**Supplementary Digital Content**

eTable 1: Distribution of participant demographic and health related variables in the UK Biobank, including participants with a history of CVD or cancer (n= 371 974)

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| --- | --- | --- | --- | --- |
| **Variable** | **Level** | **UK Biobank N Unweighted** | **UK Biobank % Unweighted** | **UK Biobank % Post-Stratified** |
| Age group (years)  | 40-49 | 92 489 | 24·86 | 38·05 |
|  | 50-59 | 125 783 | 33·81 | 31·76 |
|  | 60-70 | 153 702 | 41·32 | 30·19 |
| Sex | Female | 193 635 | 52·06 | 50·78 |
|  | Male | 178 339 | 47·94 | 49·22 |
| Qualification | College or university degree | 178 020 | 47·86 | 32·39 |
|  | Highschool diploma | 143 213 | 38·50 | 39·69 |
|  | Other/None | 50 741 | 13·64 | 27·92 |
| METS | >=7·5 MET-hrs/wk | 324 486 | 87·23 | 69·23 |
|  | >0, <7·5 MET-hrs/wk | 42 390 | 11·40 | 26·74 |
|  | No PA | 5098 | 1·37 | 4·03 |
| Fruit and Vegetables | At least 10 portions/day | 32 252 | 8·67 | 7·36 |
|  | 5 to 9 portions/day | 164 737 | 44·29 | 39·51 |
|  | under 5 portions/day | 171 134 | 46·01 | 51·76 |
|  | Unknown | 3851 | 1·04 | 1·37 |
| Alcohol use | Never | 13 761 | 3·70 | 4·49 |
|  | Previous | 12 273 | 3·30 | 4·02 |
|  | Current: < almost daily | 265 269 | 71·31 | 72·30 |
|  | Current: >=almost daily | 80 492 | 21·64 | 19·13 |
|  | Unknown | 179 | 0·05 | 0·07 |
| Smoking status | Never | 204 484 | 54·97 | 50·53 |
|  | Previous | 130 122 | 34·98 | 35·20 |
|  | Current | 37 368 | 10·05 | 14·27 |
| Unhealthy index | Tertile 1: Most healthy | 123 670 | 33·25 | 25·84 |
|  | Tertile 2 | 135 861 | 36·52 | 31·67 |
|  | Tertile 3: Least healthy | 108 429 | 29·15 | 41·07 |
|  | Unknown | 4014 | 1·08 | 1·43 |
| Previous cancer diagnosis | No | 353 192 | 94·95 | 95·39 |
|  | Yes | 18 782 | 5·05 | 4·61 |
| Previous CVD diagnosis | No | 315 629 | 84·85 | 84·33 |
|  | Yes | 56 345 | 15·15 | 15·67 |
| BMI category (kg/m2) | Underweight (<18.5) | 1732 | 0·47 | 0·45 |
|  | Normal (18.5 -24.9) | 122 864 | 33·03 | 28·53 |
|  | Overweight (25.0 -29.9) | 160 810 | 43·23 | 43·38 |
|  | Obese I (30.0 -34.9) | 63 178 | 16·98 | 19·26 |
|  | Obese II (35.0 -39.9) | 17 130 | 4·61 | 5·91 |
|  | Obese III ≥ 40.0 | 6260 | 1·68 | 2·47 |

eTable 2: Distribution of participant demographic and health related variables in the UK Biobank, excluding participants with a history of CVD or cancer, with multiple imputation (n= 400 793)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable** | **Level** | **UK Biobank N Unweighted** | **UKB % Unweighted** | **UK Biobank % PS** |
| Age group (years) | 40-49 | 106 527 | 26·58 | 42·36 |
|  | 50-59 | 138 260 | 34·50 | 31·90 |
|  | 60-70 | 156 006 | 38·92 | 25·74 |
| Sex | Female | 221 658 | 55·30 | 51·30 |
|  | Male | 179 135 | 44·70 | 48·70 |
| Education Qualification | College or university degree | 183 829 | 45·87 | 34·13 |
|  | Highschool diploma | 155 765 | 38·86 | 41·13 |
|  | Other/None | 61 199 | 15·27 | 24·74 |
| Physical Activity  | >=7·5 MET-hrs/wk | 345 075 | 86·10 | 71·00 |
|  | >0, <7·5 MET-hrs/wk | 49 598 | 12·37 | 25·18 |
|  | No PA | 6 120 | 1·53 | 3·82 |
| Fruit and Vegetable Consumption | At least 10 portions/day | 34 180 | 8·53 | 7·30 |
|  | 5 to 9 portions/day | 176 385 | 44·01 | 39·70 |
|  | under 5 portions/day | 190 228 | 47·46 | 53·01 |
| Alcohol use frequency  | Never | 17 038 | 4·25 | 4·80 |
|  | Previous | 12735 | 3·18 | 3·63 |
|  | Current: < almost daily | 288 462 | 71·97 | 73·04 |
|  | Current: >=almost daily | 82 558 | 20·60 | 18·52 |
| Smoking status | Never | 225 700 | 56·31 | 52·35 |
|  | Previous | 132 565 | 33·08 | 32·95 |
|  | Current | 42 528 | 10·61 | 14·69 |
| Unhealthy index | Tertile 1: Most healthy | 136 358 | 34·02 | 27·11 |
|  | Tertile 2 | 140 914 | 35·16 | 30·68 |
|  | Tertile 3: Least healthy | 123 520 | 30·82 | 42·21 |
| BMI category (kg/m2) | Underweight (<18.5) | 2 055 | 0·51 | 0·49 |
|  | Normal (18.5 -24.9) | 135 676 | 33·85 | 30·21 |
|  | Overweight (25.0 -29.9) | 172 370 | 43·01 | 43·31 |
|  | Obese I (30.0 -34.9) | 66 339 | 16·55 | 18·40 |
|  | Obese II (35.0 -39.9) | 17 813 | 4·44 | 5·37 |
|  | Obese III ≥ 40.0 | 6 540 | 1·63 | 2·22 |

eTable 3: Frequencies of post-stratification variables in the Health Survey for England and the UK Biobank (n= 371 974)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Level** | **HSE N Unweighted** | **HSE % Weighted** | **UK Biobank N Crude** | **UK Biobank % post-stratified** |
| Age group (years) | 40-49 | 2383 | 38·05 | 92 489 | 38·05 |
|   | 50-59 | 2141 | 31·76 | 125 783 | 31·76 |
|   | 60-70 | 2142 | 30·19 | 153 702 | 30·19 |
| Sex | Female | 3588 | 50·78 | 193 635 | 50·78 |
|   | Male | 3078 | 49·22 | 178 339 | 49·22 |
| Education Qualification | College or university degree | 2150 | 32·39 | 178 020 | 32·39 |
|   | Highschool diploma | 2620 | 39·69 | 143 213 | 39·69 |
|   | Other/None | 1896 | 27·92 | 50 741 | 27·92 |
| Physical Activity | >=7·5 MET-hrs/wk | 4613 | 69·23 | 324 486 | 69·23 |
|   | <7·5 MET-hrs/wk | 2053 | 30·77 | 47 488 | 30·77 |
| Fruit and Vegetables | At least 5 portions/day | 2040 | 30·28 | 196 989 | 46·88 |
|  | Under 5 portions/day | 4626 | 69·72 | 171 134 | 51·76 |
| BMI category (kg/m2) | Not overweight (<25) | 1969 | 28·98 | 124 596 | 28·98 |
|   | Overweight or Obese (≥25) | 4697 | 71·02 | 247 378 | 71·02 |
| Alcohol use | <almost daily | 5236 | 78·75 | 291 354 | 80·81 |
|  | Almost Daily | 1429 | 21·24 | 80 492 | 19·13 |
| Smoking status | Never | 3350 | 50·53 | 204 484 | 50·53 |
|   | Ever | 3316 | 49·47 | 167 490 | 49·47 |

eTable 4: Actual mid-year annual mortality rates in the UK population and (per 1000 person-years) unweighted and post-stratified mortality rates in the UK Biobank

|  |  |  |  |
| --- | --- | --- | --- |
| **Sex** | **Level** | **UK population** | **UK Biobank** |
|  |  | **2011** | **2012** | **Crude** | **2014** | **2015** | **2016** | **Crude** | **Post-stratified** |
| Females | Age 40-50 | 1·46 | 1·41 | 1·41 | 1·45 | 1·46 | 1·48 | 1·09 | 1·35 |
|   | Age 51-60 | 3·70 | 3·64 | 3·55 | 3·47 | 3·51 | 3·58 | 2·54 | 3·28 |
|   | Age 61-70 | 8·77 | 8·77 | 8·73 | 8·57 | 8·76 | 8·83 | 5·81 | 7·36 |
| Males | Age 40-50 | 2·25 | 2·22 | 2·27 | 2·27 | 2·33 | 2·40 | 1·65 | 2·05 |
|   | Age 51-60 | 5·55 | 5·29 | 5·37 | 5·21 | 5·24 | 5·24 | 4·26 | 5·86 |
|   | Age 61-70 | 13·43 | 13·24 | 13·29 | 13·16 | 13·30 | 13·34 | 10·52 | 13·09 |

eFigure 1: Comparison of the sex distributions in the weighted and unweighted UK Biobank and the actual UK population (2011 Census).

|  |  |
| --- | --- |
| Males | Females  |
|  |  |

eFigure 2: Adjusted hazard ratio of each lifestyle risk factor for CVD mortality, including people with history of cancer and CVD (n= 371,974)



\*Model additionally adjusted for age, sex, highest qualification, history of CVD and cancer.

eFigure 3: Adjusted hazard ratios\* of lifestyle index for cause mortality, excluding people with history of cancer or CVD



\*Model adjusted for age, sex, highest education qualification

eFigure 4: Adjusted hazard ratios\* of lifestyle index tertiles and all-cause mortality, including people with history of cancer and CVD (n=371,902)



\*Model adjusted for age, sex, highest qualification, and history of CVD or cancer

eFigure 5: Adjusted hazard ratio of each lifestyle risk factor for all-cause mortality, excluding people with history of cancer and CVD, with multiple imputation (n= 400,793)



\*Model additionally adjusted for age, sex, highest qualification.

eFigure 6: Adjusted hazard ratios\* of lifestyle index for CVD mortality, excluding people with history of cancer or CVD, with multiple imputation (n= 400,793)



\*Model additionally adjusted for age, sex, highest qualification.

eFigure 7: Adjusted hazard ratios\* of lifestyle index tertiles for cancer mortality, excluding people with history of cancer and CVD, with multiple imputation (n= 400,793)



\*Model additionally adjusted for age, sex, highest qualification.