.42)	0.35	0.24
Poor to fair	1	0.54(0.31,0.94)	0.03	1.16(0.66,2.05)	0.61	0.97(0.53,1.78)	0.93	0.44
Family history of cardiovascular disease								0.59
No	1	0.96(0.71,1.31)	0.81	0.96(0.66,1.40)	0.82	0.74(0.49,1.12)	0.16	0.20
Yes	1	1.14(0.58,2.24)	0.70	1.28(0.73,2.22)	0.39	1.38(0.72,2.64)	0.33	0.28

Cardiovascular disease							0.42
No	1	1.05(0.73,1.51) 0.79	1.16(0.75,1.79) 0.51	0.79(0.48,1.31) 0.36	0.51		
Yes	1	0.97(0.62,1.52) 0.89	0.88(0.55,1.42) 0.61	1.00(0.63,1.57) 0.99	0.87		
Chronic obstructive pulmonary diseases							0.33
No	1	0.93(0.69,1.26) 0.65	1.05(0.75,1.47) 0.77	0.87(0.60,1.25) 0.45	0.65		
Yes	1	1.70(0.79,3.65) 0.17	0.63(0.21,1.87) 0.41	0.88(0.29,2.72) 0.83	0.51		
History of chronic kidney disease							0.02
No	1	0.98(0.73,1.32) 0.89	1.00(0.71,1.40) 0.99	0.79(0.54,1.14) 0.21	0.27		
Yes	1	1.38(0.29,6.59) 0.68	1.80(0.38,8.63) 0.46	2.66(0.19,37.23) 0.47	0.47		
Cancer							0.71
No	1	1.05(0.75,1.46) 0.79	1.04(0.70,1.55) 0.84	0.85(0.55,1.29) 0.43	0.50		
Yes	1	0.88(0.42,1.85) 0.74	1.15(0.58,2.28) 0.69	0.98(0.49,1.95) 0.96	0.85		
Cancer mortality							
Sex							0.45
Male	1	0.87(0.56,1.34) 0.52	0.88(0.56,1.38) 0.58	0.61(0.36,1.03) 0.06	0.09		
Female	1	0.67(0.43,1.04) 0.08	0.49(0.31,0.79) 0.003	0.53(0.31,0.91) 0.02	0.01		
Age, years							0.77
<60	1	0.68(0.36,1.29) 0.24	0.61(0.34,1.09) 0.10	0.41(0.20,0.85) 0.02	0.01		
≥60	1	0.87(0.58,1.28) 0.47	0.80(0.53,1.21) 0.29	0.69(0.43,1.10) 0.12	0.11		
BMI, kg/m ²							0.59
Normal weight (<25)	1	1.09(0.62,1.92) 0.77	0.85(0.52,1.37) 0.50	0.62(0.33,1.14) 0.12	0.08		
Overweight (25-30)	1	0.62(0.34,1.13) 0.12	0.68(0.38,1.21) 0.19	0.65(0.32,1.32) 0.23	0.31		
Obesity (≥30)	1	0.76(0.44,1.31) 0.32	0.68(0.39,1.17) 0.16	0.43(0.24,0.78) 0.01	0.01		
Race							0.33
Non-Hispanic White	1	0.80(0.55,1.18) 0.27	0.65(0.43,0.98) 0.04	0.54(0.33,0.89) 0.01	0.01		
Non-Hispanic Black	1	0.83(0.44,1.54) 0.55	0.87(0.45,1.67) 0.68	0.88(0.38,2.07) 0.77	0.76		
Mexican American	1	0.70(0.25,1.95) 0.50	0.89(0.25,3.20) 0.86	0.22(0.05,1.01) 0.05	0.12		
Others	1	0.38(0.13,1.13) 0.08	1.70(0.59,4.89) 0.32	0.96(0.27,3.35) 0.94	0.55		
Education level							0.02
Less than high school	1	0.54(0.28,1.04) 0.07	0.79(0.48,1.30) 0.35	0.65(0.38,1.11) 0.12	0.18		
High school or equivalent	1	0.85(0.42,1.73) 0.66	0.40(0.21,0.76) 0.01	1.03(0.54,1.96) 0.93	0.65		
College or above	1	0.85(0.50,1.43) 0.54	0.78(0.44,1.39) 0.41	0.37(0.19,0.71) 0.003	0.002		
Family income-poverty ratio							0.79
<1.0	1	0.91(0.45,1.84) 0.80	0.60(0.27,1.34) 0.22	0.73(0.30,1.76) 0.48	0.33		
1.0-3.0	1	1.00(0.64,1.55) 0.99	0.86(0.52,1.41) 0.54	0.69(0.39,1.23) 0.21	0.18		
>3.0	1	0.59(0.32,1.09) 0.09	0.62(0.36,1.08) 0.09	0.47(0.25,0.90) 0.02	0.03		
Smoking status							0.66
Never	1	0.81(0.47,1.42) 0.46	0.57(0.31,1.05) 0.07	0.50(0.25,1.02) 0.06	0.02		
Former	1	1.00(0.56,1.79) 1.00	0.94(0.53,1.69) 0.84	0.63(0.34,1.18) 0.15	0.13		
Current	1	0.49(0.26,0.91) 0.02	0.57(0.30,1.09) 0.09	0.57(0.26,1.29) 0.18	0.17		
Alcohol drinking							0.17
Never	1	1.17(0.71,1.92) 0.53	0.63(0.35,1.14) 0.13	0.79(0.41,1.50) 0.47	0.17		
Low to moderate	1	0.70(0.43,1.13) 0.14	0.80(0.48,1.33) 0.38	0.47(0.25,0.88) 0.02	0.03		
Heavy	1	0.44(0.19,0.99) 0.05	0.65(0.34,1.23) 0.19	0.60(0.27,1.33) 0.21	0.29		
Healthy eating index score							0.33
Quarter 1	1	0.88(0.46,1.67) 0.69	0.43(0.20,0.96) 0.04	0.67(0.28,1.59) 0.36	0.10		
Quarter 2	1	0.53(0.27,1.04) 0.07	0.35(0.17,0.70) 0.003	0.47(0.23,0.96) 0.04	0.01		
Quarter 3	1	0.78(0.37,1.61) 0.49	1.03(0.50,2.12) 0.93	0.69(0.32,1.47) 0.34	0.58		
Quarter 4	1	1.00(0.50,2.02) 0.99	1.09(0.53,2.27) 0.81	0.65(0.32,1.32) 0.23	0.17		
Total energy intake from diet, kcal							0.86
[0,1445.5]	1	0.68(0.37,1.24) 0.21	0.86(0.46,1.61) 0.64	0.57(0.28,1.15) 0.12	0.16		
(1445.5,1908]	1	1.02(0.52,1.97) 0.96	0.75(0.36,1.55) 0.43	0.50(0.24,1.06) 0.07	0.07		
(1908,2494.5]	1	0.72(0.33,1.58) 0.41	0.57(0.28,1.15) 0.11	0.52(0.22,1.24) 0.14	0.13		
(2494.5,15594]	1	0.81(0.38,1.73) 0.59	0.96(0.47,1.94) 0.91	0.79(0.34,1.84) 0.59	0.73		
Self reported health							0.43
Very good to excellent	1	0.54(0.28,1.04) 0.07	0.77(0.42,1.40) 0.39	0.67(0.35,1.30) 0.24	0.33		
Good	1	0.78(0.44,1.38) 0.39	0.62(0.35,1.07) 0.08	0.62(0.33,1.18) 0.14	0.09		

Poor to fair	1	0.95(0.55,1.66) 0.86	0.79(0.45,1.40) 0.43	0.53(0.30,0.95) 0.03	0.02	
Family history of cardiovascular disease						0.49
No	1	0.86(0.59,1.25) 0.42	0.85(0.58,1.25) 0.41	0.63(0.39,1.01) 0.06	0.06	
Yes	1	0.64(0.35,1.18) 0.16	0.43(0.22,0.84) 0.01	0.49(0.25,0.93) 0.03	0.02	
Cardiovascular disease						0.36
No	1	0.70(0.49,0.99) 0.04	0.66(0.45,0.98) 0.04	0.57(0.37,0.88) 0.01	0.01	
Yes	1	1.15(0.59,2.24) 0.67	0.99(0.52,1.87) 0.97	0.59(0.28,1.26) 0.18	0.13	
Chronic obstructive pulmonary diseases						0.7
No	1	0.79(0.55,1.13) 0.20	0.70(0.49,1.01) 0.06	0.61(0.40,0.91) 0.02	0.01	
Yes	1	0.44(0.14,1.40) 0.17	0.82(0.26,2.60) 0.74	0.20(0.03,1.40) 0.11	0.16	
History of chronic kidney disease						0.98
No	1	0.79(0.56,1.11) 0.17	0.71(0.50,1.01) 0.06	0.57(0.38,0.87) 0.01	0.01	
Yes	1	0.57(0.09,3.58) 0.55	0.66(0.13,3.40) 0.62	0.31(0.04,2.21) 0.24	0.16	
Cancer						0.66
No	1	0.86(0.59,1.26) 0.44	0.70(0.47,1.04) 0.08	0.58(0.37,0.92) 0.02	0.01	
Yes	1	0.60(0.32,1.12) 0.11	0.67(0.36,1.22) 0.19	0.54(0.27,1.08) 0.08	0.12	
Other mortality						
Sex						0.87
Male	1	1.17(0.80,1.71) 0.42	0.93(0.62,1.37) 0.70	0.86(0.55,1.34) 0.50	0.32	
Female	1	1.03(0.77,1.37) 0.84	0.79(0.52,1.19) 0.26	0.83(0.57,1.21) 0.34	0.21	
Age, years						0.12
<60	1	1.36(0.78,2.37) 0.27	0.61(0.29,1.29) 0.20	1.13(0.54,2.36) 0.75	0.7	
≥60	1	1.02(0.80,1.28) 0.90	0.92(0.69,1.23) 0.58	0.76(0.59,0.97) 0.03	0.02	
BMI, kg/m ²						0.66
Normal weight (<25)	1	1.02(0.66,1.57) 0.92	1.01(0.63,1.60) 0.98	0.80(0.49,1.31) 0.37	0.42	
Overweight (25-30)	1	1.31(0.91,1.90) 0.15	0.87(0.56,1.33) 0.51	0.94(0.56,1.56) 0.80	0.45	
Obesity (≥30)	1	0.99(0.63,1.57) 0.97	0.68(0.36,1.25) 0.21	0.78(0.47,1.32) 0.36	0.21	
Race						0.43
Non-Hispanic White	1	1.05(0.78,1.43) 0.74	0.83(0.57,1.20) 0.32	0.79(0.56,1.12) 0.19	0.11	
Non-Hispanic Black	1	1.24(0.70,2.19) 0.46	0.63(0.34,1.17) 0.14	1.11(0.64,1.92) 0.70	0.76	
Mexican American	1	2.55(1.01,6.41) 0.05	1.35(0.61,3.01) 0.46	1.04(0.32,3.40) 0.95	0.92	
Others	1	1.92(0.93,3.96) 0.08	1.60(0.82,3.13) 0.17	0.75(0.25,2.23) 0.60	0.40	
Education level						0.28
Less than high school	1	0.90(0.60,1.35) 0.62	0.77(0.49,1.21) 0.25	1.16(0.66,2.05) 0.61	0.89	
High school or equivalent	1	1.17(0.77,1.79) 0.46	0.65(0.35,1.22) 0.18	0.56(0.31,0.99) 0.05	0.02	
College or above	1	1.36(0.87,2.15) 0.18	1.06(0.65,1.73) 0.81	0.97(0.58,1.62) 0.90	0.56	
Family income-poverty ratio						0.55
<1.0	1	0.94(0.57,1.53) 0.79	0.44(0.23,0.85) 0.01	0.69(0.36,1.35) 0.28	0.11	
1.0-3.0	1	1.31(0.96,1.79) 0.09	1.08(0.74,1.59) 0.68	0.94(0.67,1.32) 0.72	0.58	
>3.0	1	1.06(0.63,1.78) 0.84	0.80(0.46,1.38) 0.42	0.83(0.47,1.49) 0.54	0.40	
Smoking status						0.48
Never	1	1.12(0.73,1.72) 0.60	1.01(0.63,1.61) 0.98	0.76(0.44,1.29) 0.31	0.28	
Former	1	1.09(0.74,1.60) 0.68	0.68(0.46,1.01) 0.06	0.87(0.57,1.31) 0.49	0.19	
Current	1	1.10(0.65,1.84) 0.73	0.78(0.41,1.50) 0.45	0.91(0.42,1.96) 0.81	0.59	
Alcohol drinking						0.30
Never	1	1.28(0.82,1.97) 0.27	1.00(0.63,1.59) 0.98	1.12(0.69,1.83) 0.64	0.90	
Low to moderate	1	0.96(0.63,1.45) 0.84	0.82(0.52,1.29) 0.39	0.85(0.52,1.37) 0.49	0.41	
Heavy	1	1.14(0.64,2.05) 0.65	0.62(0.37,1.06) 0.08	0.42(0.20,0.90) 0.02	0.004	
Healthy eating index score						0.22
Quarter 1	1	1.12(0.69,1.82) 0.66	0.71(0.40,1.26) 0.24	0.90(0.37,2.17) 0.81	0.49	
Quarter 2	1	0.84(0.52,1.36) 0.48	0.63(0.38,1.05) 0.08	0.91(0.51,1.62) 0.75	0.48	
Quarter 3	1	1.37(0.89,2.12) 0.15	1.04(0.65,1.66) 0.88	1.49(0.78,2.84) 0.23	0.45	
Quarter 4	1	1.36(0.79,2.35) 0.26	1.04(0.58,1.87) 0.89	0.62(0.36,1.08) 0.09	0.01	
Total energy intake from diet, kcal						0.89
[0,1445.5]	1	1.12(0.82,1.53) 0.47	0.75(0.50,1.13) 0.17	0.86(0.53,1.41) 0.56	0.34	
(1445.5,1908]	1	0.88(0.55,1.41) 0.60	0.78(0.48,1.28) 0.32	0.99(0.55,1.77) 0.97	0.81	
(1908,2494.5]	1	1.39(0.83,2.33) 0.21	0.93(0.52,1.65) 0.80	0.76(0.40,1.42) 0.38	0.17	

(2494.5,15594]	1	1.30(0.54,3.15) 0.56	1.05(0.39,2.85) 0.93	0.87(0.33,2.29) 0.78	0.43
Self reported health					0.23
Very good to excellent	1	0.97(0.64,1.47) 0.90	0.66(0.41,1.05) 0.08	1.01(0.65,1.58) 0.96	0.66
Good	1	1.40(0.94,2.09) 0.10	1.00(0.62,1.60) 0.99	0.94(0.54,1.62) 0.81	0.53
Poor to fair	1	1.01(0.62,1.62) 0.98	0.87(0.51,1.48) 0.60	0.63(0.35,1.13) 0.12	0.09
Family history of cardiovascular disease					0.59
No	1	1.11(0.82,1.51) 0.49	0.93(0.65,1.33) 0.69	0.91(0.64,1.31) 0.61	0.42
Yes	1	1.24(0.77,2.01) 0.38	0.68(0.42,1.11) 0.12	0.71(0.44,1.15) 0.16	0.04
Cardiovascular disease					0.71
No	1	1.14(0.84,1.53) 0.41	0.89(0.62,1.29) 0.55	0.92(0.64,1.31) 0.63	0.40
Yes	1	1.24(0.80,1.94) 0.34	0.88(0.55,1.41) 0.59	0.79(0.46,1.36) 0.40	0.24
Chronic obstructive pulmonary diseases					0.86
No	1	1.16(0.87,1.56) 0.31	0.87(0.62,1.22) 0.41	0.87(0.63,1.20) 0.40	0.17
Yes	1	0.88(0.48,1.58) 0.66	0.73(0.40,1.34) 0.31	0.76(0.40,1.43) 0.40	0.35
History of chronic kidney disease					0.83
No	1	1.14(0.87,1.49) 0.34	0.87(0.63,1.21) 0.41	0.85(0.63,1.14) 0.28	0.13
Yes	1	0.94(0.23,3.85) 0.93	0.71(0.13,3.90) 0.70	1.04(0.18,6.06) 0.96	0.98
Cancer					0.76
No	1	1.18(0.88,1.60) 0.27	0.83(0.57,1.21) 0.32	0.87(0.61,1.24) 0.44	0.19
Yes	1	1.03(0.58,1.83) 0.92	0.90(0.52,1.55) 0.71	0.80(0.41,1.57) 0.52	0.43

Adjusted for sex, age, race, BMI, educational level, smoking status, drinking status, family income poverty ratio, healthy eating index-2015, total energy intake from the diet, self-reported health status, family history of cardiovascular diseases, self-reported cardiovascular disease, self-reported chronic obstructive pulmonary disease, self-reported chronic kidney disease, and self-reported cancer.

Supplementary Table 3 Sensitivity analysis of hazard ratios for vitamin levels with all-cause and CVD mortality in prediabetes after excluding participants who experienced an outcome event within the first three years of follow-up

	Quartiles of vitamin levels					<i>P</i> _{trend}
	Q1	Q2	Q3	Q4		
Vitamin A						
All-cause mortality						
Crude model h(95% CI) <i>P</i> -value	1	1.02(0.84,1.25) 0.81	1.16(0.96,1.40) 0.12	1.01(0.83,1.23) 0.91		0.65
Model 1 h(95% CI) <i>P</i> -value	1	0.85(0.70,1.03) 0.11	0.82(0.68,0.98) 0.03	0.75(0.61,0.92) 0.01		0.01
Model 2 h(95% CI) <i>P</i> -value	1	0.91(0.75,1.10) 0.33	0.91(0.76,1.09) 0.30	0.84(0.67,1.04) 0.11		0.16
Model 3 h(95% CI) <i>P</i> -value	1	0.90(0.73,1.09) 0.28	0.92(0.77,1.10) 0.35	0.83(0.66,1.04) 0.11		0.16
CVD mortality						
Crude model h(95% CI) <i>P</i> -value	1	1.24(0.89,1.72) 0.20	1.42(1.03,1.96) 0.03	1.36(0.98,1.89) 0.07		0.08
Model 1 h(95% CI) <i>P</i> -value	1	1.00(0.71,1.41) 0.99	0.94(0.68,1.29) 0.69	0.96(0.68,1.35) 0.81		0.77
Model 2 h(95% CI) <i>P</i> -value	1	1.05(0.73,1.52) 0.79	1.07(0.77,1.50) 0.68	1.13(0.78,1.64) 0.51		0.53
Model 3 h(95% CI) <i>P</i> -value	1	1.04(0.71,1.51) 0.85	1.10(0.77,1.56) 0.60	1.13(0.76,1.67) 0.55		0.53
Cancer mortality						
Crude model h(95% CI) <i>P</i> -value	1	0.87(0.61,1.24) 0.44	1.00(0.72,1.40) 0.99	0.86(0.57,1.29) 0.46		0.62
Model 1 h(95% CI) <i>P</i> -value	1	0.74(0.52,1.04) 0.09	0.73(0.53,1.01) 0.06	0.65(0.44,0.96) 0.03		0.04
Model 2 h(95% CI) <i>P</i> -value	1	0.77(0.54,1.11) 0.16	0.77(0.55,1.07) 0.12	0.67(0.44,1.02) 0.06		0.08
Model 3 h(95% CI) <i>P</i> -value	1	0.79(0.55,1.13) 0.20	0.78(0.56,1.09) 0.15	0.67(0.44,1.02) 0.06		0.06
Other mortality						
Crude model h(95% CI) <i>P</i> -value	1	1.01(0.76,1.35) 0.95	1.13(0.86,1.48) 0.39	0.92(0.70,1.23) 0.59		0.76
Model 1 h(95% CI) <i>P</i> -value	1	0.85(0.64,1.14) 0.28	0.82(0.61,1.10) 0.18	0.70(0.52,0.95) 0.02		0.03
Model 2 h(95% CI) <i>P</i> -value	1	0.93(0.70,1.24) 0.61	0.91(0.68,1.23) 0.55	0.79(0.57,1.10) 0.16		0.18
Model 3 h(95% CI) <i>P</i> -value	1	0.91(0.67,1.23) 0.53	0.91(0.69,1.22) 0.55	0.78(0.55,1.09) 0.15		0.17
Vitamin B1						
All-cause mortality						
Crude model h(95% CI) <i>P</i> -value	1	0.91(0.77,1.08) 0.29	0.92(0.76,1.10) 0.34	0.71(0.58,0.86) <0.001		0.001
Model 1 h(95% CI) <i>P</i> -value	1	0.89(0.77,1.04) 0.15	0.87(0.72,1.04) 0.13	0.78(0.63,0.97) 0.02		0.03
Model 2 h(95% CI) <i>P</i> -value	1	0.93(0.79,1.09) 0.37	0.96(0.79,1.17) 0.71	0.86(0.69,1.09) 0.21		0.31
Model 3 h(95% CI) <i>P</i> -value	1	0.93(0.78,1.11) 0.42	0.99(0.81,1.22) 0.96	0.89(0.70,1.15) 0.38		0.53
CVD mortality						
Crude model h(95% CI) <i>P</i> -value	1	1.06(0.76,1.48) 0.74	1.07(0.76,1.49) 0.70	0.81(0.54,1.21) 0.30		0.32
Model 1 h(95% CI) <i>P</i> -value	1	1.04(0.76,1.43) 0.81	0.99(0.71,1.38) 0.94	0.88(0.59,1.33) 0.55		0.51
Model 2 h(95% CI) <i>P</i> -value	1	1.12(0.81,1.55) 0.49	1.13(0.81,1.58) 0.48	1.05(0.68,1.62) 0.82		0.82
Model 3 h(95% CI) <i>P</i> -value	1	1.15(0.82,1.62) 0.42	1.20(0.85,1.69) 0.31	1.17(0.75,1.81) 0.49		0.47
Cancer mortality						
Crude model h(95% CI) <i>P</i> -value	1	0.67(0.49,0.92) 0.01	0.72(0.50,1.04) 0.08	0.75(0.50,1.11) 0.15		0.21

Model 1 h(95% CI) <i>P</i> -value	1	0.63(0.46,0.87) 0.005	0.65(0.45,0.93) 0.02	0.76(0.51,1.13) 0.18	0.22
Model 2 h(95% CI) <i>P</i> -value	1	0.62(0.45,0.86) 0.004	0.66(0.46,0.96) 0.03	0.75(0.50,1.13) 0.17	0.26
Model 3 h(95% CI) <i>P</i> -value	1	0.61(0.44,0.85) 0.003	0.68(0.47,0.98) 0.04	0.74(0.49,1.11) 0.15	0.26
Other mortality					
Crude model h(95% CI) <i>P</i> -value	1	1.00(0.79,1.26) 0.98	0.96(0.74,1.24) 0.75	0.62(0.47,0.81) <0.001	<0.001
Model 1 h(95% CI) <i>P</i> -value	1	1.00(0.79,1.26) 0.98	0.96(0.75,1.24) 0.76	0.73(0.54,0.99) 0.04	0.05
Model 2 h(95% CI) <i>P</i> -value	1	1.05(0.82,1.35) 0.69	1.10(0.82,1.47) 0.52	0.81(0.57,1.16) 0.26	0.37
Model 3 h(95% CI) <i>P</i> -value	1	1.05(0.81,1.36) 0.73	1.14(0.84,1.54) 0.41	0.84(0.57,1.22) 0.35	0.5
Vitamin B2					
All-cause mortality					
Crude model h(95% CI) <i>P</i> -value	1	1.04(0.86,1.26) 0.66	0.95(0.80,1.12) 0.54	0.89(0.73,1.10) 0.28	0.16
Model 1 h(95% CI) <i>P</i> -value	1	0.86(0.72,1.03) 0.10	0.76(0.64,0.91) 0.002	0.83(0.66,1.03) 0.09	0.07
Model 2 h(95% CI) <i>P</i> -value	1	0.88(0.72,1.07) 0.18	0.78(0.64,0.93) 0.01	0.85(0.66,1.10) 0.21	0.19
Model 3 h(95% CI) <i>P</i> -value	1	0.90(0.74,1.10) 0.30	0.78(0.65,0.94) 0.01	0.88(0.68,1.14) 0.34	0.27
CVD mortality					
Crude model h(95% CI) <i>P</i> -value	1	1.39(1.04,1.84) 0.02	1.22(0.90,1.65) 0.21	1.18(0.82,1.72) 0.37	0.68
Model 1 h(95% CI) <i>P</i> -value	1	1.12(0.85,1.49) 0.41	0.96(0.71,1.30) 0.80	1.10(0.76,1.61) 0.61	0.86
Model 2 h(95% CI) <i>P</i> -value	1	1.20(0.91,1.60) 0.20	1.08(0.76,1.51) 0.68	1.31(0.85,2.03) 0.22	0.36
Model 3 h(95% CI) <i>P</i> -value	1	1.25(0.93,1.68) 0.14	1.10(0.78,1.54) 0.59	1.40(0.89,2.21) 0.15	0.27
Cancer mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.83(0.57,1.21) 0.34	0.69(0.47,1.01) 0.06	0.88(0.60,1.30) 0.52	0.48
Model 1 h(95% CI) <i>P</i> -value	1	0.68(0.46,0.99) 0.04	0.53(0.36,0.78) 0.001	0.75(0.51,1.09) 0.14	0.17
Model 2 h(95% CI) <i>P</i> -value	1	0.65(0.43,0.98) 0.04	0.50(0.35,0.71) <0.001	0.67(0.45,1.02) 0.06	0.08
Model 3 h(95% CI) <i>P</i> -value	1	0.66(0.44,0.99) 0.05	0.50(0.35,0.71) <0.001	0.67(0.45,1.01) 0.06	0.08
Other mortality					
Crude model h(95% CI) <i>P</i> -value	1	1.01(0.78,1.31) 0.96	0.99(0.78,1.25) 0.92	0.75(0.54,1.04) 0.08	0.07
Model 1 h(95% CI) <i>P</i> -value	1	0.85(0.65,1.09) 0.20	0.82(0.63,1.06) 0.13	0.73(0.52,1.03) 0.07	0.09
Model 2 h(95% CI) <i>P</i> -value	1	0.86(0.66,1.13) 0.27	0.83(0.62,1.11) 0.20	0.74(0.48,1.14) 0.17	0.2
Model 3 h(95% CI) <i>P</i> -value	1	0.89(0.67,1.16) 0.38	0.83(0.62,1.11) 0.20	0.76(0.49,1.18) 0.23	0.23
Niacin					
All-cause mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.86(0.73,1.00) 0.05	0.72(0.60,0.87) <0.001	0.57(0.47,0.70) <0.0001	<0.0001
Model 1 h(95% CI) <i>P</i> -value	1	0.90(0.78,1.04) 0.15	0.79(0.66,0.94) 0.01	0.78(0.64,0.95) 0.01	0.005
Model 2 h(95% CI) <i>P</i> -value	1	0.92(0.79,1.07) 0.29	0.85(0.69,1.03) 0.10	0.82(0.66,1.01) 0.07	0.05
Model 3 h(95% CI) <i>P</i> -value	1	0.93(0.79,1.11) 0.43	0.87(0.72,1.06) 0.17	0.84(0.67,1.04) 0.11	0.08
CVD mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.95(0.69,1.32) 0.78	0.79(0.57,1.08) 0.14	0.63(0.41,0.98) 0.04	0.02
Model 1 h(95% CI) <i>P</i> -value	1	1.00(0.73,1.38) 0.99	0.85(0.63,1.17) 0.32	0.90(0.60,1.35) 0.61	0.44

Model 2 h(95% CI) <i>P</i> -value	1	1.03(0.75,1.41) 0.85	0.96(0.69,1.33) 0.79	1.04(0.68,1.60) 0.86	0.97
Model 3 h(95% CI) <i>P</i> -value	1	1.05(0.76,1.47) 0.76	0.98(0.71,1.36) 0.91	1.09(0.71,1.67) 0.68	0.8
Cancer mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.66(0.47,0.91) 0.01	0.73(0.50,1.07) 0.11	0.62(0.42,0.91) 0.01	0.03
Model 1 h(95% CI) <i>P</i> -value	1	0.66(0.48,0.91) 0.01	0.73(0.52,1.04) 0.09	0.73(0.50,1.06) 0.10	0.13
Model 2 h(95% CI) <i>P</i> -value	1	0.64(0.46,0.88) 0.01	0.74(0.51,1.07) 0.11	0.69(0.47,1.00) 0.05	0.09
Model 3 h(95% CI) <i>P</i> -value	1	0.64(0.46,0.89) 0.01	0.76(0.53,1.09) 0.13	0.69(0.48,1.00) 0.05	0.1
Other mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.93(0.72,1.20) 0.58	0.68(0.51,0.90) 0.01	0.51(0.38,0.68) <0.0001	<0.0001
Model 1 h(95% CI) <i>P</i> -value	1	1.00(0.78,1.29) 1.00	0.78(0.57,1.07) 0.12	0.74(0.53,1.03) 0.07	0.03
Model 2 h(95% CI) <i>P</i> -value	1	1.04(0.78,1.39) 0.77	0.85(0.59,1.22) 0.36	0.77(0.53,1.13) 0.18	0.13
Model 3 h(95% CI) <i>P</i> -value	1	1.08(0.80,1.45) 0.61	0.88(0.61,1.25) 0.47	0.79(0.54,1.17) 0.24	0.17
Vitamin B6					
All-cause mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.84(0.71,0.99) 0.04	0.85(0.71,1.02) 0.09	0.72(0.60,0.87) <0.001	<0.001
Model 1 h(95% CI) <i>P</i> -value	1	0.89(0.77,1.03) 0.11	0.89(0.74,1.06) 0.20	0.83(0.68,1.00) 0.05	0.06
Model 2 h(95% CI) <i>P</i> -value	1	0.96(0.82,1.12) 0.57	0.97(0.79,1.20) 0.81	0.93(0.74,1.16) 0.51	0.6
Model 3 h(95% CI) <i>P</i> -value	1	1.01(0.86,1.18) 0.93	1.05(0.86,1.29) 0.62	0.96(0.77,1.20) 0.73	0.86
CVD mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.89(0.66,1.19) 0.42	0.90(0.66,1.22) 0.48	0.85(0.60,1.20) 0.35	0.37
Model 1 h(95% CI) <i>P</i> -value	1	0.93(0.70,1.24) 0.62	0.93(0.68,1.26) 0.63	0.97(0.69,1.37) 0.87	0.85
Model 2 h(95% CI) <i>P</i> -value	1	1.02(0.75,1.39) 0.91	1.05(0.76,1.44) 0.78	1.19(0.81,1.76) 0.36	0.36
Model 3 h(95% CI) <i>P</i> -value	1	1.06(0.78,1.45) 0.70	1.09(0.79,1.51) 0.61	1.25(0.85,1.84) 0.26	0.27
Cancer mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.64(0.45,0.91) 0.01	0.76(0.54,1.07) 0.12	0.67(0.47,0.95) 0.03	0.07
Model 1 h(95% CI) <i>P</i> -value	1	0.64(0.45,0.90) 0.01	0.74(0.53,1.04) 0.08	0.68(0.48,0.98) 0.04	0.08
Model 2 h(95% CI) <i>P</i> -value	1	0.65(0.46,0.91) 0.01	0.75(0.52,1.07) 0.11	0.66(0.45,0.96) 0.03	0.09
Model 3 h(95% CI) <i>P</i> -value	1	0.65(0.46,0.92) 0.01	0.79(0.56,1.13) 0.19	0.66(0.45,0.96) 0.03	0.1
Other mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.96(0.74,1.25) 0.75	0.89(0.68,1.17) 0.40	0.68(0.50,0.92) 0.01	0.01
Model 1 h(95% CI) <i>P</i> -value	1	1.05(0.83,1.34) 0.69	0.97(0.75,1.27) 0.84	0.83(0.60,1.14) 0.25	0.23
Model 2 h(95% CI) <i>P</i> -value	1	1.16(0.89,1.51) 0.27	1.10(0.81,1.50) 0.53	0.97(0.66,1.42) 0.89	0.84
Model 3 h(95% CI) <i>P</i> -value	1	1.29(0.99,1.68) 0.06	1.25(0.92,1.69) 0.15	1.04(0.72,1.49) 0.84	0.89
Folate					
All-cause mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.88(0.75,1.03) 0.12	0.90(0.75,1.07) 0.22	0.66(0.54,0.80) <0.0001	<0.0001
Model 1 h(95% CI) <i>P</i> -value	1	0.85(0.72,1.01) 0.06	0.92(0.78,1.09) 0.34	0.75(0.62,0.92) 0.005	0.01
Model 2 h(95% CI) <i>P</i> -value	1	0.91(0.77,1.07) 0.26	1.02(0.85,1.22) 0.82	0.82(0.66,1.03) 0.09	0.22

Model 3 h(95% CI) <i>P</i> -value	1	0.95(0.80,1.12) 0.52	1.04(0.86,1.25) 0.71	0.86(0.68,1.08) 0.20	0.36
CVD mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.95(0.72,1.25) 0.70	1.04(0.75,1.45) 0.80	0.70(0.50,1.00) 0.05	0.1
Model 1 h(95% CI) <i>P</i> -value	1	0.89(0.66,1.20) 0.46	1.07(0.78,1.46) 0.66	0.80(0.56,1.13) 0.20	0.42
Model 2 h(95% CI) <i>P</i> -value	1	0.98(0.73,1.32) 0.90	1.24(0.91,1.68) 0.17	0.95(0.67,1.36) 0.80	0.8
Model 3 h(95% CI) <i>P</i> -value	1	1.03(0.76,1.41) 0.83	1.33(0.97,1.83) 0.08	1.04(0.73,1.49) 0.83	0.46
Cancer mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.94(0.67,1.31) 0.71	0.88(0.60,1.28) 0.50	0.72(0.47,1.11) 0.14	0.13
Model 1 h(95% CI) <i>P</i> -value	1	0.88(0.62,1.26) 0.49	0.85(0.58,1.25) 0.42	0.77(0.50,1.18) 0.22	0.22
Model 2 h(95% CI) <i>P</i> -value	1	0.92(0.64,1.32) 0.64	0.91(0.60,1.37) 0.65	0.78(0.49,1.24) 0.30	0.3
Model 3 h(95% CI) <i>P</i> -value	1	0.94(0.64,1.36) 0.72	0.90(0.59,1.38) 0.64	0.77(0.48,1.24) 0.29	0.28
Other mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.81(0.63,1.04) 0.09	0.82(0.63,1.07) 0.15	0.60(0.45,0.80) <0.001	<0.001
Model 1 h(95% CI) <i>P</i> -value	1	0.81(0.64,1.02) 0.07	0.88(0.68,1.14) 0.32	0.72(0.53,0.98) 0.04	0.05
Model 2 h(95% CI) <i>P</i> -value	1	0.86(0.67,1.11) 0.24	0.97(0.73,1.30) 0.85	0.77(0.54,1.10) 0.15	0.26
Model 3 h(95% CI) <i>P</i> -value	1	0.90(0.70,1.15) 0.40	0.96(0.72,1.28) 0.78	0.82(0.57,1.17) 0.27	0.36
Vitamin B12					
All-cause mortality					
Crude model h(95% CI) <i>P</i> -value	1	1.02(0.86,1.22) 0.82	1.05(0.87,1.28) 0.60	0.89(0.74,1.07) 0.21	0.24
Model 1 h(95% CI) <i>P</i> -value	1	0.95(0.80,1.14) 0.59	1.02(0.84,1.25) 0.81	0.87(0.71,1.06) 0.16	0.27
Model 2 h(95% CI) <i>P</i> -value	1	0.96(0.80,1.16) 0.70	1.05(0.85,1.29) 0.67	0.90(0.73,1.10) 0.30	0.46
Model 3 h(95% CI) <i>P</i> -value	1	0.96(0.80,1.16) 0.68	1.02(0.84,1.24) 0.84	0.89(0.72,1.10) 0.27	0.38
CVD mortality					
Crude model h(95% CI) <i>P</i> -value	1	1.00(0.70,1.45) 0.98	1.01(0.72,1.40) 0.97	0.94(0.66,1.32) 0.71	0.72
Model 1 h(95% CI) <i>P</i> -value	1	0.90(0.63,1.28) 0.55	0.95(0.68,1.32) 0.74	0.88(0.62,1.23) 0.45	0.56
Model 2 h(95% CI) <i>P</i> -value	1	0.92(0.64,1.31) 0.63	0.99(0.70,1.39) 0.94	0.95(0.66,1.37) 0.79	0.94
Model 3 h(95% CI) <i>P</i> -value	1	0.91(0.63,1.31) 0.60	0.96(0.68,1.36) 0.83	0.95(0.65,1.38) 0.77	0.9
Cancer mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.77(0.56,1.05) 0.10	0.78(0.55,1.10) 0.16	0.91(0.60,1.36) 0.64	0.73
Model 1 h(95% CI) <i>P</i> -value	1	0.71(0.51,0.98) 0.04	0.73(0.52,1.02) 0.07	0.84(0.57,1.25) 0.39	0.54
Model 2 h(95% CI) <i>P</i> -value	1	0.71(0.51,0.99) 0.04	0.72(0.51,1.00) 0.05	0.82(0.55,1.22) 0.32	0.46
Model 3 h(95% CI) <i>P</i> -value	1	0.71(0.51,0.99) 0.04	0.71(0.51,0.99) 0.05	0.80(0.54,1.20) 0.28	0.42
Other mortality					
Crude model h(95% CI) <i>P</i> -value	1	1.24(0.98,1.56) 0.07	1.31(1.00,1.74) 0.05	0.84(0.64,1.09) 0.19	0.23
Model 1 h(95% CI) <i>P</i> -value	1	1.19(0.92,1.54) 0.17	1.34(0.99,1.80) 0.06	0.87(0.64,1.18) 0.36	0.49
Model 2 h(95% CI) <i>P</i> -value	1	1.21(0.92,1.59) 0.17	1.37(1.01,1.87) 0.05	0.90(0.66,1.23) 0.50	0.66
Model 3 h(95% CI) <i>P</i> -value	1	1.20(0.92,1.57) 0.17	1.32(0.98,1.76) 0.07	0.88(0.65,1.20) 0.43	0.52
Vitamin C					

All-cause mortality							
Crude model h(95% CI) <i>P</i> -value	1	0.83(0.68,1.03) 0.09	1.05(0.85,1.30) 0.64	0.89(0.71,1.10) 0.28	0.75		
Model 1 h(95% CI) <i>P</i> -value	1	0.74(0.62,0.89) <0.001	0.81(0.66,0.99) 0.04	0.76(0.62,0.93) 0.01	0.04		
Model 2 h(95% CI) <i>P</i> -value	1	0.82(0.69,0.98) 0.03	0.92(0.75,1.13) 0.44	0.89(0.72,1.11) 0.31	0.58		
Model 3 h(95% CI) <i>P</i> -value	1	0.82(0.69,0.97) 0.02	0.92(0.75,1.12) 0.40	0.89(0.72,1.11) 0.31	0.59		
CVD mortality							
Crude model h(95% CI) <i>P</i> -value	1	0.98(0.67,1.44) 0.92	1.27(0.89,1.80) 0.18	1.01(0.69,1.49) 0.95	0.61		
Model 1 h(95% CI) <i>P</i> -value	1	0.86(0.61,1.23) 0.41	0.93(0.67,1.31) 0.68	0.83(0.56,1.23) 0.36	0.49		
Model 2 h(95% CI) <i>P</i> -value	1	0.95(0.66,1.36) 0.79	1.08(0.74,1.56) 0.70	1.02(0.65,1.60) 0.94	0.8		
Model 3 h(95% CI) <i>P</i> -value	1	0.92(0.64,1.32) 0.64	1.05(0.72,1.53) 0.81	1.04(0.66,1.65) 0.86	0.71		
Cancer mortality							
Crude model h(95% CI) <i>P</i> -value	1	0.75(0.53,1.06) 0.11	0.99(0.68,1.43) 0.94	0.86(0.59,1.26) 0.44	0.79		
Model 1 h(95% CI) <i>P</i> -value	1	0.66(0.48,0.92) 0.01	0.77(0.55,1.08) 0.13	0.73(0.51,1.06) 0.10	0.23		
Model 2 h(95% CI) <i>P</i> -value	1	0.73(0.53,1.00) 0.05	0.85(0.60,1.21) 0.37	0.82(0.57,1.18) 0.29	0.51		
Model 3 h(95% CI) <i>P</i> -value	1	0.73(0.53,1.00) 0.05	0.85(0.60,1.20) 0.35	0.80(0.56,1.15) 0.23	0.44		
Other mortality							
Crude model h(95% CI) <i>P</i> -value	1	0.80(0.59,1.09) 0.16	0.97(0.69,1.36) 0.86	0.83(0.61,1.14) 0.25	0.49		
Model 1 h(95% CI) <i>P</i> -value	1	0.73(0.54,0.99) 0.04	0.77(0.54,1.08) 0.13	0.73(0.55,0.98) 0.04	0.08		
Model 2 h(95% CI) <i>P</i> -value	1	0.81(0.60,1.08) 0.15	0.87(0.62,1.23) 0.44	0.87(0.63,1.19) 0.37	0.52		
Model 3 h(95% CI) <i>P</i> -value	1	0.82(0.62,1.09) 0.17	0.87(0.62,1.23) 0.44	0.88(0.65,1.19) 0.41	0.54		
Vitamin D							
All-cause mortality							
Crude model h(95% CI) <i>P</i> -value	1	1.21(0.94,1.56) 0.15	1.49(1.12,1.99) 0.01	1.57(1.14,2.16) 0.01	0.002		
Model 1 h(95% CI) <i>P</i> -value	1	0.97(0.75,1.26) 0.83	1.08(0.84,1.38) 0.56	1.30(0.96,1.77) 0.09	0.05		
Model 2 h(95% CI) <i>P</i> -value	1	1.03(0.80,1.32) 0.82	1.22(0.95,1.55) 0.11	1.42(1.03,1.97) 0.03	0.02		
Model 3 h(95% CI) <i>P</i> -value	1	1.04(0.82,1.32) 0.73	1.18(0.91,1.51) 0.21	1.38(1.00,1.89) 0.05	0.03		
CVD mortality							
Crude model h(95% CI) <i>P</i> -value	1	1.62(1.00,2.63) 0.05	2.07(1.14,3.76) 0.02	2.20(1.14,4.25) 0.02	0.02		
Model 1 h(95% CI) <i>P</i> -value	1	1.24(0.75,2.06) 0.40	1.41(0.75,2.63) 0.28	1.75(0.92,3.32) 0.09	0.07		
Model 2 h(95% CI) <i>P</i> -value	1	1.27(0.76,2.12) 0.35	1.53(0.82,2.86) 0.18	1.90(0.97,3.72) 0.06	0.04		
Model 3 h(95% CI) <i>P</i> -value	1	1.26(0.77,2.05) 0.36	1.49(0.79,2.81) 0.22	1.79(0.90,3.55) 0.10	0.08		
Cancer mortality							
Crude model h(95% CI) <i>P</i> -value	1	1.09(0.60,1.98) 0.78	1.10(0.58,2.09) 0.76	1.24(0.71,2.17) 0.45	0.47		
Model 1 h(95% CI) <i>P</i> -value	1	0.88(0.49,1.58) 0.67	0.82(0.45,1.49) 0.52	1.02(0.59,1.78) 0.94	0.92		
Model 2 h(95% CI) <i>P</i> -value	1	0.91(0.51,1.62) 0.75	0.88(0.48,1.63) 0.69	1.03(0.58,1.83) 0.92	0.89		
Model 3 h(95% CI) <i>P</i> -value	1	0.99(0.56,1.73) 0.96	0.90(0.48,1.67) 0.73	1.08(0.61,1.90) 0.80	0.86		
Other mortality							
Crude model h(95% CI) <i>P</i> -value	1	1.09(0.74,1.62) 0.65	1.52(1.01,2.26) 0.04	1.51(0.96,2.38) 0.07	0.03		

Model 1 h(95% CI) <i>P</i> -value	1	0.91(0.62,1.35) 0.65	1.12(0.76,1.63) 0.57	1.30(0.84,2.02)0.23	0.13
Model 2 h(95% CI) <i>P</i> -value	1	1.01(0.68,1.51) 0.96	1.36(0.92,2.01) 0.12	1.52(0.94,2.48) 0.09	0.04
Model 3 h(95% CI) <i>P</i> -value	1	0.99(0.66,1.48) 0.95	1.27(0.87,1.86) 0.22	1.41(0.89,2.23) 0.14	0.07
Vitamin E					
All-cause mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.87(0.72,1.05) 0.13	0.69(0.57,0.84) <0.001	0.60(0.49,0.75) <0.0001	<0.0001
Model 1 h(95% CI) <i>P</i> -value	1	0.89(0.73,1.08) 0.25	0.72(0.59,0.89) 0.003	0.75(0.60,0.93) 0.01	0.002
Model 2 h(95% CI) <i>P</i> -value	1	0.91(0.74,1.12) 0.38	0.77(0.61,0.96) 0.02	0.81(0.62,1.06) 0.13	0.06
Model 3 h(95% CI) <i>P</i> -value	1	0.95(0.78,1.16) 0.61	0.80(0.63,1.00) 0.05	0.83(0.64,1.08) 0.17	0.08
CVD mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.88(0.66,1.16) 0.35	0.72(0.52,0.99) 0.04	0.84(0.58,1.20) 0.33	0.22
Model 1 h(95% CI) <i>P</i> -value	1	0.91(0.69,1.20) 0.51	0.76(0.54,1.06) 0.11	1.09(0.74,1.62) 0.66	0.95
Model 2 h(95% CI) <i>P</i> -value	1	0.99(0.74,1.32) 0.92	0.90(0.61,1.32) 0.58	1.40(0.91,2.17) 0.13	0.23
Model 3 h(95% CI) <i>P</i> -value	1	1.05(0.80,1.38) 0.74	0.95(0.64,1.42) 0.80	1.47(0.95,2.28) 0.08	0.17
Cancer mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.98(0.69,1.40) 0.92	0.81(0.52,1.25) 0.33	0.70(0.45,1.09) 0.12	0.09
Model 1 h(95% CI) <i>P</i> -value	1	0.98(0.69,1.39) 0.90	0.80(0.52,1.23) 0.30	0.78(0.51,1.20) 0.26	0.19
Model 2 h(95% CI) <i>P</i> -value	1	0.99(0.69,1.41) 0.94	0.82(0.53,1.25) 0.35	0.79(0.51,1.22) 0.28	0.2
Model 3 h(95% CI) <i>P</i> -value	1	0.99(0.70,1.41) 0.96	0.83(0.54,1.26) 0.38	0.77(0.50,1.19) 0.24	0.17
Other mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.80(0.59,1.08) 0.15	0.62(0.48,0.80) <0.001	0.42(0.31,0.56) <0.0001	<0.0001
Model 1 h(95% CI) <i>P</i> -value	1	0.84(0.61,1.14) 0.27	0.67(0.50,0.88) 0.005	0.54(0.39,0.74) <0.001	<0.0001
Model 2 h(95% CI) <i>P</i> -value	1	0.83(0.59,1.15) 0.26	0.66(0.48,0.90) 0.01	0.54(0.36,0.79) 0.002	<0.001
Model 3 h(95% CI) <i>P</i> -value	1	0.86(0.62,1.19) 0.37	0.68(0.50,0.93) 0.02	0.56(0.38,0.83) 0.004	0.002
Vitamin K					
All-cause mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.92(0.76,1.11) 0.38	0.84(0.69,1.03) 0.09	0.68(0.55,0.85) <0.001	<0.001
Model 1 h(95% CI) <i>P</i> -value	1	0.89(0.74,1.08) 0.25	0.83(0.69,1.01) 0.06	0.70(0.57,0.86) <0.001	<0.001
Model 2 h(95% CI) <i>P</i> -value	1	0.91(0.74,1.12) 0.39	0.91(0.74,1.11) 0.35	0.73(0.58,0.92) 0.01	0.01
Model 3 h(95% CI) <i>P</i> -value	1	0.92(0.75,1.15) 0.47	0.92(0.75,1.11) 0.37	0.75(0.59,0.94) 0.01	0.01
CVD mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.94(0.66,1.33) 0.73	1.18(0.81,1.71) 0.39	0.85(0.58,1.24) 0.40	0.73
Model 1 h(95% CI) <i>P</i> -value	1	0.89(0.62,1.29) 0.55	1.14(0.79,1.64) 0.50	0.88(0.60,1.29) 0.52	0.88
Model 2 h(95% CI) <i>P</i> -value	1	0.94(0.65,1.36) 0.73	1.29(0.88,1.89) 0.19	1.02(0.69,1.52) 0.92	0.51
Model 3 h(95% CI) <i>P</i> -value	1	0.96(0.66,1.41) 0.84	1.29(0.87,1.92) 0.21	1.07(0.71,1.60) 0.75	0.43
Cancer mortality					
Crude model h(95% CI) <i>P</i> -value	1	0.72(0.50,1.04) 0.08	0.71(0.50,1.02) 0.06	0.59(0.39,0.90) 0.02	0.01
Model 1 h(95% CI) <i>P</i> -value	1	0.70(0.49,1.02) 0.06	0.70(0.49,0.98) 0.04	0.59(0.38,0.91) 0.02	0.01

Model 2 h(95% CI) <i>P</i> -value	1	0.69(0.47,1.02) 0.06	0.70(0.49,1.00) 0.05	0.56(0.36,0.88) 0.01	0.01
Model 3 h(95% CI) <i>P</i> -value	1	0.68(0.45,1.00) 0.05	0.71(0.50,1.02) 0.06	0.55(0.35,0.86) 0.01	0.01
Other mortality					
Crude model h(95% CI) <i>P</i> -value	1	1.04(0.76,1.43) 0.80	0.74(0.51,1.07) 0.11	0.65(0.48,0.89) 0.01	0.002
Model 1 h(95% CI) <i>P</i> -value	1	1.03(0.77,1.38) 0.85	0.75(0.52,1.08) 0.12	0.68(0.51,0.90) 0.01	0.003
Model 2 h(95% CI) <i>P</i> -value	1	1.06(0.77,1.46) 0.73	0.84(0.57,1.23) 0.36	0.70(0.51,0.97) 0.03	0.02
Model 3 h(95% CI) <i>P</i> -value	1	1.08(0.79,1.49) 0.62	0.85(0.59,1.22) 0.37	0.72(0.52,1.00) 0.05	0.02

Data are presented as HR (95% CI) unless otherwise indicated. Crude model: without adjustment. Model 1: adjusted for sex, age, BMI, ethnicity, educational level, and family income poverty ratio. Model 2: adjusted for model 1 variables as well as smoking status, alcohol drinking status, HEI, and total energy intake from the diet. Model 3: adjusted for model 1 and model 2 variables as well as self-reported health status, family history of cardiovascular diseases, self-reported history of cardiovascular disease, self-reported chronic obstructive pulmonary disease, chronic kidney disease, and cancer.