94,532 person-waves in CHNS data from 1997 to 2015

(32,752 participants)

76,500 person-waves

(25,960 participants)

Excluded 18,032 person-waves

1. Age<18 years, n=17,672

2. Being pregnant, n=360

Remains 17,383 participants

(67810 person-waves)

A cohort based on 17,517 participants with two or more survey waves

(68057 person-waves)

Excluded 8,443 participants

Participants with only one survey wave

Excluded 134 participants

Missing dietary copper intake

Finally, 17,310 participants were included in this study

(67590 person-waves)

Excluded 73 participants

Outlier of energy intake (male: >4,200 & <600 kcal/day, female: >3,600 & <500 kcal/day)

**Supplementary Figure 1. Flow chart of study participants.**

**Rplot01**

**Supplementary Figure 2. Relation of dietary copper intake (without energy adjustment) with risk of all-cause mortality based on restricted cubic splines.**

\*Adjusted for sex, age, body mass index (BMI), ever alcohol drinking, ever smoking, education levels, occupations, urban or rural residents, systolic blood pressure (SBP), diastolic blood pressure (DBP), as well as dietary intakes of fat, protein, and carbohydrate.

**Supplementary Table 1. Population characteristics of the included and excluded participants.**

|  |  |  |
| --- | --- | --- |
| **Characteristics** | **Included** | **Excluded** |
| **N, person-wave** | 68057 | 8443 |
| **Energy-adjusted copper intake, mg/day** | 1.9 (0.6) | 1.9 (1.2) |
| **Male, No. (%)** | 8607 (49.1) | 3771 (44.7) |
| **Age, year** | 43.9 (15.9) | 39.6 (17.6) |
| **Body mass index, kg/m2** | 22.9 (3.4) | 23.3 (4.0) |
| **Ever smokers, n (%)** | 5507 (31.6) | 1881 (23.9) |
| **Ever alcohol drinkers, n (%)** | 6140 (35.6) | 2246 (28.7) |
| **Systolic blood pressure, mmHg** | 120.4 (17.8) | 121.0 (17.8) |
| **Diastolic blood pressure, mmHg** | 77.7 (10.8) | 78.0 (10.8) |
| **Self-reported diabetes, n (%)** | 387 (2.3) | 250 (3.0) |
| **Self-reported hypertension, n (%)** | 1360 (7.8) | 729 (8.7) |
| **Urban residents, n (%)** | 6737 (38.5) | 4275 (50.6) |
| **Education, n (%)** |  |  |
| Illiteracy | 3598 (21.1) | 410 (5.1) |
| Primary school | 3313 (19.4) | 994 (12.5) |
| Middle school | 5409 (31.7) | 2886 (36.2) |
| High school or above | 4762 (27.9) | 3685 (46.2) |
| **Regions, n (%)** |  |  |
| Central | 8499 (48.5) | 4269 (50.6) |
| North | 3722 (21.2) | 1904 (22.6) |
| South | 5296 (30.2) | 2270 (26.9) |
| **Occupations, n (%)** |  |  |
| Farmer | 5660 (32.6) | 1008 (12.1) |
| Worker | 4514 (26.0) | 2700 (32.4) |
| Unemployed | 5164 (29.8) | 3565 (42.7) |
| Other | 2003 (11.6) | 1067 (12.8) |
| **Dietary intakes** |  |  |
| Energy, Kcal/day | 2131.5 (535.8) | 2084.8 (679.2) |
| Fat, g/day | 74.5 (29.1) | 74.2 (37.8) |
| Carbohydrate, g/day | 299.5 (99.0) | 288.0 (117.9) |
| Protein, g/day | 65.9 (19.9) | 66.4 (28.6) |

Variables are presented as Mean (SD) or n (%). Q, quartile

**Supplementary Table 2. Population characteristics by categories of energy-adjusted dietary copper intake.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Characteristics** | **Energy-adjusted dietary copper intake, mg/day** | | | | ***P* value**\* |
| **Q1(<1.60)** | **Q2(1.60-<1.83)** | **Q3(1.83-<2.09)** | **Q4(≥2.09)** |
| **N** | 4328 | 4327 | 4327 | 4328 |  |
| **Intakes of nutrients or food groups** |  |  |  |  |  |
| Sodium, g/day | 5.2 (3.0) | 4.9 (2.6) | 4.9 (2.5) | 5.1 (3.1) | < 0.001 |
| Potassium, g/day | 1.5 (0.5) | 1.5 (0.4) | 1.6 (0.4) | 1.9 (0.7) | < 0.001 |
| Calcium, mg/day | 365.1 (156.6) | 358.6 (135.1) | 377.2 (145.3) | 474.3 (249.5) | < 0.001 |
| Magnesium, mg/day | 269.3 (77.2) | 271.9 (76.4) | 291.4 (75.9) | 348.2 (108.9) | < 0.001 |
| Iron intake, mg/day | 20.1 (7.1) | 19.9 (6.4) | 20.7 (6.0) | 25.0 (9.5) | < 0.001 |
| Zinc intake, mg/day | 10.6 (3.2) | 10.4 (2.9) | 10.4 (2.8) | 11.9 (3.4) | < 0.001 |
| Selenium intake, μg/day | 43.2 (17.3) | 40.0 (16.2) | 39.3 (16.2) | 45.6 (23.0) | < 0.001 |
| Vitamin A intake, μg/day | 504.2 (416.7) | 462.1 (362.7) | 443.6 (384.3) | 493.0 (559.0) | < 0.001 |
| Vitamin B1 intake, mg/day | 0.9 (0.3) | 0.9 (0.3) | 0.9 (0.3) | 1.1 (0.4) | < 0.001 |
| Vitamin B2 intake, mg/day | 0.8 (0.3) | 0.7 (0.2) | 0.7 (0.3) | 0.8 (0.4) | < 0.001 |
| Vitamin E intake, mg/day | 31.9 (22.3) | 28.1 (14.8) | 29.8 (14.3) | 33.1 (14.8) | < 0.001 |
| Niacin intake, mg/day | 14.4 (5.1) | 13.6 (4.5) | 13.6 (4.3) | 15.5 (5.3) | < 0.001 |
| Legumes, g/day | 41.4 (47.1) | 45.6 (46.7) | 50.9 (46.2) | 67.3 (60.0) | < 0.001 |
| Seafoods, g/day | 1.4 (5.8) | 1.7 (6.3) | 2.1 (7.3) | 5.7 (16.6) | < 0.001 |
| Vegetables, g/day | 277.8 (116.6) | 275.6 (105.0) | 286.0 (108.1) | 305.7 (124.6) | < 0.001 |
| Fruits, g/day | 31.6 (57.1) | 29.7 (50.0) | 33.7 (52.6) | 47.5 (77.4) | < 0.001 |
| Nuts, g/day | 2.7 (7.9) | 2.9 (7.8) | 3.6 (9.4) | 5.4 (13.3) | < 0.001 |
| Whole grains, g/day | 13.5 (34.2) | 14.7 (31.5) | 17.5 (35.2) | 26.4 (48.7) | < 0.001 |

\* A *P*<0.0014 was set to be statistically significant.

Variables are presented as Mean (SD) or n (%). Q, quartile

**Supplementary Table 3. The association between energy-adjusted dietary copper intake and the risk of all-cause mortality with further adjustments for the intakes of primary food sources of copper (model 1), or the intakes of other major nutrients (model 2)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Energy-adjusted dietary copper intake, mg/day** | **N** | **Cases**  **(Incidence rate\*)** | **Adjusted Model 1** | | **Adjusted Model 2** | |
| **HR (95%CI)** | ***P* value** | **HR (95%CI)** | ***P* value** |
| Quartiles |  |  |  |  |  |  |
| Q1(<1.60) | 4328 | 198(5.4) | ref |  | ref |  |
| Q2(1.60-<1.83) | 4327 | 305(6.7) | 0.96(0.78, 1.19) | 0.73 | 0.86 (0.70, 1.07) | 0.17 |
| Q3(1.83-<2.09) | 4327 | 369(7.6) | 1.22 (0.98, 1.52) | 0.08 | 1.04 (0.84, 1.30) | 0.71 |
| Q4(≥2.09) | 4328 | 452(10.4) | 2.13 (1.68, 2.70) | <0.001 | 1.69 (1.32, 2.16) | <0.001 |
| Categories |  |  |  |  |  |  |
| Q1-Q3(<2.09) | 12982 | 872(6.7) | ref |  | ref |  |
| Q4(≥2.09) | 4328 | 452(10.4) | 1.93 (1.66, 2.25) | <0.001 | 1.73(1.48, 2.02) | <0.001 |

\*Incident rate is presented per 1000 person-years of follow-up. Q, quartile

Adjusted Model 1：adjusted for sex, age, body mass index (BMI), ever alcohol drinking, ever smoking, education levels, occupations, urban or rural residents, systolic blood pressure (SBP), diastolic blood pressure (DBP), and dietary intakes of fat, protein, carbohydrate, as well as legumes, nuts, vegetable, fruits, seafoods, whole grains.

Adjusted Model 2：adjusted for sex, age, body mass index (BMI), ever alcohol drinking, ever smoking, education levels, occupations, urban or rural residents, systolic blood pressure (SBP), diastolic blood pressure (DBP), and dietary intakes of fat, protein, and carbohydrate, as well as sodium, potassium, zinc, calcium, iron, magnesium, selenium, vitamin A, vitamin B1, vitamin B2, vitamin E, and niacin.

**Supplementary Table 4. The association between energy-adjusted dietary copper intake at baseline and the risk of all-cause mortality.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Baseline energy-adjusted dietary copper intake, mg/day** | **N** | **Cases**  **(Incident rate\*)** | **Crude Model** | | **Adjusted Model†** | |
| **HR (95%CI)** | ***P***  **value** | **HR (95%CI)** | ***P* value** |
| Quartiles |  |  |  |  |  |  |
| Q1(<1.61) | 4109 | 204(5.7%) | Ref |  | Ref |  |
| Q2(1.61-<1.90) | 4109 | 313(8.0%) | 1.38 (1.16,1.64) | < 0.001 | 1.12 (0.91,1.37) | 0.29 |
| Q3(1.90-<2.27) | 4109 | 373(8.8%) | 1.50 (1.26,1.78) | < 0.001 | 1.12 (0.91,1.38) | 0.29 |
| Q4(≥2.27) | 4109 | 386(8.5%) | 1.43 (1.21,1.70) | < 0.001 | 1.29 (1.03,1.62) | 0.03 |

\*Incident rate is presented per 1000 person-years of follow-up. Q, quartile

**†**Adjusted for sex, age, body mass index (BMI), ever alcohol drinking, ever smoking, education levels, occupations, urban or rural residents, systolic blood pressure (SBP), diastolic blood pressure (DBP), as well as dietary intakes of fat, protein, and carbohydrate at baseline.