**Quantity and variety of fruit and vegetable intake in midlife and cognitive impairment in late life: a prospective cohort study**

**Supplemental Table 1.** **List of fruits and vegetables.**

|  |  |
| --- | --- |
| Food groups and subgroups | Food items |
| Fruits | Apple, pear, apricots and peaches, orange, persimmon, grapes, papaya, mango, tangerine, banana, pineapple, watermelon, cantaloupe, and honeydew melon. |
| Vegetables | *Pak choi and Shanghai pak choi* (Chinese cabbage and Chinese greens), *kai choi* (mustard greens), Chinese chives and flowering Chinese chives, *ung choi* (Chinese water spinach), *choi sum* (Chinese flowering cabbage), *yin choi and po choi* (Chinese spinach amaranth and spinach), watercress, *kai lan* (Chinese broccoli), sweet potato leaves and other dark green leafy vegetables, cabbage head and *won nga pak* (celery cabbage), lettuce head and Chinese lettuce, broccoli, cauliflower, carrots, cucumber, green beans (including peas and snowpeas),tomatoes, bean sprout, *fu kua and mo qua* (balsam pear and fuzzy squash), *gee choi* (laver), onions, celery, corn, *Tung goo* (shiitakemushroom), and wood ear and cloud ear mushroom. |
| Low-glycaemic-index fruits | Apple, pear, apricots and peaches, orange, and persimmon. |
| Moderate-glycaemic-index fruits | Grapes, papaya, mango, and tangerine. |
| High-glycaemic-index fruits | Banana, pineapple, watermelon, cantaloupe, and honeydew melon. |
| Light-green vegetables | *Pak choi and Shanghai pak choi* (Chinese cabbage and Chinese greens), cabbage head and *won nga pak* (celery cabbage), lettuce head and Chinese lettuce, cucumber, green beans (including peas and snowpeas), *fu kua and mo qua* (balsam pear and fuzzy squash), green onions, and celery. |
| Dark-green vegetables | *kai choi* (mustard greens), Chinese chives and flowering Chinese chives, *ung choi* (Chinese water spinach), *choi sum* (Chinese flowering cabbage), *yin choi and po choi* (Chinese spinach amaranth and spinach), watercress, *kai lan* (Chinese broccoli), sweet potato leaves and other dark green leafy vegetables, and broccoli. |
| Cruciferous vegetables | *Pak choi and Shanghai pak choi* (Chinese cabbage and Chinese greens), *kai choi* (mustard greens), *choi sum* (Chinese flowering cabbage), watercress, *kai lan* (Chinese broccoli), cabbage head and *won nga pak* (celery cabbage), broccoli, and cauliflower. |
| Yellow vegetables | Carrots, and corn. |
| Tomatoes | Tomatoes. |
| Mushrooms | *Tung goo* (shiitakemushroom), and wood ear and cloud ear mushroom. |

**Supplemental Table 2. The Spearman correlation coefficients between quantity and variety of fruits and vegetables.**

|  | **Quantity of intake** | | |
| --- | --- | --- | --- |
|  | **Fruit and vegetable, g/d** | **Fruit, g/d** | **Vegetable, g/d** |
| **Variety of intake, unadjusted** |  |  |  |
| Fruit and vegetable | 0.41 | - | - |
| Fruit | - | 0.47 | - |
| Vegetable | - | - | 0.39 |
| **Variety of intake, adjusted for quantity by residual method** |  |  |  |
| Fruit and vegetable | 0.08 | - | - |
| Fruit | - | 0.11 | - |
| Vegetable | - | - | 0.08 |

All the *P* values for Spearman’s correlation coefficients were <0.001.

**Supplemental Table 3.** **The Spearman correlation coefficients between fruits and vegetable intake, and its correlation with other food groups.**

|  | **Fruit and vegetable, g/d** | **Fruit, g/d** | **Vegetable, g/d** |
| --- | --- | --- | --- |
| Fruit and vegetable, g/d | 1.00 |  |  |
| Fruit, g/d | 0.94 | 1.00 |  |
| Vegetable, g/d | 0.55 | 0.29 | 1.00 |
| Red meat, g/d | -0.15 | -0.15 | -0.04 |
| Poultry, g/d | -0.05 | -0.06 | 0.021 |
| Fresh fish and shellfish, g/d | 0.08 | 0.03 | 0.19 |
| Preserved fish and shellfish, g/d | 0.012 | -0.013 | 0.09 |
| Dairy products, g/d | 0.09 | 0.10 | 0.04 |
| Nuts, g/d | 0.08 | 0.08 | 0.07 |

1 *P* =0.01; 2*P* = 0.06; 3 *P* = 0.22;

*P* <0.001 for the other correlation coefficients.

**Supplemental Table 4. Sensitivity analyses for the multivariable-adjusted odds ratios of cognitive impairment by quartiles of fruit and vegetable intake**

|  | **Analysis 1a** | **Analysis 2b** | **Analysis 3c** | **Analysis 4d** |
| --- | --- | --- | --- | --- |
| Quantity of total FV intake, g/d |  |  |  |  |
| Q1 (164.98) | 1.00 | 1.00 | 1.00 | 1.00 |
| Q2 (264.89) | 0.94 (0.81, 1.09) | 0.90 (0.79, 1.04) | 0.86 (0.77, 0.96) | 0.92 (0.81, 1.05) |
| Q3 (356.47) | 0.84 (0.72, 0.99) | 0.82 (0.71, 0.94) | 0.77 (0.68, 0.86) | 0.85 (0.74, 0.97) |
| Q4 (520.64) | 0.79 (0.68, 0.93) | 0.83 (0.72, 0.95) | 0.83 (0.74, 0.93) | 0.85 (0.73, 0.97) |
| *P-*trend | 0.003 | 0.007 | 0.001 | 0.01 |
| Quantity of fruit intake, g/d |  |  |  |  |
| Q1 (76.30) | 1.00 | 1.00 | 1.00 | 1.00 |
| Q2 (158.84) | 0.92 (0.79, 1.07) | 0.93 (0.81, 1.06) | 0.91 (0.82, 1.02) | 0.93 (0.81, 1.06) |
| Q3 (235.08) | 0.83 (0.71, 0.97) | 0.85 (0.74, 0.98) | 0.82 (0.73, 0.92) | 0.88 (0.77, 1.01) |
| Q4 (383.44) | 0.86 (0.73, 1.01) | 0.88 (0.76, 1.01) | 0.90 (0.80, 1.01) | 0.82 (0.71, 0.95) |
| *P-*trend | 0.06 | 0.07 | 0.05 | 0.25 |
| Quantity of vegetable intake, g/d |  |  |  |  |
| Q1 (62.62) | 1.00 | 1.00 | 1.00 | 1.00 |
| Q2 (92.56) | 0.92 (0.79, 1.08) | 0.94 (0.82, 1.08) | 0.89 (0.80, 1.00) | 0.99 (0.86, 1.13) |
| Q3 (119.41) | 0.92 (0.79, 1.08) | 0.90 (0.78, 1.04) | 0.86 (0.76, 0.96) | 0.88 (0.76, 1.01) |
| Q4 (169.11) | 0.83 (0.70, 0.97) | 0.87 (0.75, 1.01) | 0.85 (0.75, 0.96) | 0.94 (0.81, 1.08) |
| *P-*trend | 0.02 | 0.05 | 0.008 | 0.006 |
| Variety of total FV intake |  |  |  |  |
| Q1 (17.87) | 1.00 | 1.00 | 1.00 | 1.00 |
| Q2 (22.76) | 0.80 (0.69, 0.93) | 0.75 (0.65, 0.85) | 0.82 (0.74, 0.92) | 0.79 (0.69, 0.90) |
| Q3 (26.31) | 0.75 (0.65, 0.88) | 0.69 (0.60, 0.79) | 0.73 (0.65, 0.81) | 0.77 (0.67, 0.88) |
| Q4 (30.46) | 0.74 (0.63, 0.86) | 0.71 (0.62, 0.81) | 0.82 (0.73, 0.91) | 0.77 (0.68, 0.89) |
| *P-*trend | <0.001 | <0.001 | <0.001 | <0.001 |
| Variety of fruit intake |  |  |  |  |
| Q1 (3.69) | 1.00 | 1.00 | 1.00 | 1.00 |
| Q2 (5.85) | 0.87 (0.75, 1.01) | 0.80 (0.70, 0.91) | 0.79 (0.70, 0.88) | 0.79 (0.69, 0.90) |
| Q3 (7.58) | 0.83 (0.71, 0.97) | 0.77 (0.67, 0.89) | 0.89 (0.79, 0.99) | 0.82 (0.72, 0.94) |
| Q4 (9.76) | 0.79 (0.67, 0.93) | 0.75 (0.65, 0.87) | 0.86 (0.77, 0.97) | 0.77 (0.67, 0.89) |
| *P-*trend | 0.003 | <0.001 | 0.047 | <0.001 |
| Variety of vegetable intake |  |  |  |  |
| Q1 (12.94) | 1.00 | 1.00 | 1.00 | 1.00 |
| Q2 (16.53) | 0.84 (0.72, 0.97) | 0.84 (0.73, 0.96) | 0.94 (0.84, 1.05) | 0.84 (0.73, 0.96) |
| Q3 (19.07) | 0.84 (0.72, 0.98) | 0.85 (0.74, 0.98) | 0.82 (0.73, 0.92) | 0.88 (0.77, 1.01) |
| Q4 (21.95) | 0.86 (0.73, 1.01) | 0.82 (0.71, 0.95) | 0.84 (0.75, 0.95) | 0.88 (0.76, 1.01) |
| *P-*trend | 0.06 | 0.01 | 0.001 | 0.13 |

FV, fruit and vegetable. Covariates in the models were the same as in the final models of table 2. Linear trend was tested by treating the median values of quartiles as a continuous variable. aExcluding those with baseline history of cancer, cardiovascular disease, diabetes or hypertension; bExcluding those aged 65 years and older; cUsing the commonly used cut-point of <24 to define cognitive impairment. dExcluding those with a medical history of stroke at the third follow up.

**Supplemental Table 5. Multivariable-adjusted odds ratios for cognitive impairment by quartiles of subgroups of fruit and vegetable intake**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Quartiles of subgroups of fruit and vegetable intake** | | | | |
|  | **Q1** | **Q2** | **Q3** | **Q4** | ***P*-trend** |
| Low-glycaemic-index fruits | 1.00 | 0.86 (0.76, 0.98) | 0.85 (0.75, 0.97) | 0.87 (0.76, 0.99) | 0.08 |
| Moderate-glycaemic-index fruits | 1.00 | 0.93 (0.81, 1.06) | 0.83 (0.72, 0.95) | 0.83 (0.72, 0.95) | 0.006 |
| High-glycaemic-index fruits | 1.00 | 0.95 (0.83, 1.09) | 0.90 (0.79, 1.03) | 0.91 (0.80, 1.04) | 0.18 |
| Light-green vegetables | 1.00 | 1.02 (0.89, 1.16) | 0.97 (0.85, 1.10) | 0.86 (0.75, 0.98) | 0.01 |
| Dark-green vegetables | 1.00 | 1.13 (1.00, 1.29) | 0.96 (0.84, 1.10) | 1.00 (0.87, 1.14) | 0.42 |
| Cruciferous vegetables | 1.00 | 1.13 (0.99, 1.28) | 0.97 (0.85, 1.11) | 0.99 (0.86, 1.13) | 0.35 |
| Yellow vegetables | 1.00 | 0.96 (0.84, 1.10) | 0.94 (0.82, 1.07) | 0.88 (0.77, 1.01) | 0.06 |
| Tomatoes | 1.00 | 0.91 (0.80, 1.04) | 0.88 (0.77, 1.01) | 0.90 (0.79, 1.03) | 0.22 |
| Mushrooms | 1.00 | 0.91 (0.80, 1.04) | 0.84 (0.73, 0.96) | 0.72 (0.63, 0.82) | <0.001 |

Linear trend was tested by treating the median values of quartiles as a continuous variable.

**Supplemental Table 6. Median daily intake (10th–90th percentile) for participants included and excluded in the third follow-up visits**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Vegetable and fruit groups** | **Baseline (n=62197) a** | **The third follow-up visit (n=16894) a** | **Individuals who did not participate in the third follow-up visit (n=45303) a, b** | **Individuals who did not participate in the third follow-up visit for reasons other than death (n=27578) a, b** |
| Quantity of total FV intake, g/d | 278.7 (126.1-519.1) | 300.8 (140.0-541.7) | 270.6 (121.6-509.3) | 284.5 (133.3-529.2) |
| Quantity of fruit intake, g/d | 174.1 (50.0-388.5) | 188.8 (58.1-406.3) | 167.9 (46.8-380.4) | 178.6 (53.5-397.8) |
| Quantity of vegetable intake, g/d | 96.9 (51.8-167.5) | 102.8 (55.4-177.3) | 94.9 (50.6-163.7) | 98.6 (53.7-169.1) |
| Variety of total FV intake | 23.5 (15.7-30.4) | 24.1 (16.6-30.6) | 23.2 (15.4-30.3) | 23.5 (15.9-30.4) |
| Variety of fruit intake | 6.2 (2.8-9.7) | 6.5 (3.2-9.9) | 6.1 (2.7-9.7) | 6.3 (2.9-9.8) |
| Variety of vegetable intake | 17.2 (11.5-22.0) | 17.5 (12.1-22.1) | 17.1 (11.4-22.0) | 17.2 (11.6-22.0) |

FV, fruit and vegetable. Quantity of intake was adjusted for total energy intake using the residual method. aParticipants with extreme energy intakes (<600 or >3000 kcal/d for women and <700 or >3700 kcal/d for men) were excluded. bAll *P* <0.05 comparing with the participants included in the third follow-up visits.