**Supplement**

Supplement table 1 Change in metabolic health status and risk of CKD: sensitivity analyses

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Stable MHNW | MHNW-MUNW | MUNW | Stable MHOW | MHOW-MUOW | MUOW | Stable MHO | MHO-MUO | MUO |
| Competing risk model | Reference | 1.17(1.03-1.33) | 1.36(1.21-1.51) | 1.07(0.98-1.17) | 1.25(1.12-1.40) | 1.52(1.40-1.65) | 1.16(1.01-1.32) | 1.36(1.17-1.57) | 1.90(1.73-2.09) |
|  |  |  |  |  |  |  |  |  |  |
| Excluding participants with CKD occurring within the first two years of follow-up | Reference | 1.15(1.00-1.32) | 1.35(1.20-1.52) | 1.07(0.97-1.17) | 1.24(1.10-1.39) | 1.53(1.39-1.67) | 1.13(0.98-1.30) | 1.32(1.12-1.55) | 1.91(1.72-2.11) |
|  |  |  |  |  |  |  |  |  |  |
| Excluding participants received medication | Reference | 1.18(1.03-1.35) | 1.44(1.26-1.63) | 1.08(0.98-1.18) | 1.26(1.13-1.42) | 1.56(1.41-1.72) | 1.13(0.98-1.30) | 1.35(1.15-1.58) | 1.94(1.73-2.17) |
|  |  |  |  |  |  |  |  |  |  |
| Using overweight and obesity defined as ≥ 25kg/ m2 and ≥ 30kg/ m2 | Reference | 1.22(1.10-1.37) | 1.36(1.24-1.49) | 1.09(1.00-1.19) | 1.21(1.08-1.34) | 1.67(1.54-1.81) | 1.10(0.90-1.35) | 1.47(1.19-1.83) | 1.94(1.71-2.19) |
|  |  |  |  |  |  |  |  |  |  |
| Interval-censored survival models | Reference | 1.18(1.04-1.34) | 1.37(1.22-1.53) | 1.06(0.97-1.16) | 1.24(1.11-1.39) | 1.54(1.41-1.68) | 1.16(1.01-1.32) | 1.35(1.16-1.58) | 1.91(1.74-2.10) |

Cox proportional-hazards regression models used age as the time scale, all models were adjusted for sex, income, educational level, drinking, smoking, physical activity, ALT, LDL-C, Hs-CRP. MHNW, metabolically healthy normal-weight; MHOW, metabolically healthy overweight; MHO, metabolically healthy obesity; MUNW, metabolically unhealthy normal-weight; MUOW, metabolically unhealthy overweight; MUO, metabolically unhealthy obesity.

Supplement table 2 Baseline characteristics of participants across metabolic health status and waist circumstance categories.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | MHNW | MUNW | MHO | MUO | *P* |
| N | 18324 | 5209 | 9341 | 6510 | - |
| Age, years | 49.22±11.17 | 53.33±10.09 | 53.18±10.91 | 55.41±10.25 | ＜0.001 |
| Male, % | 13891(75.91) | 4519(86.75) | 6980(74.72) | 5269(80.94) | ＜0.001 |
| BMI, kg/m2 | 23.41±2.56 | 24.63±2.63 | 26.49±3.15 | 27.78±3.09 | ＜0.001 |
| WC, cm | 79.72±6.10 | 82.49±5.12 | 95.13±6.97 | 96.32±6.95 | ＜0.001 |
| LDL-C, mmol/L | 2.30(1.82-2.74) | 2.40(1.89-2.86) | 2.10(1.56-2.63) | 2.21(1.64-2.78) | **＜0.001** |
| ATL, U/L | 17.00(12.00-23.00) | 19.00(14.00-26.00) | 19.00(13.00-27.00) | 22.00(16.00-31.70) | ＜0.001 |
| Hs-CRP, mg/L | 0.50(0.20-1.37) | 0.70(0.28-1.63) | 0.90(0.32-2.72) | 1.22(0.50-3.34) | ＜0.001 |
| Current smoker, % | 5976(32.61) | 1830(35.13) | 2611(27.95) | 2067(31.75) | ＜0.001 |
| Current drinker, % | 3212(17.53) | 1196(22.96) | 1521(16.28) | 1316(20.22) | ＜0.001 |
| Active physical exercise, % | 2169(11.84) | 755(14.49) | 999(10.69) | 939(14.42) | ＜0.001 |
| High income, % | 1383(7.55) | 343(6.58) | 583(6.24) | 513(7.88) | ＜0.001 |
| University or higher degree, % | 1851(10.10) | 304(5.84) | 601(6.43) | 404(6.21) | ＜0.001 |

BMI, body mass index; WC, waist circumstance; MHNW, metabolically healthy normal-weight; MHO, metabolically healthy obesity; MUNW, metabolically unhealthy normal-weight; MUO, metabolically unhealthy obesity.

Supplement table 3 Association of change in metabolic health status and risk of CKD by waist circumstance categories.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | N | Events | Incidence, /1000 person-years | HR(95%CI) |
| Stable MHNW | 14501 | 1498 | 14.28 | Reference |
| MHNW-MUNW | 3747 | 447 | 17.05 | 1.16(1.05-1.29) |
| MUNW | 5209 | 824 | 23.56 | 1.47(1.34-1.60) |
| Stable MHO | 6178 | 790 | 17.86 | 1.07(0.98-1.16) |
| MHO-MUO | 3145 | 479 | 21.58 | 1.27(1.15-1.42) |
| MUO | 6510 | 1284 | 29.66 | 1.65(1.53-1.79) |

Cox proportional-hazards regression models used age as the time scale, all models were adjusted for sex, income, educational level, drinking, smoking, physical activity, ALT, LDL-C, Hs-CRP. MHNW, metabolically healthy normal-weight; MHO, metabolically healthy obesity; MUNW, metabolically unhealthy normal-weight; MUO, metabolically unhealthy obesity.



Supplement Figure 1. Flow chart of participants

|  |
| --- |
| Number at risk |
| Stable MHNW | 10891 | 10886 | 10588 | 9804 | 9512 | 8566 | 8252 | 7047 | 5399 | 2488 |
| MHNW-MUNW | 2270 | 2267 | 2209 | 2006 | 1931 | 1678 | 1600 | 1309 | 1019 | 481 |
| MUNW | 2703 | 2688 | 2601 | 2272 | 2196 | 1859 | 1778 | 1424 | 1136 | 485 |
| Stable MHOW | 7751 | 7738 | 7564 | 6997 | 6798 | 6081 | 5835 | 4963 | 3972 | 1743 |
| MHOW-MUOW | 3230 | 3222 | 3130 | 2876 | 2783 | 2460 | 2364 | 1976 | 1544 | 727 |
| MUOW | 5698 | 5687 | 5484 | 4882 | 4702 | 4034 | 3851 | 3086 | 2362 | 1097 |
| Stable MHO | 2155 | 2153 | 2085 | 1921 | 1874 | 1700 | 1649 | 1395 | 1138 | 488 |
| MHO-MUO | 1415 | 1414 | 1368 | 1255 | 1205 | 1094 | 1060 | 875 | 682 | 293 |
| MUO | 3346 | 3339 | 3220 | 2841 | 2755 | 2361 | 2248 | 1829 | 1398 | 581 |

Supplement Figure 2. Kaplan Meier curves showing change in metabolic health status over time and risk of chronic kidney disease



Supplement Figure 3. Association of metabolic health status and risk of CKD by BMI and WC categories. (MHNW, metabolically healthy normal-weight; MHOW, metabolically healthy overweight; MHO, metabolically healthy obesity; MUNW, metabolically unhealthy normal-weight; MUOW, metabolically unhealthy overweight; MUO, metabolically unhealthy obesity. Cox proportional-hazards regression models used age as the time scale, all models were adjusted for sex, income, educational level, drinking, smoking, physical activity, ALT, LDL-C, Hs-CRP.)