**Supplementary** **materials**

**Table S1.** Baseline characteristics according to the sex-specific quartiles of dietary intake of iron in middle-aged and older Chinese (*n*=2,696).

|  | **Total iron** | ***P*** | **Heme iron** | ***P*** | **Nonheme iron** | ***P*** |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Q1****(*n* 673)** | **Q2****(*n* 674)** | **Q3****(*n* 674)** | **Q4****(*n* 675)** | **Q1****(*n* 673)** | **Q2****(*n* 674)** | **Q3****(*n* 674)** | **Q4****(*n* 675)** | **Q1****(*n* 673)** | **Q2****(*n* 674)** | **Q3****(*n* 674)** | **Q4****(*n* 675)** |
| Age (y) | 58.0 (5.7)\* | 57.9 (5.6) | 58.0 (5.6) | 57.9 (5.5) | 0.963 | 58.9 (5.7) | 58.4 (5.7) | 57.5 (5.4) | 57.0 (5.2) | <0.001 | 57.6 (5.6) | 58.2 (5.7) | 57.6 (5.6) | 58.2 (5.4) | 0.082 |
| Female (%) | 70.9 | 70.8 | 70.8 | 70.8 | 1.000 | 70.9 | 70.8 | 70.8 | 70.8 | 1.000 | 70.9 | 70.8 | 70.8 | 70.8 | 1.000 |
| Education level (%) |  |  |  |  | 0.803 |  |  |  |  | 0.149 |  |  |  |  | 0.473 |
| ≤9 years | 28.8 | 31.5 | 29.4 | 27.6 |  | 29.9 | 30.4 | 29.7 | 27.3 |  | 27.8 | 31.6 | 30.9 | 27.0 |  |
| 9-12 years | 47.1 | 44.8 | 45.7 | 46.5 |  | 43.8 | 44.2 | 45.1 | 51.0 |  | 47.6 | 45.0 | 45.0 | 46.7 |  |
| ≥12 years | 24.1 | 23.7 | 24.9 | 25.9 |  | 26.3 | 25.4 | 25.2 | 21.8 |  | 24.7 | 23.4 | 24.2 | 26.4 |  |
| Household income (%) |  |  |  |  | 0.272 |  |  |  |  | 0.060 |  |  |  |  | 0.323 |
| ≤500 yuan/month/person | 1.6 | 2.5 | 2.1 | 2.5 |  | 2.2 | 3.1 | 1.2 | 2.2 |  | 1.9 | 2.5 | 1.8 | 2.5 |  |
| 501-1500 yuan/month/person | 27.8 | 29.8 | 27.7 | 24.7 |  | 24.8 | 30.4 | 24.9 | 29.2 |  | 29.4 | 28.3 | 27.3 | 24.3 |  |
| 1501-3000 yuan/month/person | 46.2 | 46.2 | 46.7 | 43.6 |  | 46.5 | 43.6 | 46.6 | 44.6 |  | 44.6 | 45.1 | 47.2 | 44.4 |  |
| ＞3000 yuan/month/person | 23.4 | 23.6 | 23.4 | 29.2 |  | 26.5 | 22.9 | 27.3 | 24.0 |  | 24.1 | 24.0 | 23.7 | 28.7 |  |
| Smoker (%) | 15.3 | 14.5 | 15.1 | 13.5 | 0.777 | 12.6 | 15.1 | 13.1 | 17.6 | 0.037 | 16.1 | 14.0 | 15.4 | 13.0 | 0.383 |
| Alcohol drinker (%) | 7.1 | 5.3 | 6.8 | 6.2 | 0.551 | 4.8 | 6.4 | 7.0 | 7.4 | 0.206 | 7.1 | 6.1 | 7.0 | 5.3 | 0.499 |
| Physical activity (MET-h/d) | 40.9 (14.9) | 41.5 (15.0) | 41.4 (14.5) | 42.2 (15.1) | 0.339 | 42.1 (15.2) | 41.6 (14.7) | 41.5 (14.9) | 40.9 (14.7) | 0.495 | 41.0 (14.9) | 41.4 (15.0) | 41.0 (14.2) | 42.7 (15.3) | 0.218 |
| BMI (kg/m2) | 23.3 (3.0) | 23.1 (3.1) | 23.1 (3.0) | 23.1 (2.9) | 0.453 | 23.1 (2.9) | 23.2 (3.0) | 23.4 (3.1) | 23.0 (3.1) | 0.256 | 23.3 (3.1) | 23.1 (3.0) | 23.1 (3.0) | 23.2 (2.9) | 0.513 |
| Hypertension (%) | 34.8 | 34.9 | 30.6 | 31.0 | 0.168 | 36.9 | 32.2 | 32.3 | 29.8 | 0.046 | 33.3 | 35.6 | 30.9 | 31.4 | 0.238 |
| Total energy (kcal/d) | 1785.3 (527.0) | 1782.3 (481.3) | 1769.4 (486.3) | 1796.6 (479.9) | 0.979 | 1793.2 (499.8) | 1773.7 (497.6) | 1768.0 (472.8) | 1798.6 (504.9) | 0.679 | 1790.8 (525.2) | 1775.2 (491.0) | 1785.1 (491.3) | 1782.5 (467.1) | 0.920 |
| Carbohydrate (g/d)† | 224.6 (33.5) | 235.6 (30.8) | 238.7 (31.6) | 238.4 (30.9) | <0.001 | 253.3 (31.7) | 239.1 (28.2) | 230.4 (26.4) | 214.4 (29.2) | <0.001 | 219.3 (32.6) | 235.6 (30.5) | 239.7 (30.3) | 242.7 (30.4) | <0.001 |
| Fiber (g/d)† | 8.9 (2.3) | 10.1 (2.2) | 11.4 (2.5) | 13.3 (3.2) | <0.001 | 11.5 (3.5) | 11.1 (3.0) | 10.7 (2.8) | 10.4 (2.8) |  0.001 | 8.8 (2.2) | 10.1 (2.3) | 11.3 (2.3) | 13.5 (3.1) | <0.001 |
| Protein (g/d)† | 65.3 (9.3) | 69.8 (10.5) | 73.9 (11.3) | 78.6 (11.2) | <0.001 | 63.1 (8.1) | 69.4(7.6) | 73.3(7.5) | 81.9 (13.5) | <0.001 | 68.0 (13.0) | 69.9 (10.7) | 73.0 (10.0) | 76.7 (11.0) | <0.001 |
| Total fat (g/d)† | 64.0 (13.9) | 57.5 (11.7) | 54.6 (11.7) | 53.0 (11.2) | <0.001 | 52.7 (13.5) | 56.3 (12.4) | 58.5 (11.7) | 61.6 (12.2) | <0.001 | 65.2 (13.4) | 57.4 (11.4) | 54.5 (11.5) | 52.0 (11.1) | <0.001 |
| Ratio of PUFAs to SFAs† | 1.12 (0.61) | 1.07 (0.40) | 1.07 (0.40) | 1.07 (0.32) |  0.027 | 1.20 (0.52) | 1.12 (0.47) | 1.02 (0.41) | 0.98 (0.33) | <0.001 | 1.09 (0.60) | 1.07 (0.43) | 1.07 (0.38) | 1.09 (0.34) |  0.001 |
| Cholesterol (mg/d)† | 315.8 (123.6) | 337.1 (138.7) | 345.7 (128.8) | 383.3 (211.7) | <0.001 | 273.7 (173.4) | 323.9 (150.4) | 360.3 (127.2) | 423.8 (132.4) | <0.001 | 333.2 (129.0) | 343.0 (144.1) | 339.1 (121.9) | 366.7 (213.0) |  0.008 |
| Vitamin C (mg/d)† | 98.0 (41.1) | 117.7 (38.5) | 138.1 (45.1) | 169.4 (66.1) | <0.001 | 130.4 (65.8) | 129.7 (52.3) | 131.2 (50.7) | 131.8 (52.3) |  0.703 | 98.9 (40.5) | 117.6 (40.9) | 134.7 (42.7) | 171.8 (65.9) | <0.001 |
| Magnesium (mg/d)† | 300.0 (45.1) | 337.1 (42.3) | 367.1 (46.0) | 419.4 (75.1) | <0.001 | 359.4 (81.4) | 356.0 (65.1) | 350.4 (63.5) | 357.9 (66.5) |  0.564 | 300.3 (46.4) | 337.1 (43.7) | 365.6 (45.7) | 420.5 (73.2) | <0.001 |
| Total iron (mg/d)† | 17.3 (1.1) | 19.4 (0.5) | 20.9 (0.5) | 23.8 (2.3) | <0.001 | 20.0 (3.0) | 20.1 (2.6) | 20.1 (2.4) | 21.2 (2.7) | <0.001 | 17.4 (1.2) | 19.4 (0.7) | 20.9 (0.8) | 23.7 (2.4) | <0.001 |
| Heme iron (mg/d)† | 1.1 (0.5) | 1.2 (0.5) | 1.3 (0.5) | 1.5 (0.8) | <0.001 | 0.7 (0.2) | 1.0 (0.1) | 1.4 (0.1) | 2.1 (0.6) | <0.001 | 1.3 (0.5) | 1.2 (0.5) | 1.3 (0.6) | 1.3 (0.8) |  0.720 |
| Nonheme iron (mg/d)† | 16.2 (1.1) | 18.1 (0.7) | 19.6 (0.7) | 22.3 (2.4) | <0.001 | 19.3 (3.0) | 19.0 (2.6) | 18.8 (2.4) | 19.1 (2.5) |  0.109 | 16.1 (1.1) | 18.1 (0.4) | 19.6 (0.5) | 22.4 (2.3) | <0.001 |
| Cereals (mg/d)† | 622.4 (157.1) | 676.3 (170.8) | 663.8 (172.4) | 639.7 (173.5) | <0.001 | 715.9 (186.7) | 665.1 (163.6) | 624.5 (147.9) | 586.8 (151.7) | <0.001 | 601.5 (150.1) | 674.3 (167.3) | 674.6 (173.0) | 651.5 (177.2) | <0.001 |
| Total meat (g/d)† | 106.5 (48.3) | 106.1 (45.2)  | 106.0 (44.5) | 105.8 (52.9) |  0.625 | 60.6 (21.5) | 92.3 (22.7) | 118.2 (30.9) | 153.1 (51.1) | <0.001 | 117.5 (50.7) | 106.7 (44.8) | 103.3 (44.6) | 96.8 (48.8) | <0.001 |
| Red meat (g/d)† | 84.5 (42.9) | 82.6 (39.5) | 80.7 (39.3) | 77.6 (41.7) |  0.009 | 47.2 (20.4) | 71.2 (24.1) | 91.8 (31.6) | 115.1 (46.9) | <0.001 | 92.1 (44.3) | 83.6 (39.7) | 78.4 (38.4) | 71.3 (38.3) | <0.001 |
| Processed meat (g/d)† | 3.1 (5.9) | 3.2 (6.2) | 2.9 (4.9) | 2.8 (4.6) | 0.343 | 1.8 (2.4) | 2.3 (3.5) | 3.2 (4.7) | 4.7 (8.5) | <0.001 | 3.5 (6.8) | 3.1 (5.4) | 2.8 (4.5) | 2.7 (4.6) |  0.001 |
| Poultry (g/d)† | 22.0 (19.2) | 23.5 (20.2) | 25.2 (20.6) | 28.2 (27.9) | <0.001 | 13.4 (9.9) | 21.1 (13.8) | 26.3 (17.6) | 38.0 (32.8) | <0.001 | 25.3 (23.2) | 23.0 (19.3) | 25.0 (20.6) | 25.6 (25.8) |  0.307 |
| Fish/shellfish (g/d)† | 41.0 (37.5) | 50.2 (53.8) | 60.6 (65.4) | 62.3 (53.0) | <0.001 | 31.8 (21.0) | 46.6 (29.2) | 55.9 (34.6) | 79.7 (89.2) | <0.001 | 50.6 (73.1) | 49.9 (47.4) | 56.5 (44.2) | 57.1 (45.8) | <0.001 |
| Vegetables (g/d)† | 268.0 (104.6) | 337.5 (109.9) | 401.4 (131.5) | 506.0 (220.2) | <0.001 | 379.1 (211.6) | 375.2 (164.9) | 378.5 (152.9) | 380.4 (155.7) |  0.342 | 271.0 (105.2) | 333.5 (111.5) | 395.1 (127.8) | 513.4 (218.1) | <0.001 |
| Fruit (g/d)† | 130.6 (104.9) | 139.1 (95.1) | 152.7 (105.4) | 160.5 (99.9) | <0.001 | 153.4 (119.9) | 144.0 (94.4) | 147.7 (98.0) | 137.8 (93.1) |  0.065 | 130.5 (101.3) | 140.5 (101.0) | 148.7 (98.4) | 162.2 (104.7) | <0.001 |

MET, metabolic equivalent of energy；BMI, body Mass Index; SFAs, saturated fatty acid; PUFAs, polyunsaturated fatty acids; SFAs, saturated fatty acids.

*\* Mean* (*Standard Deviation*)for all continuous variables.

† Dietary data were energy adjusted.

**Table S2.** Baseline characteristics in middle-aged and older Chinese from the GNHS 2008-2010 (*n* 2,238) and from the GNHS 2013 (*n* 458).

|  | **GNHS 2008-2010****(*n* 2,238)** | **GNHS 2013****(*n* 458)** | ***P*** |
| --- | --- | --- | --- |
| Age (y) | 57.3 (4.9)\* | 60.9 (7.5) | <0.001 |
| Female (%) | 73.1 | 59.6 | <0.001 |
| Education level (%) |  |  |  0.010 |
| ≤9 years | 28.8 | 31.7 |  |
| 9-12 years | 47.1 | 39.7 |  |
| ≥12 years | 23.9 | 28.6 |  |
| Household income (%) |  |  | <0.001 |
| ≤500 yuan/month/person | 2.6 | 0.4 |  |
| 501-1500 yuan/month/person | 32.3 | 3.3 |  |
| 1501-3000 yuan/month/person | 46.2 | 41.1 |  |
| ＞3000 yuan/month/person | 19.0 | 55.2 |  |
| Smoker (%) | 13.6 | 19.4 |  0.001 |
| Alcohol drinker (%) | 5.3 | 11.6 | <0.001 |
| Physical activity (MET-h/d) | 42.8 (15.8) | 35.3 (6.0) | <0.001 |
| BMI (kg/m2) | 23.1 (3.1) | 23.6 (2.8) |  0.003 |
| Hypertension (%) | 31.4 | 40.8 | <0.001 |
| Total energy (kcal/d) | 1832.0 (496.4) | 1745.7 (404.5) | <0.001 |
| Carbohydrate (g/d)† | 233.1 (31.8) | 240.3 (33.5) | <0.001 |
| Fiber (g/d)† | 10.9 (3.1) | 10.9 (3.0) |  0.898 |
| Protein (g/d)† | 71.9 (11.9) | 72.2 (10.8) |  1.000 |
| Total fat (g/d)† | 57.9 (12.8) | 54.4 (13.0) | <0.001 |
| Ratio of PUFAs to SFAs† | 1.08 (0.44) | 1.07 (0.48) |  0.004 |
| Cholesterol (mg/d)† | 339.5(133.2) | 374.6 (238.8) |  0.412 |
| Vitamin C (mg/d)† | 132.5 (56.3) | 122.4 (51.4) |  0.006 |
| Magnesium (mg/d)† | 356.8 (70.5) | 351.7 (63.4) |  0.051 |
| Total iron (mg/d)† | 20.3 (2.7) | 20.5 (2.8) |  0.065 |
| Heme iron (mg/d)† | 1.3 (0.6) | 1.3 (0.7) |  0.837 |
| Nonheme iron (mg/d)† | 19.0 (2.7) | 19.3 (2.6) |  0.182 |
| Cereals (mg/d)† | 645.9 (168.3) | 673.1 (175.3) |  0.001 |
| Total meat (g/d)† | 106.7 (48.7) | 103.2 (43.6) |  0.361 |
| Red meat (g/d)† | 81.5 (41.7) | 80.6 (36.8) |  0.786 |
| Processed meat (g/d)† | 3.1 (5.8) | 2.7 (3.5) |  0.305 |
| Poultry (g/d)† | 25.1 (22.4) | 22.6 (22.3) |  0.021 |
| Fish/shellfish (g/d)† | 54.5 (56.4) | 48.8 (40.3) |  0.018 |
| Vegetables (g/d)† | 385.1 (176.2) | 345.1 (151.1) | <0.001 |
| Fruit (g/d)† | 146.1 (103.5) | 143.8 (94.8) |  0.896 |

MET, metabolic equivalent of energy；BMI, body Mass Index; SFAs, saturated fatty acid; PUFAs, polyunsaturated fatty acids; SFAs, saturated fatty acids.

\* Mean (Standard Deviation) for all continuous variables.

† Dietary data were energy adjusted.

**Table S3.** *HRs* and *95% CIs* of T2DM according to sex-specific quartiles of total iron intake, heme iron intake, nonheme iron intake in middle-aged and older Chinese from the GNHS 2008-2010 (*n* 2,238).

|  |  |  |
| --- | --- | --- |
|  | **Dietary iron intake** | ***P*-trend\*** |
|  | **Q1****(*n* 559)** | **Q2****(*n* 559)** | **Q3****(*n* 559)** | **Q4****(*n* 560)** |
| **Total iron** |  |  |  |  |  |
| Intake, mg/d† | 17.48 | 19.35 | 20.88 | 23.17 |  |
| T2DM Case, *n* | 41 | 45 | 40 | 57 |  |
| Person years | 2983 | 3018 | 3023 | 2990 |  |
| Model 1‡ | 1.00 (*Reference*) | 1.16 (0.76, 1.77) | 0.97 (0.63, 1.51) | 1.48 (0.99, 2.22) | 0.079 |
| Model 2§ | 1.00 (*Reference*) | 1.15 (0.72, 1.84) | 1.00 (0.58, 1.72) | 1.40 (0.78, 2.52) | 0.279 |
| **Heme iron** |  |  |  |  |  |
| Intake, mg/d | 0.71 | 1.04 | 1.35 | 1.89 |  |
| T2DM Case, *n* | 52 | 35 | 39 | 57 |  |
| Person years | 2965 | 3028 | 3026 | 2994 |  |
| Model 1 | 1.00 (*Reference*) | 0.67 (0.43, 1.02) | 0.77 (0.50, 1.16) | 1.16 (0.80, 1.71) | 0.208 |
| Model 2 | 1.00 (*Reference*) | 0.87 (0.52, 1.44) | 1.22 (0.67, 2.21) | 1.98 (1.04, 3.76) | 0.009 |
| **Nonheme iron** |  |  |  |  |  |
| Intake, mg/d | 16.31 | 18.09 | 19.58 | 21.77 |  |
| T2DM Case, *n* | 47 | 39 | 43 | 54 |  |
| Person years | 2978 | 3017 | 3047 | 2970 |  |
| Model 1 | 1.00 (*Reference*) | 0.85 (0.56, 1.30) | 0.88 (0.58, 1.33) | 1.20 (0.81, 1.78) | 0.309 |
| Model 2 | 1.00 (*Reference*) | 0.80 (0.50, 1.28) | 0.76 (0.45, 1.28) | 0.88 (0.48, 1.61) | 0.716 |

Abbreviations: *HRs*, *Hazard ratios*; 95%*CIs*, 95% *confidence intervals*; T2DM, Type 2 diabetes mellitus*.*

\* Cox proportional hazard model was used to calculate *P* for trend by treating the median values of dietary iron intake in quartiles as continuous values.

†Dietary iron intake was shown as median intake value of each quartile.

‡Model 1: Adjusted for age (continuous), education level (*≤*9, 9-12, ≥12 years), household income (≤500, 501-1500, 1501-3000, >3000 yuan/month/person), smoking status (nonsmoker, smoker), alcohol drinking status (nondrinker, drinker), physical activity (continuous), BMI (continuous).

§ Model 2: Adjusted for Model 1 plus intakes of total energy, protein, fiber, cholesterol, the ratio of PUFAs and SFAs, magnesium, vitamin C, meat, vegetables, fruit (all in sex-specific quartiles). Additionally adjusted nonheme iron for heme iron and adjusted heme iron for nonheme iron.

**Table S4.** *HRs* and *95% CIs* of T2DM according to sex-specific quartiles of total iron intake, heme iron intake, nonheme iron intake in middle-aged and older Chinese from the GNHS 2013 (*n* 458).

|  |  |  |
| --- | --- | --- |
|  | **Dietary iron intake** | ***P*-trend\*** |
|  | **Q1****(*n* 114)** | **Q2****(*n* 114)** | **Q3****(*n* 114)** | **Q4****(*n* 116)** |
| **Total iron** |  |  |  |  |  |
| Intake, mg/d† | 17.80 | 19.57 | 20.89 | 23.32 |  |
| T2DM Case, *n* | 5 | 10 | 2 | 5 |  |
| Person years | 365 | 356 | 365 | 375 |  |
| Model 1‡ | 1.00 (*Reference*) | 2.50 (0.84, 7.49) | 0.47 (0.09, 2.46) | 1.06 (0.30, 3.70) | 0.622 |
| Model 2§ | 1.00 (*Reference*) | 4.18 (1.10, 15.95) | 0.59 (0.07, 4.70) | 1.69 (0.18, 15.54) | 0.749 |
| **Heme iron** |  |  |  |  |  |
| Intake, mg/d | 0.69 | 1.01 | 1.34 | 1.88 |  |
| T2DM Case, *n* | 7 | 3 | 8 | 4 |  |
| Person years | 358 | 370 | 362 | 371 |  |
| Model 1 | 1.00 (*Reference*) | 0.35 (0.09, 1.40) | 1.05 (0.37, 3.00) | 0.62 (0.18, 2.20) | 0.763 |
| Model 2 | 1.00 (*Reference*) | 0.30 (0.05, 1.79) | 1.78 (0.36, 8.77) | 1.06 (0.15, 7.65) | 0.501 |
| **Nonheme iron** |  |  |  |  |  |
| Intake, mg/d | 16.64 | 18.27 | 19.61 | 22.09 |  |
| T2DM Case, *n* | 4 | 10 | 3 | 5 |  |
| Person years | 367 | 353 | 368 | 373 |  |
| Model 1 | 1.00 (*Reference*) | 2.84 (0.87, 9.33) | 0.93 (0.20, 4.27) | 1.27 (0.33, 4.80) | 0.759 |
| Model 2 | 1.00 (*Reference*) | 5.39 (1.22, 23.88) | 1.78 (0.22, 14.33) | 2.17 (0.21, 21.98) | 0.491 |

Abbreviations: *HRs*, *Hazard ratios*; 95%*CIs*, 95% *confidence intervals*; T2DM, Type 2 diabetes mellitus*.*

\* Cox proportional hazard model was used to calculate *P* for trend by treating the median values of dietary iron intake in quartiles as continuous values.

†Dietary iron intake was shown as median intake value of each quartile.

‡Model 1: Adjusted for age (continuous), education level (*≤*9, 9-12, ≥12 years), household income (≤500, 501-1500, 1501-3000, >3000 yuan/month/person), smoking status (nonsmoker, smoker), alcohol drinking status (nondrinker, drinker), physical activity (continuous), BMI (continuous).

§ Model 2: Adjusted for Model 1 plus intakes of total energy, protein, fiber, cholesterol, the ratio of PUFAs and SFAs, magnesium, vitamin C, meat, vegetables, fruit (all in sex-specific quartiles). Additionally adjusted nonheme iron for heme iron and adjusted heme iron for nonheme iron.