

Supplementary Material

Supplementary Table 1: Cox-proportional hazard for all-cause mortality, CVD and cancer incidence and mortality by ethnicity.

	Total n	Deaths/ Events	White- Europeans HR (95%-CI)	South Asians HR (95%-CI)	p-value
All-cause mortality					
Model 0	465,037	12,974	1.00 (Ref)	1.04 (0.84; 1.24)	0.661
Model 1	465,037	12,974	1.00 (Ref)	1.14 (0.95; 1.37)	0.142
Model 2	465,037	12,974	1.00 (Ref)	0.94 (0.78; 1.12)	0.492
Model 3	395,203	7,932	1.00 (Ref)	0.84 (0.62; 1.12)	0.233
CVD mortality					
Model 0	448,240	3,251	1.00 (Ref)	1.73 (1.31; 2.29)	<0.0001
Model 1	448,240	3,251	1.00 (Ref)	1.69 (1.27; 2.24)	<0.0001
Model 2	448,240	3,251	1.00 (Ref)	1.42 (1.07; 1.89)	0.014
Model 3	395,203	2,381	1.00 (Ref)	1.28 (0.84; 1.97)	0.242
CVD incidence					
Model 0	448,239	30,347	1.00 (Ref)	1.93 (1.78; 2.11)	<0.0001
Model 1	448,239	30,347	1.00 (Ref)	1.89 (1.73; 2.06)	<0.0001
Model 2	448,239	30,347	1.00 (Ref)	1.78 (1.63; 1.94)	<0.0001
Model 3	395,202	24,648	1.00 (Ref)	1.80 (1.62; 2.01)	<0.0001
Cancer mortality					
Model 0	427,411	5,642	1.00 (Ref)	0.56 (0.39; 0.80)	0.002
Model 1	427,411	5,642	1.00 (Ref)	0.62 (0.43; 0.90)	0.012
Model 2	427,411	5,642	1.00 (Ref)	0.59 (0.41; 0.85)	0.005
Model 3	395,203	4,786	1.00 (Ref)	0.64 (0.41; 1.00)	0.052
Cancer incidence					
Model 0	427,410	27,159	1.00 (Ref)	0.77 (0.67; 0.89)	<0.0001
Model 1	427,410	27,159	1.00 (Ref)	0.81 (0.70; 0.93)	0.003
Model 2	427,410	27,159	1.00 (Ref)	0.80 (0.70; 0.92)	0.002
Model 3	395,202	24,287	1.00 (Ref)	0.84 (0.71; 0.99)	0.036

European participants were used as the reference categories. Participants were included if they were free of CVD at baseline for CVD outcomes and free of cancer at baseline for cancer outcomes. Model 0 was adjusted for age, sex, deprivation index, income and professional qualifications. Model 1 was additionally adjusted for smoking, red meat intake, processed meat intake, oily fish intake, fruit and vegetable intake, the frequency of alcohol intake, sedentary time, total physical activity, sleep duration, BMI, and comorbidities including CVD and cancer if these were not the main outcome. Model 2 was additionally adjusted for diabetes status. Model 3 was a sensitivity analysis of model 1, with participants with T2D were excluded from the analyses.

HR, hazard ratio; 95% CI, 95% confidence interval; n, number of participants; CVD, cardiovascular disease.

Supplementary Table 2: Cox-proportional hazard for all-cause mortality, CVD and cancer incidence and mortality by diabetes and ethnicity.

	Total n	Deaths/ Events	White-Europeans			South-Asians			p-value	p _(interaction)	
			Without T2D HR (95% CI)	With T2D HR (95% CI)	Total n	Deaths/ Events	Without T2D HR (95% CI)	With T2D HR (95% CI)			
All-cause mortality											
Model 0	457,935	12,852	1.00 (Ref)	1.77 (1.68; 1.87)	<0.001	7,102	122	1.00 (Ref)	2.36 (1.62; 3.45)	<0.001	0.299
Model 1	457,935	12,852	1.00 (Ref)	1.62 (1.53; 1.72)	<0.001	7,102	122	1.00 (Ref)	2.46 (1.67; 3.63)	<0.001	0.190
CVD mortality											
Model 0	441,505	3,200	1.00 (Ref)	2.36 (2.13; 2.61)	<0.001	6,735	51	1.00 (Ref)	3.88 (2.16; 6.97)	<0.001	0.366
Model 1	441,505	3,200	1.00 (Ref)	1.99 (1.79; 2.21)	<0.001	6,735	51	1.00 (Ref)	4.26 (2.32; 7.80)	<0.001	0.208
CVD incidence											
Model 0	441,504	29,806	1.00 (Ref)	1.58 (1.52; 1.64)	<0.001	6,735	541	1.00 (Ref)	1.63 (1.35; 1.97)	0.012	0.663
Model 1	441,504	29,806	1.00 (Ref)	1.36 (1.31; 1.43)	<0.001	6,735	541	1.00 (Ref)	1.62 (1.33; 1.97)	0.019	0.634
Cancer mortality											
Model 0	420,558	5,613	1.00 (Ref)	1.38 (1.25; 1.51)	<0.001	6,853	29	1.00 (Ref)	1.36 (0.59; 3.09)	0.470	0.627
Model 1	420,558	5,613	1.00 (Ref)	1.30 (1.18; 1.43)	<0.001	6,853	29	1.00 (Ref)	1.56 (0.67; 3.65)	0.307	0.713
Cancer incidence											
Model 0	420,557	26,963	1.00 (Ref)	1.07 (1.02; 1.13)	0.010	6,853	196	1.00 (Ref)	1.04 (0.74; 1.47)	0.820	0.645
Model 1	420,557	26,963	1.00 (Ref)	1.05 (0.99; 1.10)	0.097	6,853	196	1.00 (Ref)	1.05 (0.74; 1.50)	0.776	0.735

Participants without T2D were used as the reference categories. Participants were included if they were free of CVD at baseline for CVD outcomes and free of cancer at baseline for cancer outcomes. Model 0 was adjusted for age, sex, deprivation index, income and professional qualifications. Model 1 was additionally adjusted for smoking, red meat intake, processed meat intake, oily fish intake, fruit and vegetable intake, the frequency of alcohol intake, sedentary time, total physical activity, sleep duration and BMI.

HR, hazard ratio; 95% CI, 95% confidence interval; n, number of participants; CVD, cardiovascular disease.

Supplementary Table 3: Cox-proportional hazard for all-cause mortality, CVD and cancer incidence and mortality by ethnicity after adjusting for different markers of adiposity.

	Total n	Deaths/ Events	White- Europeans HR (95%-CI)	South Asians HR (95%-CI)	p-value
All-cause mortality					
Adjusted for BMI	465,037	12,974	1.00 (Ref)	1.04 (0.84; 1.24)	0.661
Adjusted for WC	465,037	12,974	1.00 (Ref)	1.06 (1.09; 1.10)	<0.0001
Adjusted for Body Fat	465,037	12,974	1.00 (Ref)	1.06 (0.88; 1.27)	0.553
Adjusted for all three	395,203	7,932	1.00 (Ref)	1.08 (0.90; 1.30)	0.419
CVD mortality					
Adjusted for BMI	448,240	3,251	1.00 (Ref)	1.73 (1.31; 2.29)	<0.0001
Adjusted for WC	448,240	3,251	1.00 (Ref)	1.71 (1.29; 2.27)	<0.0001
Adjusted for Body Fat	448,240	3,251	1.00 (Ref)	1.70 (1.27; 2.27)	<0.0001
Adjusted for all three	395,203	2,381	1.00 (Ref)	1.81 (1.36; 2.42)	<0.0001
CVD incidence					
Adjusted for BMI	448,239	30,347	1.00 (Ref)	1.93 (1.78; 2.11)	<0.0001
Adjusted for WC	448,239	30,347	1.00 (Ref)	1.87 (1.72; 2.04)	<0.0001
Adjusted for Body Fat	448,239	30,347	1.00 (Ref)	1.84 (1.68; 2.01)	<0.0001
Adjusted for all three	395,202	24,648	1.00 (Ref)	1.94 (1.77; 2.12)	<0.0001
Cancer mortality					
Adjusted for BMI	427,411	5,642	1.00 (Ref)	0.56 (0.39; 0.80)	0.002
Adjusted for WC	427,411	5,642	1.00 (Ref)	0.63 (0.43; 0.90)	0.013
Adjusted for Body Fat	427,411	5,642	1.00 (Ref)	0.65 (0.45; 0.94)	0.022
Adjusted for all three	395,203	4,786	1.00 (Ref)	0.66 (0.46; 0.95)	0.026
Cancer incidence					
Adjusted for BMI	427,410	27,159	1.00 (Ref)	0.77 (0.67; 0.89)	<0.0001
Adjusted for WC	427,410	27,159	1.00 (Ref)	0.81 (0.70; 0.93)	0.003
Adjusted for Body Fat	427,410	27,159	1.00 (Ref)	0.81 (0.70; 0.93)	0.003
Adjusted for all three	395,202	24,287	1.00 (Ref)	0.81 (0.70; 0.94)	0.005

European participants were used as the reference categories. Participants were included if they were free of CVD at baseline for CVD outcomes and free of cancer at baseline for cancer outcomes. Analyses were adjusted for age, sex, deprivation index, income, professional qualifications, smoking, red meat intake, processed meat intake, oily fish intake, fruit and vegetable intake, the frequency of alcohol intake, sedentary time, total physical activity, sleep duration and different adiposity variables, by including BMI alone, WC alone, body fat alone and the three adiposity markers together.

HR, hazard ratio; 95% CI, 95% confidence interval; n, number of participants; CVD, cardiovascular disease.

Supplementary Table 4: Cox-proportional hazard for all-cause mortality, CVD and cancer incidence and mortality by diabetes and ethnicity after adjusting for different markers of adiposity.

	Total n	Deaths/ Events	White-Europeans			South Asians				
			White Without T2D HR (95% CI)	White With T2D HR (95% CI)	p-value	Total n	Deaths/ Events	Without T2D HR (95% CI)	With T2D HR (95% CI)	p-value
All-cause mortality										
Adjusted for BMI	457,935	12,852	1.00 (Ref)	1.77 (1.68; 1.87)	<0.001	7,102	122	1.00 (Ref)	2.36 (1.62; 3.45)	<0.001
Adjusted for WC	457,843	12,843	1.00 (Ref)	1.53 (1.45; 1.62)	<0.0001	7,099	122	1.00 (Ref)	2.41 (1.63; 3.57)	<0.0001
Adjusted for Body Fat	451,196	12,435	1.00 (Ref)	1.58 (1.49; 1.68)	<0.0001	7,016	116	1.00 (Ref)	2.57 (1.73; 3.83)	<0.0001
Adjusted for all three	451,131	12,428	1.00 (Ref)	1.49 (1.40; 1.58)	<0.0001	7,015	116	1.00 (Ref)	2.51 (1.68; 3.74)	<0.0001
CVD mortality										
Adjusted for BMI	441,505	3,200	1.00 (Ref)	2.36 (2.13; 2.61)	<0.001	6,735	51	1.00 (Ref)	3.88 (2.16; 6.97)	<0.001
Adjusted for WC	441,418	3,199	1.00 (Ref)	1.78 (1.60; 1.98)	<0.0001	6,732	51	1.00 (Ref)	4.11 (2.24; 7.54)	<0.0001
Adjusted for Body Fat	435,521	3,079	1.00 (Ref)	1.94 (1.74; 2.16)	<0.0001	6,654	49	1.00 (Ref)	4.84 (2.61; 8.96)	<0.0001
Adjusted for all three	435,460	3,078	1.00 (Ref)	1.73 (1.55; 1.93)	<0.0001	6,653	49	1.00 (Ref)	4.74 (2.55; 8.80)	<0.0001
CVD incidence										
Adjusted for BMI	441,504	29,806	1.00 (Ref)	1.58 (1.52; 1.64)	<0.001	6,735	541	1.00 (Ref)	1.63 (1.35; 1.97)	0.012
Adjusted for WC	441,417	29,794	1.00 (Ref)	1.29 (1.24; 1.35)	<0.0001	6,732	541	1.00 (Ref)	1.57 (1.29; 1.91)	<0.0001
Adjusted for Body Fat	435,520	29,069	1.00 (Ref)	1.39 (1.33; 1.45)	<0.0001	6,654	529	1.00 (Ref)	1.67 (1.37; 2.03)	<0.0001
Adjusted for all three	435,459	29,059	1.00 (Ref)	1.29 (1.24; 1.35)	<0.0001	6,653	529	1.00 (Ref)	1.61 (1.32; 1.95)	<0.0001
Cancer mortality										
Adjusted for BMI	420,558	5,613	1.00 (Ref)	1.38 (1.25; 1.51)	<0.001	6,853	29	1.00 (Ref)	1.36 (0.59; 3.09)	0.470
Adjusted for WC	420,488	5,611	1.00 (Ref)	1.24 (1.13; 1.37)	<0.0001	6,850	29	1.00 (Ref)	1.67 (0.70; 3.94)	0.245
Adjusted for Body Fat	414,477	5,494	1.00 (Ref)	1.31 (1.19; 1.45)	<0.0001	6,768	29	1.00 (Ref)	1.56 (0.67; 3.63)	0.303
Adjusted for all three	414,433	5,493	1.00 (Ref)	1.26 (1.14; 1.39)	<0.0001	6,767	29	1.00 (Ref)	1.70 (0.72; 4.00)	0.227
Cancer incidence										
Adjusted for BMI	420,557	26,963	1.00 (Ref)	1.07 (1.02; 1.13)	0.010	6,853	196	1.00 (Ref)	1.04 (0.74; 1.47)	0.820
Adjusted for WC	420,487	26,958	1.00 (Ref)	1.03 (0.98; 1.09)	0.236	6,850	196	1.00 (Ref)	1.04 (0.73; 1.48)	0.841
Adjusted for Body Fat	414,476	26,522	1.00 (Ref)	1.06 (1.00; 1.12)	0.033	6,768	190	1.00 (Ref)	1.06 (0.74; 1.52)	0.733
Adjusted for all three	414,432	26,518	1.00 (Ref)	1.04 (0.98; 1.10)	0.165	6,767	190	1.00 (Ref)	1.03 (0.72; 1.48)	0.857

Participants without T2D were used as the reference categories for each of the ethnic groups. Participants were included if they were free of CVD at baseline for CVD outcomes and free of cancer at baseline for cancer outcomes. Analyses were adjusted for age, sex, deprivation index, income, professional qualifications, smoking, red meat intake, processed meat intake, oily fish intake, fruit and vegetable intake, the frequency of alcohol intake, sedentary time, total physical activity, sleep duration and different adiposity variables, by including BMI alone, WC alone, body fat alone and the three adiposity markers together. HR, hazard ratio; 95% CI, 95% confidence interval; n, number of participants; CVD, cardiovascular disease.

Supplementary Figure 1: Directed acyclic graph (DAG) of the causal pathway between type 2 diabetes and all-cause mortality

