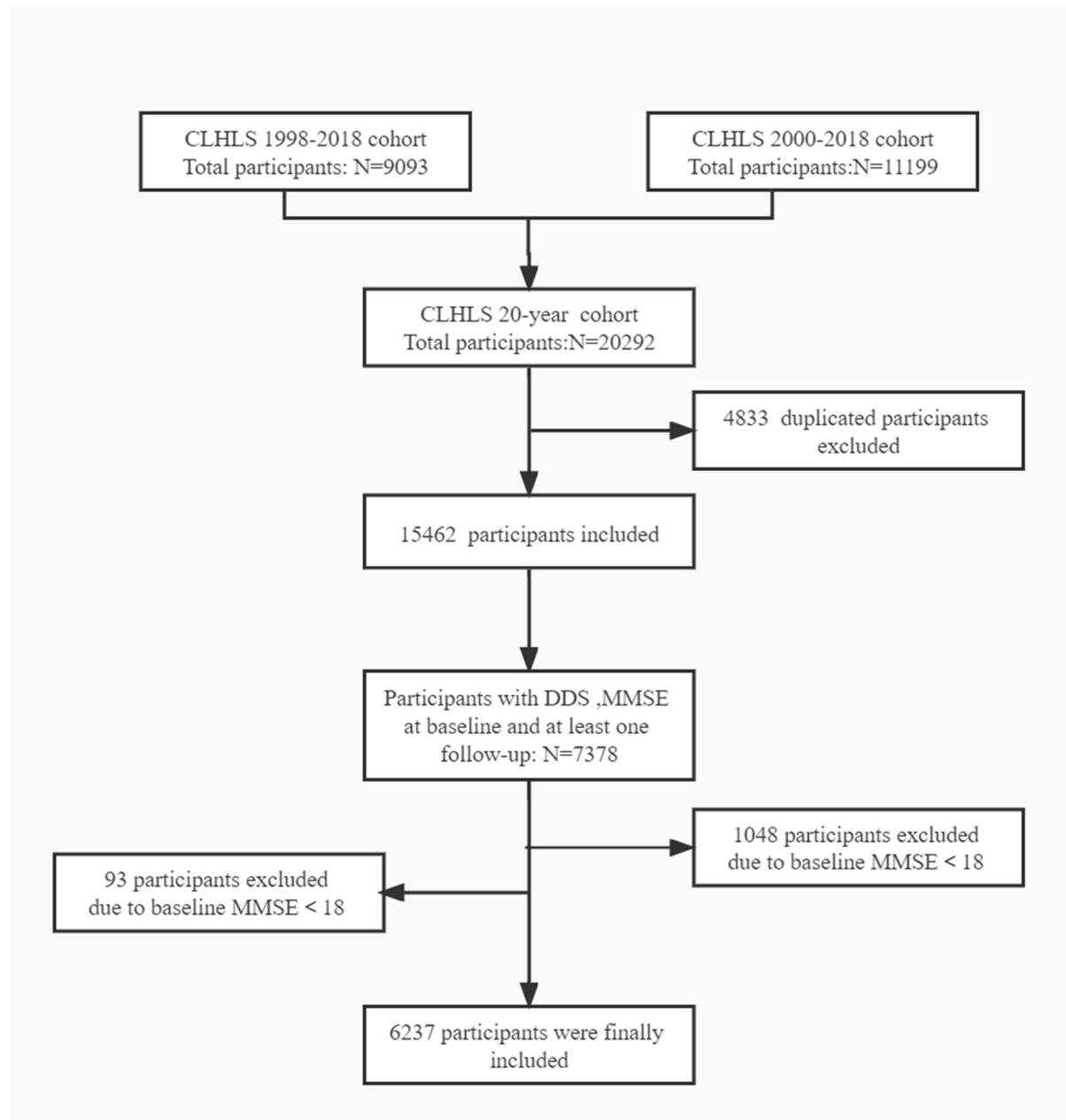


# **Adherence to high dietary diversity and incident cognitive impairment for the oldest-old: a community-based, nationwide cohort study**

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**Figure S1.** Flow chart of the study population. CLHLS: Chinese Longitudinal Health Longevity Study



**Table S1. The Chinese Version of the Mini-Mental State Exam (MMSE)<sup>(1)</sup>.**

| Domains                             | MMSE items   | Score<br>(Total<br>=30) |
|-------------------------------------|--|-------------------------|
| Orientation                         | What time of day is it right now (morning, afternoon, evening)?  | 1                       |
|                                     | What is the animal year of this year?  | 1                       |
|                                     | What is the date (day and month) of the mid-autumn festival?   | 1                       |
|                                     | What is the season right now?  | 1                       |
|                                     | What is the name of this county or district?   | 1                       |
| Naming                              | Please name as many kinds of food as possible in 1 minute (1 point for each food and 7 points for those who name 7 or more foods)  | 7                       |
| Registration                        | Table, apple, cloth. Please repeat these three objects.  | 3                       |
| Attention and calculation           | I will ask you to spend \$3 from \$20, then you must spend \$3 from the number you arrived at and continue to spend \$3 until you are asked to stop.                               | 5                       |
| Memory                              | Name the three objects learned earlier (table, apple, and cloth).  | 3                       |
| Language and visuospatial abilities | The individual is asked to draw a figure of overlapping pentagons.   | 1                       |
|                                     | Naming pen and watch   | 2                       |
|                                     | Repeating the following sentence: "What you plant, what you will get."   | 1                       |
|                                     | The individual is asked to follow the interviewer's instruction: "Take the paper using your right hand, fold it in the middle using both hands, and place the paper on the floor." | 3                       |

**Table S2. The association between DDS change patterns and risk of cognitive impairment in subgroups (univariate model).**

| Subgroups                | DDS change patterns |              |           |                    |                    |                    | DDS change score   |
|--------------------------|---------------------|--------------|-----------|--------------------|--------------------|--------------------|--------------------|
|                          | Event<br>s          | Participants | High-High | High-Low           | Low-High           | Low-Low            |                    |
| <b>Age(years)</b>        |                     |              |           |                    |                    |                    |                    |
| 80--89                   | 857                 | 3698         | Reference | 1.96 (1.59,2.43) ‡ | 1.38 (1.11,1.71) ‡ | 2.16 (1.80,2.60) ‡ | 0.97 (0.95,0.99) ‡ |
| ≥90                      | 972                 | 2539         | Reference | 1.38(1.12,1.69) ‡  | 1.15 (0.93,1.42)   | 1.69(1.42,2.01) ‡  | 0.96(0.95,0.98) ‡  |
| <b>Gender</b>            |                     |              |           |                    |                    |                    |                    |
| Male                     | 613                 | 2893         | Reference | 1.68(1.32,2.13) ‡  | 1.23 (0.96,1.57)   | 1.99 (1.62,2.44) ‡ | 0.96(0.94,0.99) ‡  |
| Female                   | 1216                | 3344         | Reference | 1.56 (1.29,1.89) ‡ | 1.18 (0.97,1.43)   | 1.77(1.51,2.08) ‡  | 0.96(0.95,0.98) ‡  |
| <b>Education</b>         |                     |              |           |                    |                    |                    |                    |
| Illiterate               | 1309                | 3680         | Reference | 1.55(1.19,2.02) ‡  | 1.09(0.82,1.45)    | 1.87(1.48,2.36) ‡  | 0.96(0.93,0.98) ‡  |
| Literate                 | 520                 | 2557         | Reference | 1.62 (1.35,1.94) ‡ | 1.22 (1.02,1.47)   | 1.78(1.53,2.07)    | 0.97(0.95,0.98) ‡  |
| <b>Residence</b>         |                     |              |           |                    |                    |                    |                    |
| Urban                    | 738                 | 3050         | Reference | 1.51(1.21,1.89) ‡  | 1.18(0.94,1.47)    | 2.16 (1.80,2.60) ‡ | 0.97(0.95,0.99) ‡  |
| Rural                    | 1091                | 3187         | Reference | 1.66 (1.35,2.03) ‡ | 1.26(1.02,1.55)    | 1.71(1.43,2.04) ‡  | 0.97(0.95,0.98) ‡  |
| <b>Smoking status</b>    |                     |              |           |                    |                    |                    |                    |
| Current or former smoker | 545                 | 2304         | Reference | 1.29 (0.99,1.68) ‡ | 1.08 (0.82,1.41)   | 1.43 (1.13,1.81) ‡ | 0.97(0.94,0.99) ‡  |
| Non-smoker               | 1284                | 3933         | Reference | 1.71(1.43,2.05) ‡  | 1.25 (1.04,1.50)   | 1.90 (1.63,2.21) ‡ | 0.96(0.95,0.98) ‡  |
| <b>Drinking</b>          |                     |              |           |                    |                    |                    |                    |

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|                           |      |      |           |                               |                              |                               |                              |  |
|---------------------------|------|------|-----------|-------------------------------|------------------------------|-------------------------------|------------------------------|--|
| <b>status</b>             |      |      |           |                               |                              |                               |                              |  |
| Current or former drinker | 591  | 2232 | Reference | 1.90 (1.46,2.46) <sup>‡</sup> | 1.54 (1.19,1.99)             | 2.53(2.04,3.15) <sup>‡</sup>  | 0.97(0.94,0.99) <sup>‡</sup> |  |
| Non-drinker               | 1238 | 4005 | Reference | 1.58(1.32,1.89) <sup>‡</sup>  | 1.16(0.96,1.39)              | 1.79 (1.54,2.09) <sup>‡</sup> | 0.96(0.95,0.98) <sup>‡</sup> |  |
| <b>Regular exercise</b>   |      |      |           |                               |                              |                               |                              |  |
| Yes                       | 540  | 2370 | Reference | 1.63 (1.28,2.08) <sup>‡</sup> | 1.18(0.91,1.54)              | 2.03(1.64,2.52) <sup>‡</sup>  | 0.95(0.93,0.97) <sup>‡</sup> |  |
| No                        | 1289 | 3867 | Reference | 1.63 (1.35,1.96) <sup>‡</sup> | 1.19(0.99,1.44)              | 1.79(1.52,2.10) <sup>‡</sup>  | 0.97(0.95,0.98) <sup>‡</sup> |  |
| <b>Living pattern</b>     |      |      |           |                               |                              |                               |                              |  |
| Living with family        | 1505 | 5084 | Reference | 1.68 (1.43,1.97) <sup>‡</sup> | 1.24(1.05,1.46) <sup>‡</sup> | 2.03 (1.77,2.33) <sup>‡</sup> | 0.96(0.95,0.98) <sup>‡</sup> |  |
| Living alone              | 324  | 1153 | Reference | 1.91(1.28,2.86) <sup>‡</sup>  | 1.60(1.09,2.35) <sup>‡</sup> | 2.22(1.59,3.09) <sup>‡</sup>  | 0.98(0.95,1.01)              |  |

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<sup>‡</sup>p < 0.05

**Table S3.**  $\beta$ -Coefficients and 95%CI for the association of the DDS change patterns with MMSE score changes over Follow-up Time (N=6237): results from Linear Mixed-effects models

| <b>DDS change model</b>        | <b>MMSE score <math>-\beta</math></b> | <b>95%CI</b>   | <b>P-value</b> |
|--------------------------------|---------------------------------------|----------------|----------------|
| <b>Animal-DDS change model</b> |                                       |                |                |
| <b>Baseline</b>                |                                       |                |                |
| High-high                      | <b>Reference</b>                      |                |                |
| High-low                       | -0.270                                | -0.711, 0.096  | 0.172          |
| Low-high                       | 0.132                                 | -0.329, 0.427  | 0.476          |
| Low-low                        | -0.248                                | -0.660, -0.002 | 0.122          |
| <b>Longitudinal</b>            |                                       |                |                |
| High-high $\times$ time        | Reference                             |                |                |
| High-low $\times$ time         | -0.070                                | -0.122,0.051   | 0.244          |
| Low-high $\times$ time         | -0.141                                | -0.174,-0.014  | 0.010          |
| Low-low $\times$ time          | -0.089                                | -0.159,-0.021  | 0.060          |
| <b>Plant-DDS change model</b>  |                                       |                |                |
| <b>Baseline</b>                |                                       |                |                |
| High-high                      | <b>Reference</b>                      |                |                |
| High-low                       | -0.300                                | -0.656,0.0563  | 0.099          |
| Low-high                       | 0.166                                 | -0.182,0.514   | 0.350          |
| Low-low                        | -0.338                                | -0.643,-0.033  | 0.030          |
| <b>Longitudinal</b>            |                                       |                |                |
| High-high $\times$ time        | <b>Reference</b>                      |                |                |
| High-low $\times$ time         | -0.145                                | -0.253,-0.037  | 0.009          |
| Low-high $\times$ time         | -0.124                                | -0.225,-0.023  | 0.016          |
| Low-low $\times$ time          | -0.141                                | -0.230, -0.051 | 0.002          |

**Table S4.** Characteristics of 6237 participants at baseline

| <b>Variables</b>                        | <b>Total</b> | <b>Large loss</b> | <b>Small loss</b> | <b>Normal</b> | <b>Small gain</b> | <b>Large gain</b> |
|---|--------------|-------------------|-------------------|---------------|-------------------|-------------------|
| No. of participants (%)                 | 6237(100.0)  | 589(9.4)          | 1280 (20.5)       | 2268(36.4)    | 1483 (23.8)       | 617 (9.9)         |
| Age, years, mean (SD)                   | 88.55(6.93)  | 88.76(6.88)       | 88.89(7.07)       | 88.59(7.07)   | 88.37(6.79)       | 87.94(6.42)       |
| <b>Age group</b>                        |              |                   |                   |               |                   |                   |
| 80-89                                   | 3698         | 341               | 741               | 1350          | 882               | 384               |
| ≥90                                     | 2539         | 67                | 248               | 918           | 601               | 233               |
| <b>Gender</b>                           |              |                   |                   |               |                   |                   |
| Male                                    | 2893         | 259               | 608               | 1046          | 695               | 285               |
| Female                                  | 3344         | 330               | 672               | 1222          | 788               | 332               |
| <b>Type of residence</b>                |              |                   |                   |               |                   |                   |
| Urban                                   | 3050         | 269               | 594               | 1115          | 747               | 325               |
| Rural                                   | 3187         | 320               | 686               | 1153          | 736               | 292               |
| <b>Marital status</b>                   |              |                   |                   |               |                   |                   |
| In marriage                             | 1495         | 139               | 301               | 533           | 372               | 150               |
| Not in marriage                         | 4742         | 450               | 979               | 1735          | 1111              | 467               |
| <b>Educational background</b>           |              |                   |                   |               |                   |                   |
| Illiteracy                              | 2266         | 207               | 470               | 842           | 528               | 219               |
| Literacy                                | 3971         | 382               | 810               | 1426          | 955               | 398               |
| <b>Living pattern</b>                   |              |                   |                   |               |                   |                   |
| With family members                     | 5084         | 486               | 1047              | 1850          | 1210              | 491               |
| Alone or at nursing home                | 1153         | 103               | 233               | 418           | 273               | 126               |
| <b>Tobacco smoking status</b>           |              |                   |                   |               |                   |                   |
| Non-smoker                              | 3933         | 382               | 798               | 1434          | 931               | 388               |
| Current smoker                          | 1261         | 127               | 276               | 450           | 295               | 113               |
| Former smoker                           | 1043         | 80                | 206               | 384           | 257               | 116               |
| <b>Drinking status</b>                  |              |                   |                   |               |                   |                   |
| Non-drinker                             | 4005         | 367               | 795               | 1485          | 936               | 422               |
| Current drinker                         | 1549         | 167               | 337               | 553           | 381               | 111               |
| Former drinker                          | 683          | 55                | 148               | 230           | 166               | 84                |
| <b>Regular exercise</b>                 |              |                   |                   |               |                   |                   |
| Yes                                     | 2370         | 227               | 520               | 877           | 546               | 200               |
| No                                      | 3867         | 362               | 760               | 1391          | 937               | 417               |
| <b>Number of teeth, mean (SD)</b>       | 6325         | 7.07 (11.06)      | 6.82 (10.21)      | 7.47 (12.64)  | 8.00 (12.88)      | 7.19 (11.39)      |
| <b>Use of artificial denture</b>        |              |                   |                   |               |                   |                   |
| No                                      | 4556         | 421               | 967               | 1666          | 1058              | 444               |
| Yes                                     | 1681         | 168               | 313               | 602           | 425               | 173               |
| <b>BMI, mean (SD), kg/m<sup>2</sup></b> | 6325         | 20.24 (4.41)      | 19.97 (4.32)      | 20.00 (4.28)  | 19.90 (4.25)      | 19.98 (4.45)      |
| <b>Hypertension</b>                     |              |                   |                   |               |                   |                   |
| No                                      | 5339         | 495               | 1098              | 1923          | 1297              | 526               |
| Yes                                     | 898          | 94                | 182               | 345           | 186               | 91                |
| <b>Diabetes</b>                         |              |                   |                   |               |                   |                   |
| Yes                                     | 62           | 5                 | 14                | 18            | 14                | 11                |
| No                                      | 6175         | 584               | 1266              | 2250          | 1469              | 606               |
| <b>Hear disease</b>                     |              |                   |                   |               |                   |                   |

|   |             |             |             |             |             |             |
|---|-------------|-------------|-------------|-------------|-------------|-------------|
| No  | 5799        | 535         | 1183        | 2114        | 1398        | 569         |
| Yes   | 438         | 54          | 97          | 154         | 85          | 48          |
| <b>Cerebrovascular disease</b>                            |             |             |             |             |             |             |
| No  | 6183        | 573         | 1253        | 2225        | 1451        | 601         |
| Yes   | 142         | 16          | 27          | 43          | 32          | 16          |
| <b>Digestive disease</b>                                  |             |             |             |             |             |             |
| No  | 6020        | 563         | 1237        | 2192        | 1431        | 597         |
| Yes   | 217         | 26          | 43          | 76          | 52          | 20          |
| <b>Cancer</b>   |             |             |             |             |             |             |
| No  | 6364        | 584         | 1277        | 2260        | 1479        | 617         |
| Yes   | 20          | 5           | 3           | 8           | 4           | 0           |
| <b>Respiratory disease</b>                                |             |             |             |             |             |             |
| No  | 5591        | 527         | 1138        | 2003        | 1316        | 531         |
| Yes   | 722         | 62          | 142         | 265         | 167         | 86          |
| <b>Eye diseases</b>                                       |             |             |             |             |             |             |
| Yes   | 894         | 99          | 194         | 350         | 177         | 74          |
| No  | 5343        | 490         | 1086        | 1918        | 1306        | 543         |
| Baseline MMSE score, mean (SD)                            | 26.32 (3.3) | 26.39 (3.2) | 26.48 (3.2) | 26.32 (3.3) | 26.25 (3.3) | 26.05 (3.4) |
| Disability in ADL (activities of daily living), mean (SD) | 5.67 (0.90) | 5.58 (1.03) | 5.66 (0.91) | 5.67 (0.89) | 5.69 (0.86) | 5.68 (0.87) |

\*Data were expressed as counts (percentages), except for age and duration of follow-up; Missing data: 3 for occupation, 82 for BMI; 12 for education, 1 for smoke; 4 for drink; 55 for missing teeth;125 for diabetes; 109 for hypertension;121 for stroke and CVD;

**Table S5.** Subgroup analysis for the association of DDS change with cognitive impairment

| <b>DDS change</b>  | <b>Events</b> | <b>Participants</b> | <b>HR (95%CI)</b> | <b>P-value</b> |
|--------------------|---------------|---------------------|-------------------|----------------|
| <b>Age (years)</b> |               |                     |                   |                |
| <b>80--89</b>      |               | 3698                |                   |                |
| Large decline      | 95            | 341                 | 1.72 (1.34,2.21)  | 0.000          |
| Small decline      | 198           | 741                 | 1.46 (1.21,1.76)  | 0.000          |
| Stable status      | 288           | 1350                | Reference         |                |
| Small improvement  | 184           | 882                 | 0.82 (0.68,0.99)  | 0.042          |
| Large improvement  | 92            | 384                 | 0.90 (0.70,1.15)  | 0.383          |
| <b>≥90</b>         |               | 2539                |                   |                |
| Large decline      | 121           | 248                 | 1.68 (1.35,2.09)  | 0.000          |
| Small decline      | 204           | 539                 | 1.08 (0.91,1.29)  | 0.388          |
| Stable status      | 363           | 918                 | Reference         |                |
| Small improvement  | 213           | 601                 | 0.80 (0.68,0.96)  | 0.013          |
| Large improvement  | 71            | 233                 | 0.59 (0.45,0.77)  | 0.000          |
| <b>Gender</b>      |               |                     |                   |                |
| <b>Male</b>        |               | 2893                |                   |                |
| Large decline      | 78            | 260                 | 1.79 (1.35,2.37)  | 0.000          |
| Small decline      | 130           | 616                 | 1.14 (0.91,1.43)  | 0.267          |
| Stable status      | 217           | 1069                | Reference         |                |
| Small improvement  | 140           | 709                 | 0.81 (0.65,1.01)  | 0.057          |
| Large improvement  | 54            | 291                 | 0.75 (0.55,1.03)  | 0.073          |
| <b>Female</b>      |               | 3344                |                   |                |
| Large decline      | 437           | 1235                | 1.65 (1.35,2.03)  | 0.000          |
| Small decline      | 140           | 334                 | 1.28 (1.09,1.49)  | 0.002          |
| Stable status      | 276           | 680                 | Reference         |                |
| Small improvement  | 261           | 795                 | 0.83 (0.71,0.98)  | 0.025          |
| Large improvement  | 110           | 336                 | 0.77 (0.61,0.96)  | 0.018          |
| <b>Education</b>   |               |                     |                   |                |
| <b>Illiterate</b>  |               | 3680                |                   |                |
| Large decline      | 148           | 359                 | 1.70 (1.39,2.08)  | 0.000          |
| Small decline      | 301           | 743                 | 1.37 (1.18,1.59)  | 0.000          |

|                   |     |      |                  |       |
|-------------------|-----|------|------------------|-------|
| Stable status     | 454 | 1327 | Reference        |       |
| Small improvement | 286 | 878  | 0.85 (0.73,0.99) | 0.035 |
| Large improvement | 120 | 373  | 0.78 (0.63,0.96) | 0.021 |
| <b>Literate</b>   |     | 2557 |                  |       |
| Large decline     | 59  | 208  | 1.67 (1.24,2.25) | 0.001 |
| Small decline     | 91  | 479  | 0.91 (0.71,1.17) | 0.456 |
| Stable status     | 174 | 866  | Reference        |       |
| Small improvement | 96  | 541  | 0.74 (0.58,0.94) | 0.014 |
| Large improvement | 39  | 224  | 0.72 (0.51,1.03) | 0.069 |

## 6.S-Sensitivity analyses

### 6.1 Excluded participants who lost to follow-up or died in the second 3 years

**Table S6.1.1.** The association between DDS change patterns and cognitive impairment

| DDS change patterns  | DDS change patterns from baseline to first follow up |                        |                 |                        |                 |                       |                 |
|----------------------|--|------------------------|-----------------|------------------------|-----------------|-----------------------|-----------------|
|                      | High-high  | High-low<br>HR (95%CI) | <i>P</i> -value | Low-high<br>HR (95%CI) | <i>P</i> -value | Low-low<br>HR (95%CI) | <i>P</i> -value |
| Total DDS            |  |                        |                 |                        |                 |                       |                 |
| Model 1              | Reference  | 1.45 (1.17,1.79)       | 0.001           | 1.11 (0.90,1.37)       | 0.336           | 1.55 (1.29,1.86)      | 0.000           |
| Model 2 <sup>‡</sup> | Reference  | 1.33 (1.07,1.65)       | 0.011           | 0.92 (0.74,1.14)       | 0.427           | 1.22 (1.01,1.48)      | 0.039           |

Model1<sup>\*</sup>: Adjusted for age, sex;

Model2<sup>‡</sup>: Adjusted for model1 plus residence, education background, occupation, current marital status, living arrangement, tobacco smoking status, drinking status, regular exercise, number of teeth (continuous), use of artificial dentures, hypertension, diabetes, cerebrovascular diseases, respiratory diseases, digestive system diseases, ADL score, cancer, eye diseases and BMI (continuous), hear diseases. Other chronic diseases, baseline MMSE

**Table S6.1.2.** The association between DDS change and the incidence of cognitive impairment

|  | Model1*          |           | Model2†          |           |
|--|------------------|-----------|------------------|-----------|
|  | HR (95%CI)       | P-value   | HR (95%CI)       | P-value   |
| <b>DDS change</b><br><b>(continuous)</b> |                  |           |                  |           |
| <b>Plant-based DDS</b>                   | 0.98 (0.95,1.01) | 0.174     | 0.95 (0.92,0.98) | 0.001     |
| <b>Animal-based DDS</b>                  | 0.97 (0.93,1.01) | 0.104     | 0.95 (0.91,0.99) | 0.019     |
| <b>DDS(categorical)</b>                  |                  |           |                  |           |
| Large decline                            | 1.38 (1.08,1.77) | 0.010     | 1.58 (1.21,2.06) | 0.001     |
| Small decline                            | 1.27 (1.06,1.52) | 0.011     | 1.33 (1.10,1.61) | 0.004     |
| Stable status                            | Reference        | Reference | Reference        | Reference |
| Small improvement                        | 1.08 (0.90,1.29) | 0.405     | 0.99 (0.82,1.19) | 0.885     |
| Large improvement                        | 1.19 (0.94,1.51) | 0.151     | 0.93 (0.72,1.20) | 0.559     |

Model 1\*: Adjusted for age, sex;

Model2†: Adjusted for model1 plus residence, education background, occupation, current marital status, living arrangement, tobacco smoking status, drinking status, regular exercise, number of teeth(continuous), use of artificial dentures, hypertension, diabetes, cerebrovascular diseases, respiratory diseases, digestive system diseases, ADL score, cancer, eye diseases and BMI(continuous), hear diseases. Other chronic diseases, baseline MMSE, baseline DDS

## 6.2 Using the definition of cognitive impairment (MMSE score less than 24)

**Table S6.2.1.** The association between DDS change patterns and cognitive impairment

| DDS change patterns  | DDS change patterns from baseline to first follow up |                        |                 |                        |                 |                       |                 |
|----------------------|--|------------------------|-----------------|------------------------|-----------------|-----------------------|-----------------|
|                      | High-high  | High-low<br>HR (95%CI) | <i>P</i> -value | Low-high<br>HR (95%CI) | <i>P</i> -value | Low-low<br>HR (95%CI) | <i>P</i> -value |
| Total DDS            |  |                        |                 |                        |                 |                       |                 |
| Model 1              | Reference  | 1.38 (1.24,1.53)       | 0.000           | 1.18 (1.07,1.33)       | 0.001           | 1.46 (1.33,1.60)      | 0.000           |
| Model 2 <sup>†</sup> | Reference  | 1.29 (1.15,1.43)       | 0.000           | 1.05 (0.94,1.17)       | 0.386           | 1.24 (1.12,1.36)      | 0.000           |

Model1: Adjusted for age and sex.

Model2: Adjusted for model1 plus residence, education background, occupation, current marital status, living arrangement, tobacco smoking status, drinking status, regular exercise, number of teeth(continuous), use of artificial dentures, hypertension, diabetes, cerebrovascular diseases, respiratory diseases, digestive system diseases, ADL score, cancer, eye diseases and BMI(continuous), hear diseases. Other chronic diseases, baseline MMSE

**Table S6.2.2.** The association between DDS change and the incidence of cognitive impairment

|                                  | <b>Model1</b>       |                | <b>Model2</b>       |                |
|----------------------------------|---------------------|----------------|---------------------|----------------|
|                                  | <b>HR (95%CI)</b>   | <b>P-value</b> | <b>HR (95%CI)</b>   | <b>P-value</b> |
| <b>DDS change (continuous)</b>   | 0.99<br>(0.98,0.99) | 0.003          | 0.96<br>(0.95,0.97) | 0.000          |
| <b>Plant-based DDS</b>           | 0.98<br>(0.97,0.97) | 0.010          | 0.95<br>(0.94,0.97) | 0.000          |
| <b>Animal-based DDS(ordinal)</b> | 0.98<br>(0.96,0.99) | 0.025          | 0.96<br>(0.94,0.98) | 0.000          |
| Large decline                    | 1.24<br>(1.10,1.40) | 0.000          | 1.45<br>(1.28,1.65) | 0.000          |
| Small decline                    | 1.05<br>(0.96,1.15) | 0.300          | 1.13<br>(1.02,1.24) | 0.015          |
| Stable status                    | Reference           | Reference      | Reference           | Reference      |
| Small improvement                | 0.97<br>(0.89,1.07) | 0.577          | 0.90<br>(0.82,0.99) | 0.032          |
| Large improvement                | 1.00<br>(0.89,1.14) | 0.975          | 0.83<br>(0.73,0.95) | 0.005          |

Model1: Adjusted for age and sex.

Model2: Adjusted for model1 plus residence, education background, occupation, current marital status, living arrangement, tobacco smoking status, drinking status, regular exercise, number of teeth(continuous), use of artificial dentures, hypertension, diabetes, heart diseases, cerebrovascular diseases, respiratory diseases, digestive system diseases, ADL score, cancer, eye diseases and BMI(continuous), hear diseases. Other chronic diseases, baseline MMSE, baseline DDS

### 6.3 Excluded participants with chronic diseases (hypertension, diabetes, cancer, cerebrovascular diseases) at baseline

**Table S6.3.1.** The association between DDS change patterns and cognitive impairment

| DDS change patterns  | DDS change patterns from baseline to first follow up |                        |                 |                        |                 |                       |                 |
|----------------------|--|------------------------|-----------------|------------------------|-----------------|-----------------------|-----------------|
|                      | High-high  | High-low<br>HR (95%CI) | <i>P</i> -value | Low-high<br>HR (95%CI) | <i>P</i> -value | Low-low<br>HR (95%CI) | <i>P</i> -value |
| Total DDS            |  |                        |                 |                        |                 |                       |                 |
| Model 1              | Reference  | 1.50 (1.27,1.77)       | 0.000           | 1.19 (1.01,1.40)       | 0.042           | 1.64 (1.42,1.89)      | 0.000           |
| Model 2 <sup>†</sup> | Reference  | 1.38 (1.16,1.63)       | 0.000           | 1.02 (0.86,1.21)       | 0.805           | 1.35(1.16,1.56)       | 0.000           |

Model1: Adjusted for age and sex.

Model2: Adjusted for model1 plus residence, education background, occupation, current marital status, living arrangement, tobacco smoking status, drinking status, regular exercise, number of teeth(continuous), use of artificial dentures, hypertension, diabetes, cerebrovascular diseases, respiratory diseases, digestive system diseases, ADL score, cancer, eye diseases and BMI(continuous), hear diseases. Other chronic diseases, baseline MMSE

**Table S6.3.2.** The association between DDS change and the incidence of cognitive impairment

|                                | <b>Model1</b>     |                | <b>Model2</b>     |                |
|--------------------------------|-------------------|----------------|-------------------|----------------|
|                                | <b>HR (95%CI)</b> | <b>P-value</b> | <b>HR (95%CI)</b> | <b>P-value</b> |
| <b>DDS change (continuous)</b> | 0.97 (0.95,0.98)  | 0.000          | 0.93 (0.92,0.95)  | 0.000          |
| <b>Plant-based DDS</b>         | 0.96 (0.94,0.98)  | 0.000          | 0.92 (0.90,0.94)  | 0.000          |
| <b>Animal-based DDS</b>        | 0.96 (0.94,0.99)  | 0.014          | 0.94 (0.91,0.97)  | 0.000          |
| <b>DDS (categorical)</b>       |                   |                |                   |                |
| Large decline                  | 1.47 (1.24,1.74)  | 0.000          | 1.81 (1.51,2.16)  | 0.000          |
| Small decline                  | 1.08 (0.94,1.24)  | 0.290          | 1.20 (1.04,1.39)  | 0.014          |
| Stable status                  | Reference         | Reference      | Reference         | Reference      |
| Small improvement              | 0.92(0.80,1.06)   | 0.245          | 0.86 (0.74,0.99)  | 0.037          |
| Large improvement              | 1.01 (0.83,1.22)  | 0.928          | 0.79 (0.65,0.97)  | 0.025          |

Model1: Adjusted for age and sex.

Model2: Adjusted for model1 plus residence, education background, occupation, current marital status, living arrangement, tobacco smoking status, drinking status, regular exercise, number of teeth(continuous), use of artificial dentures, hypertension, diabetes, cerebrovascular diseases, respiratory diseases, digestive system diseases, ADL score, cancer, eye diseases and BMI (continuous), hear diseases Other chronic diseases, baseline MMSE, baseline DDS

## 6.4 Education was treated as a continuous variable

**Table S6.4.1.** The association between DDS change patterns and cognitive impairment

| DDS change patterns  | DDS change patterns from baseline to first follow up |                        |         |                        |         |                       |         |
|----------------------|--|------------------------|---------|------------------------|---------|-----------------------|---------|
|                      | High-high  | High-low<br>HR (95%CI) | P-value | Low-high<br>HR (95%CI) | P-value | Low-low<br>HR (95%CI) | P-value |
| Total DDS            |  |                        |         |                        |         |                       |         |
| Model 1              | Reference  | 1.56 (1.35,1.81)       | 0.000   | 1.18 (1.01,1.38)       | 0.028   | 1.70 (1.50,1.93)      | 0.000   |
| Model 2 <sup>†</sup> | Reference  | 1.44 (1.24,1.68)       | 0.000   | 1.03 (0.88,1.20)       | 0.719   | 1.43 (1.26,1.64)      | 0.000   |

Model1: Adjusted for age and sex.

Model2: Adjusted for model1 plus residence, education background, occupation, current marital status, living arrangement, tobacco smoking status, drinking status, regular exercise, number of teeth(continuous), use of artificial dentures, hypertension, diabetes, cerebrovascular diseases, respiratory diseases, digestive system diseases, ADL score, cancer, eye diseases and BMI (continuous), hear diseases. Other chronic diseases, baseline MMSE

**Table S6.4.2.** The association between DDS change and the incidence of cognitive impairment

|                                | <b>Model1</b>     |                | <b>Model2</b>     |                |
|--------------------------------|-------------------|----------------|-------------------|----------------|
|                                | <b>HR (95%CI)</b> | <b>P-value</b> | <b>HR (95%CI)</b> | <b>P-value</b> |
| <b>DDS change (continuous)</b> | 0.97 (0.96,0.98)  | 0.000          | 0.93 (0.92,0.95)  | 0.000          |
| <b>Plant-based DDS</b>         | 0.96 (0.95,0.98)  | 0.000          | 0.93 (0.91,0.95)  | 0.000          |
| <b>Animal-based DDS</b>        | 0.95 (0.93,0.98)  | 0.000          | 0.92 (0.90,0.95)  | 0.000          |
| <b>DDS (categorical)</b>       |                   |                |                   |                |
| Large decline                  | 1.39 (1.20,1.63)  | 0.000          | 1.70 (1.44,2.01)  | 0.000          |
| Small decline                  | 1.11 (0.98,1.26)  | 0.100          | 1.23 (1.08,1.40)  | 0.001          |
| Stable status                  | Reference         | Reference      | Reference         | Reference      |
| Small improvement              | 0.91 (0.80,1.03)  | 0.125          | 0.82 (0.73,0.94)  | 0.003          |
| Large improvement              | 0.97 (0.82,1.15)  | 0.721          | 0.75 (0.63,0.90)  | 0.002          |

Model1: Adjusted for age and sex.

Model2: Adjusted for model1 plus residence, education background, occupation, current marital status, living arrangement, tobacco smoking status, drinking status, regular exercise, number of teeth(continuous), use of artificial dentures, hypertension, diabetes, cerebrovascular diseases, respiratory diseases, digestive system diseases, ADL score, cancer, eye diseases and BMI(continuous), hear diseases. Other chronic diseases, baseline MMSE, baseline DDS

## Reference

1. Liu, M.; He, P.; Zhou, C.; Zhang, Z.; Zhang, Y.; Li, H.; Ye, Z.; Wu, Q.; Yang, S.; Zhang, Y., et al. Association of waist-calf circumference ratio with incident cognitive impairment in older adults. *Am J Clin Nutr* **2022**, *115*, 1005-1012, doi:10.1093/ajcn/nqac011.