

## Online Supplement 1 Diseases included in the 'CVD' group

hypertension  
heart/cardiac problem  
peripheral vascular disease  
venous thromboembolic disease  
essential hypertension  
gestational hypertension/pre-eclampsia  
angina  
heart attack/myocardial infarction  
heart failure/pulmonary odema  
heart arrhythmia  
heart valve problem/heart murmur  
cardiomyopathy  
pericardial problem  
stroke  
transient ischaemic attack (tia)  
subdural haemorrhage/haematoma  
subarachnoid haemorrhage  
leg claudication/ intermittent claudication  
arterial embolism  
pulmonary embolism +/- dvt  
deep venous thrombosis (dvt)  
peripheral neuropathy  
ischaemic stroke  
mitral valve disease  
mitral regurgitation / incompetence  
aortic valve disease  
aortic regurgitation / incompetence  
hypertrophic cardiomyopathy (hcm / hocm)  
pericarditis  
pericardial effusion  
aortic aneurysm rupture  
aortic dissection  
aortic stenosis  
brain haemorrhage

**Online supplement 2**

**General characteristics and lifestyle behaviours of the 'Other diseases' group (n=203,700) who were excluded from analysis.** Data shown in red for n=167,810 individuals who had information on physical activity, sitting and sleep behaviours.

	<b>% within each disease group</b>				
	<b>No Disease</b> <i>(n=103,993)</i>	<b>CVD</b> <i>(n=113,469)</i>	<b>Type 2 diabetes without CVD</b> <i>(n=4074)</i>	<b>Type 2 diabetes + CVD</b> <i>(n=11,574)</i>	<b>'Other diseases'</b> <i>(n=167,810)</i>
<b>SOCIO-DEMOGRAPHICS</b>					
<b>% Male</b>	47.0	53.3	63.6	68.0	<b>42.2</b>
<b>Age (n)</b>	<i>103,993</i>	<i>113,469</i>	<i>4074</i>	<i>11,574</i>	<b>167,810</b>
60-73	28.6	57.4	53.9	66.4	<b>38.5</b>
<b>BMI (n)</b>	<i>103,443</i>	<i>112,852</i>	<i>4048</i>	<i>11,478</i>	<b>167163</b>
≥30 (obese)	15.0	33.6	44.6	60.0	<b>18.8</b>
<b>Townsend deprivation quintile (%)</b>	<i>103,861</i>	<i>113,323</i>	<i>4070</i>	<i>11,557</i>	<b>167,598</b>
5 (most deprived)	17.1	20.5	25.1	28.5	<b>18.2</b>
<b>DIET</b>					
<b>Dietary change in past 5 yrs</b>	<i>103,902</i>	<i>113,300</i>	<i>4070</i>	<i>11,555</i>	<b>167,620</b>
YES	28.9	45.9	75.5	75.3	<b>37.5</b>
<b>PHYSICAL ACTIVITY</b>					
<b>Total Physical activity<sup>a</sup> (MET.mins/wk)</b>	<i>103,993</i>	<i>113,469</i>	<i>4074</i>	<i>11,574</i>	<b>167,810</b>
≤918 (Low physical activity)	25.0	30.5	35.4	40.1	<b>28.2</b>
>918-1902	25.0	24.2	22.5	22.2	<b>24.4</b>
>1902-3706	25.0	22.2	20.7	19.7	<b>23.7</b>
>3706-19278 (High physical activity)	25.0	23.2	21.3	18.0	<b>23.8</b>
<b>TV VIEWING</b>					
<b>TV viewing<sup>a</sup> (hours/day)</b>	<i>103,993</i>	<i>113,469</i>	<i>4074</i>	<i>11,574</i>	<b>167,810</b>
≤1 (Low TV viewing)	26.6	16.2	15.4	10.5	<b>23.1</b>
>1-2	30.5	24.5	22.3	19.3	<b>28.2</b>
>2-3	22.6	24.5	24.1	22.8	<b>23.1</b>
>3 (High TV viewing)	20.3	34.8	38.1	47.3	<b>25.6</b>
<b>SLEEP</b>					
<b>Sleep duration<sup>c</sup> (hours/night)</b>	<i>103,993</i>	<i>113,469</i>	<i>4074</i>	<i>11,574</i>	<b>167,810</b>
<7 (Poor sleep duration)	21.3	26.4	27.0	27.5	<b>24.0</b>
7-8 (Good sleep duration)	73.4	64.6	62.1	58.6	<b>68.6</b>
>8 (Poor sleep duration)	5.3	9.1	10.8	13.9	<b>7.3</b>
<b>BEHAVIOURAL PHENOTYPE</b>					
UNHEALTHY	1.8	5.2	5.8	10.0	<b>3.1</b>
HEALTHY	4.5	2.4	1.9	1.2	<b>3.5</b>

**Online supplement 3**

**Prevalance data and logistic regression analysis for Total frequency and Total duration of physical activity from the UK Biobank questionnaire.** *Total frequency was calculated as the days for walking+moderate+activity and total duration was calculated as the minutes for walking+moderate+vigorous activity.*

**TOTAL FREQUENCY**

A-proportion attaining physical activity quartiles in each disease group

	<b>HEALTHY</b>	<b>CVD</b>	<b>Type 2 diabetes without CVD</b>	<b>Type 2 diabetes +CVD</b>
<b>Total frequency physical activity (days)</b>	103,993	113,469	4074	11,574
≤7 (Low physical activity)	25.4	30.6	33.9	38.9
>7-11	28.7	28.0	27.5	25.7
>11-14	21.5	21.0	20.1	19/6
>14 (High physical activity)	24.4	20.3	18.5	15.8

B-Odds of reporting unhealthy behaviours

	<b>Low physical activity</b>	<b>High sitting time [TV viewing]</b>	<b>Poor sleep</b>	<b>Low Physical Activity + High Sitting + Poor Sleep</b>
<b>No Disease</b>	1.00	1.00	1.00	1.00
<b>CVD</b>	1.23 (1.21 to 1.26)	1.42 (1.39 to 1.45)	1.37 (1.34 to 1.39)	2.11 (1.99-2.23)
<b>Type 2 diabetes without CVD</b>	1.34 (1.25 to 1.44)	1.59 (1.49 to 1.69)	1.38 (1.30 to 1.47)	2.11 (1.83-2.44)
<b>Type 2 diabetes + CVD</b>	1.63 (1.56 to 1.71)	1.92 (1.85 to 1.99)	1.52 (1.46 to 1.58)	3.07 (2.82-3.34)

## TOTAL DURATION

### A-proportion attaining physical activity quartiles in each disease group

	HEALTHY	CVD	Type 2 diabetes without CVD	Type 2 diabetes +CVD
<b>Total duration physical activity (mins)</b>	103,993	113,469	4074	11,574
≤60 (Low physical activity)	27.8	34.1	39.5	44.7
>60-105	23.5	21.1	20.7	19.3
>105-180	26.4	23.4	20.2	19.7
>180 (High physical activity)	22.3	21.4	19.6	16.4

### B-Odds of reporting unhealthy behaviour

	Low physical activity	High sitting time [TV viewing]	Poor sleep	Low Physical Activity + High Sitting + Poor Sleep
<b>No Disease</b>	1.00	1.00	1.00	1.00
<b>CVD</b>	1.23 (1.21 to 1.26)	1.42 (1.39 to1.45)	1.37 (1.34 to1.39)	2.12 (2.00 to 2.24)
<b>Type 2 diabetes without CVD</b>	1.43 (1.34 to 1.53)	1.59 (1.49 to1.69)	1.38 (1.30 to1.47)	2.13 (1.85 to 2.44)
<b>Type 2 diabetes + CVD</b>	1.72 (1.65 to 1.80)	1.92 (1.85 to 1.99)	1.52 (1.46 to1.58)	3.29 (3.04 to 3.57)

Online Supplement 4

**Socio-demographics of those who have missing data on physical activity, sitting or sleep and therefore excluded from analysis (n=60,938).**

	<b>% within each disease group</b>			
	<b>No Disease (n=23,515)  20.7% missing</b>	<b>CVD (n=32,928)  18.4% missing</b>	<b>Type 2 diabetes without CVD (n=1104)  22.5% missing</b>	<b>Type 2 diabetes with CVD (n=3391)  21.3% missing</b>
<b>SOCIO-DEMOGRAPHICS</b>				
<b>% Male</b>	39.2	40.6	53.8	53.0
<b>Age (n)</b>	23,515	32,928	1104	3391
37-49	31.1	10.4	13.1	5.5
50-59	36.5	28.9	29.5	26.9
60-73	32.4	60.7	57.3	67.6
<b>BMI (n)</b>	22,903	32,651	1090	3356
<18.5-24.9 (under and acceptable weight)	40.5	20.4	12.6	6.9
25-29.9 (overweight)	42.1	40.7	37.2	29.8
≥30 (obese)	17.4	39.0	50.3	63.4
<b>Townsend deprivation quintile (n)</b>	23,494	32,892	1099	3387
1 (least deprived)	19.4	16.6	15.7	12.1
2	18.9	18.0	15.2	14.1
3	20.0	19.0	18.4	17.6
4	19.9	19.8	18.7	22.0
5 (most deprived)	21.8	26.7	32.0	34.3
<b>Ethnicity (n)</b>	22,828	32,574	1092	3365
White/British	92.5	93.8	83.2	86.9
Mixed	0.7	0.5	0.5	0.7
Asian	2.5	2.0	9.8	6.5
Black African	2.2	2.4	3.8	3.8
Chinese	0.6	0.2	0.3	0.2
Other	1.4	1.0	2.4	1.8

**Online Supplement 5     Dietary data from the food frequency questionnaire across cardio-metabolic disease groups.**

	% within each disease group			
	No Disease (n=103,993)	CVD (n=113,469)	Type 2 diabetes without CVD (n=4074)	Type 2 diabetes + CVD (n=11,574)
<b>Oily fish</b>	103,648	113,059	4,057	11,530
Never	10.6	9.8	12.7	11.1
Less than once a week	35.3	30.2	31.9	30.6
Once a week	38.1	38.8	35.3	37.1
2-4 times a week	15.3	20.1	18.3	20.0
5-6 times a week	0.7	0.8	1.2	0.9
Once of more daily	0.2	0.3	0.6	0.4
<b>Processed meat</b>	103,891	113,330	4,061	11,554
Never	10.2	7.9	8.6	6.4
Less than once a week	30.9	29.6	27.2	25.0
Once a week	29.0	29.7	28.1	29.6
2-4 times a week	26.2	28.7	30.4	33.9
5-6 times a week	3.0	3.3	4.3	4.1
Once of more daily	0.7	0.9	1.4	1.1
<b>Poultry intake</b>	103,916	113,349	4,069	11,551
Never	5.8	4.0	5.1	3.7
Less than once a week	10.4	10.5	10.7	11.2
Once a week	36.0	36.3	34.2	35.3
2-4 times a week	45.6	46.9	46.8	47.1
5-6 times a week	1.9	2.1	2.7	2.3
Once of more daily	0.3	0.3	0.5	0.4
<b>Cheese intake</b>	102,188	110,315	3,900	11,141
Never	2.1	3.1	3.7	4.1
Less than once a week	14.9	18.5	23.2	21.2
Once a week	20.4	22.4	23.1	24.7
2-4 times a week	47.3	44.3	39.8	40.9
5-6 times a week	11.2	8.5	7.6	6.3
Once of more daily	4.0	3.1	2.6	2.8
<b>Salt intake</b>	103,979	113,457	4,073	11,573
Never/Rarely	56.5	58.4	54.3	55.5
Sometimes	28.0	26.3	28.7	28.0
Usually	11.3	10.8	12.0	11.9
Always	4.2	4.5	5.1	4.6
<b>Non-oily fish intake</b>	103,705	113,135	4,055	11,516
Never	4.7	4.0	5.7	4.8
Less than once a week	29.9	27.3	28.9	26.9
Once a week	49.8	51.1	47.9	49.9
2-4 times a week	15.0	16.8	16.4	17.6
5-6 times a week	0.5	0.5	0.8	0.5
Once of more daily	0.1	0.2	0.2	0.3
<b>Beef intake</b>	103,790	113,154	4,057	11,534

Never	11.6	9.3	12.1	9.3
Less than once a week	46.0	45.4	42.7	41.6
Once a week	31.8	33.0	32.6	34.9
2-4 times a week	10.5	12.0	12.2	13.7
5-6 times a week	0.2	0.2	0.4	0.3
Once of more daily	0.1	0.1	0.1	0.1
<b>Lamb/mutton intake</b>	<i>103,671</i>	<i>112,946</i>	<i>4,053</i>	<i>11,514</i>
Never	18.1	16.1	15.5	14.9
Less than once a week	58.1	56.2	52.8	51.8
Once a week	21.1	24.4	26.2	28.4
2-4 times a week	2.6	3.1	5.3	4.7
5-6 times a week	0.1	0.1	0.1	0.1
Once of more daily	0.0	0.0	0.0	0.1
<b>Pork intake</b>	<i>103,671</i>	<i>112,999</i>	<i>4,057</i>	<i>11,516</i>
Never	17.7	15.5	18.4	15.5
Less than once a week	58.4	56.7	51.9	51.8
Once a week	20.8	24.0	24.6	27.5
2-4 times a week	3.0	3.7	4.9	5.0
5-6 times a week	0.1	0.1	0.1	0.2
Once of more daily	0.0	0.0	0.1	0.1
<b>Milk type used</b>	<i>103,940</i>	<i>113,415</i>	<i>4,070</i>	<i>11,571</i>
Full cream	7.9	5.9	5.6	4.9
Semi-skimmed	66.3	64.0	65.6	66.2
Skimmed	18.1	21.9	21.4	22.2
Soya	3.7	3.5	3.5	2.5
Other type of milk	1.0	1.2	0.8	1.1
Never/rarely have milk	3.1	3.5	3.2	3.1
<b>Spread type</b>	<i>103,846</i>	<i>113,315</i>	<i>4,059</i>	<i>11,550</i>
Never/rarely use	11.3	10.7	10.4	8.4
Butter/spreadable	39.5	33.0	28.3	29.9
Flora pro active/benecol	0.4	0.6	0.6	0.7
Other type spread/marg	48.8	55.7	60.7	61.1
<b>Bread type</b>	<i>100,505</i>	<i>109,974</i>	<i>3,973</i>	<i>11,352</i>
White	24.2	27.9	23.8	29.7
Brown	12.6	12.9	14.0	13.0
Wholemeal/wholegrain	59.7	55.3	58.1	53.7
Other	3.5	3.9	4.2	3.6
<b>Cereal type</b>	<i>85,959</i>	<i>92,847</i>	<i>3,479</i>	<i>9,744</i>
Bran	17.1	16.7	16.1	16.9
Biscuit (e.g. Weetabix)	16.8	18.3	23.9	24.6
Oat (porridge)	23.9	26.8	29.2	29.0
Muesli	23.7	18.4	14.7	12.5
other	18.4	19.8	16.2	17.0
<b>Never eat</b>	<i>103,848</i>	<i>113,190</i>	<i>4,039</i>	<i>11,527</i>
Eggs or foods containing eggs	2.1	3.3	4.4	4.6
Dairy products	1.6	2.6	4.1	3.5
Wheat products	1.6	2.9	3.2	3.0
<b>Does your diet vary from week to week?</b>	<i>103,701</i>	<i>113,167</i>	<i>4,052</i>	<i>11,534</i>

Never/rarely	38.0	32.3	29.8	27.6
Sometimes	55.1	58.8	59.9	61.8
Often	6.9	8.9	10.3	10.6
<b>Bread intake (slices of bread each week)</b> <i>mean (SD)</i>	12.1 (8.5)	12.7 (8.7)	14.4 (9.8)	14.6 (9.3)
<b>Cereal intake (bowls of cereal per week)</b> <i>mean (SD)</i>	4.5 (2.8)	4.4 (2.8)	4.8 (2.8)	4.5 (2.8)