**Preplanned Studies**

# Health Status and Food Intake Frequency of Elderly Residents During COVID-19 Community Closure — Jiangxia District, Wuhan City, China, 2020

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## Summary

### What is already known about this topic?

Elderly persons are vulnerable to infectious diseases, and nutritional status and health conditions were important to evaluate for disease prevention and ability to recover for the elderly during the coronavirus disease 2019 (COVID-19) pandemic.

### What is added by this report?

In our study, a rapid assessment questionnaire was used to investigate the change of household life and dietary intake of the elderly (aged 60 years or more) during community closure. Food consumption frequency of aquatic food products, soybeans, and fresh fruits declined dramatically with reductions of 70.9%, 70.9%, and 53.0%, respectively, and 49.6% of the elderly lived with chronic non-communicable diseases but had little knowledge of nutrition and health.

### What are the implications for public health practice?

Community closure measures in Wuhan City have played a key role in cutting off the transmission route of COVID-19 and protecting vulnerable groups. As a high-risk population, the elderly should be advised to maintain and strengthen a balanced diet with proper nutrition through increasing intake of aquatic food products, soybeans, fruits, and vegetables, reducing total caloric intake, and decreasing oil and salt consumption. These measures will be significant for the elderly to reduce the risk of chronic disease complications and COVID-19 infection and to decrease the chance of critical illness.

The coronavirus disease 2019 (COVID-19) pandemic presented great physical and mental challenges for the residents of Wuhan (*1*). Elderly individuals aged 60 years or more were more susceptible and vulnerable to infectious diseases due to comparatively weaker immune functions and were a high-risk group in the pandemic. Except for effective personal protection, balanced diets and proper nutrition were effective means to maintain the immune function of the elderly. To assess the change of diet and health status of the elderly after community closure measures, we conducted a survey in Jiangxia District of Wuhan City, Hubei Province.

Considering the feasibility of field investigations, we selected two communities (A and B) in the Zhifang Sub-District, which had relatively strict management due to higher numbers of diagnosed cases compared to other sub-districts in Jiangxia District. The residents of the two communities were relatively concentrated; 11.6% of Community A were elderly individuals under social community management (where the community was managed by its own members) and 48.5% of Community B were elderly under factory group management (where residents had family members working in the factory, and this factory managed the community). Anonymous online surveys were conducted in Community A, and because some elderly individuals could not use smart phones, family members helped complete the online survey. Questionnaires in Community B were completed in person by trained team members.

A total of 117 questionnaires were completed from March 16 to 23, 2020 after 3 participants were excluded for being aged under 60 years. Overall, 35.9% of the questionnaires were completed independently, and 64.1% were completed by family members or community workers. SAS 9.4 software (SAS Institute Inc., Cary, NC, USA) was applied for statistical analysis. T-tests, analysis of variance, and chi-square tests were used to compare the differences among subgroups. Bilateral $p<0.05$ was considered as statistically significant.

In our survey, 45.3% of the participants were male and the ratio of genders was 1:1.21. The average age of the elderly was 72.2 ± 8.5 years (range: 60–102 years) with a similar average age in both genders. As for education, 67.5% of the elderly had schooling of 9

years or less (equivalent to junior high school or below), and 15.4% had schooling of 13 years and above (equivalent to a college or tertiary education). Among the older participants, the smoking rate was 16.2% (26.4% for men and 7.8% for women). An estimated 49.6% of the elderly suffered from chronic diseases including 69.0% having hypertension and those with diabetes, osteoporosis, and tumors accounted for 15.5%, 15.5% and 15.5%, respectively. An estimated 69.0% of surveyed individuals were chronically taking 3 or more medications. During the pandemic, 72.6% of the elderly reported that they did not pay attention to diet and nutrition, and 95.7% of the elderly did not deliberately take nutritional supplements. In our study, 21.4% of the elderly did not know their weight and 61.5% neglected waist circumference. A proportion of 15.2% in those who knew their weight reported an increased weight, while 22.2% had reductions in weight. There were statistically significant differences between gender, age, education, health status, and change of body weight between the 2 communities ($p < 0.05$) (Table 1).

During the community closure period, the elderly reported that basic food and drink were mainly supplied by local community (83.8%) and family reserves (70.1%). There was a higher proportion of online purchasing in Community A (36.8%) than in Community B (13.3%) with statistically significant differences ($p < 0.01$). The elderly in Community A also reported a statistically higher proportion of food reductions (43.9%) than in Community B (1.7%; $p < 0.01$), and also a higher proportion of the elderly ate two meals per day or less in community A than community B (38.6% $vs.$ 5.0%, $p < 0.01$). Furthermore, only 21.4% of the elderly met the recommended 1,500 mL of daily water intake (Table 1).

About 83.8% of the elderly consumed rice or wheat products once or more per day, and 82.1% consumed fresh vegetables more than one time a day. The proportion of the elderly who consumed red meat and poultry once a week or more was 69.2%. The frequency of egg consumption of the elderly was 63.3% of at least once a day and 28.2% of 1–6 times a week. However, the proportions of elderly consuming soybeans, milk, and aquatic food products (including freshwater fish, marine fish, shrimp, crab, shellfish and other animal aquatic products excluding seaweed, kale, etc.) less than once a week were 73.5%, 61.6%, 60.6%, respectively. Red meat and poultry intake frequency of more than once a day among males was significantly higher than that in female (52.8% $vs.$ 34.4%, $p < 0.01$).

Potatoes consumption frequency of more than once per day among individuals aged 80 years and above was significantly lower than that of individuals aged 70–79 years and individuals aged 60–69 years (10.7%, 20.0%, 16.3%; $p < 0.05$). However, there were no statistically significant differences of intake frequency of specific foods between the elderly in better health status and those living with chronic diseases. When compared with before community closures, the proportions of elderly consuming dramatically less aquatic food products, soybeans, and fresh fruit after community closures were 70.9%, 70.9%, and 53.0%, respectively. Subgroup analysis showed that the consumption of rice/wheat products and coarse grains was significantly reduced among females than in males ( rice/wheat products: 21.9% $vs.$ 5.7%, coarse grains: 46.9% vs. 24.5%, $p < 0.05$), but healthy individuals consumption of eggs, red meat, and poultry were reportedly more significantly reduced than in individuals with chronic diseases (eggs: 22.0% $vs.$ 6.9%; red meat and poultry: 44.1% $vs.$ 32.8%; $p < 0.05$)(Table 2).

Table 3 showed that 85.5%, 83.8%, 79.5%, 73.5%, 70.9%, and 60.7% of the elderly consumed milk, potatoes, coarse grains, soybeans, fresh fruits, and aquatic food products lower than recommended levels. Females also showed much higher rates of not consuming recommended amounts of rice/wheat products, red meat, and poultry when compared to males (rice/wheat products: 23.4% $vs.$ 7.6%; red meat and poultry: 45.3% $vs.$ 13.2%).

## DISCUSSION

This investigation demonstrated that dietary nutrition status of the elderly was affected during the COVID-19 pandemic in Wuhan as their consumption of aquatic food products, soybeans and fresh fruits decreased significantly. Furthermore, unreasonable and unbalanced diet structure combined with decreased physical activity will increase the risk of chronic diseases. Therefore, the elderly should maintain balanced diet as well as an active lifestyle during the pandemic.

During the period of community closure in Wuhan, early of foods reservs such as rice, flour, oil, vegetables, eggs, meats, and poultry were often prioritized at the family level. These basic foods provided adequate energy and moderate levels of protein to prevent severe energy-protein malnutrition from occurring in the short term. In addition, community food supplies were

TABLE 1. Characteristics of participants in two communities during the period of community closure.

| variables | Community A (n=57) | Community B (n=60) | Total (n=117) |
|---|---|---|---|
| Female (n, %) | 37 (64.9) | 27 (45.0)[*] | 64(54.7) |
| Age (mean ± sd) | 69.4±8.4 | 74.8±7.7[†] | 72.2±8.5 |
| Age group (n, %) | | | |
|   60–69 years | 31 (54.4) | 18 (30.0)[†] | 49 (41.9) |
|   70–79 years | 17 (29.8) | 23 (38.3) | 40 (34.2) |
|   80 years and above | 9 (15.8) | 19 (31.7) | 28 (23.9) |
| Education level (n, %) | | | |
|   Primary school and below | 30 (52.6) | 9 (15.0)[†] | 39 (33.3) |
|   Junior high school | 11 (19.3) | 29 (48.4) | 40 (34.2) |
|   Senior high school | 6 (10.5) | 14 (23.3) | 20 (17.1) |
|   College or other tertiary education | 10 (17.6) | 8 (13.3) | 18 (15.4) |
| Smoking (n, %) | 9 (15.8) | 10 (16.7) | 19 (16.2) |
| Living with chronic diseases[§] (n, %) | 16 (28.1) | 42 (70.0)[†] | 58 (49.6) |
|   Hypertension (n, %) | 10 (62.5) | 30 (71.4) | 40 (69.0) |
|   Diabetes (n, %) | 4 (25.0) | 5 (11.9) | 9 (15.5) |
|   Osteoporosis (n, %) | 5 (31.2) | 4 (9.5) | 9 (15.5) |
|   Tumors (n, %) | 5 (31.2) | 4 (9.5) | 9 (15.5) |
| Chronic use of 3 or more medications (n, %) | 13 (81.2) | 27 (64.3)[*] | 40 (69.0) |
| Paid attention to diet and nutrition (n, %) | 6 (10.5) | 26 (43.3)[**] | 32 (27.4) |
| Taking nutritional supplements (n, %) | 1 (1.8) | 4 (6.7) | 5 (4.3) |
| Current self-reported body weight (mean±sd) | 59.4±14.2 | 62.3±11.0 | 61.0±12.5 |
| Former self-reported body weight (mean±sd) | 59.9±13.9 | 63.3±11.1[†] | 61.8±12.4 |
| Body weight change during community closure[¶] | | | |
|   No change (n, %) | 15 (48.4) | 30 (73.2)[*] | 45 (62.5) |
|   Weight gain (n, %) | 8 (25.8) | 3 (7.3) | 11 (15.2) |
|   Weight loss (n, %) | 8 (25.8) | 8 (19.5) | 16 (22.2) |
| Self-reported waist circumference (mean±sd) | 84.9±14.3 | 87.7±12.3 | 86.8±12.9 |
| Food sources (n, %) | | | |
|   Local community supplies | 45 (79.0) | 53 (88.3) | 98 (83.8) |
|   Family reserves | 39 (68.4) | 43 (71.7) | 82 (70.1) |
|   Online purchase | 21 (36.8) | 8 (13.3)[†] | 29 (24.8) |
| Food intake reduction during community closure (n, %) | 25 (43.9) | 1 (1.7)[†] | 26 (22.2) |
| Consuming 2 meals per day or fewer during community closure (n, %) | 22 (38.6) | 3 (5.0)[†] | 25 (21.4) |
| Water intake of at least 1,500 mL per day (n, %) | 8 (14.0) | 17 (28.3) | 25 (21.4) |

[*]: Comparison of variables between two communities, *p*<0.05.
[†]: Comparison of variables between two communities, *p*<0.01.
[§]: Chronic diseases included cardiovascular and cerebrovascular diseases, cancer, diabetes, and chronic respiratory diseases.
[¶]: The weight change was calculated among those who had known their body weights both before and after community closure.

a complementary addition for household food stocks. But due to different community management, there were differences in the variety and quantity of the food supply, which potentially influenced the food intake of the elderly. Due to limits in the food supply and insufficient intake of fresh fruits, soybeans, and aquatic food products, the elderly inevitably experienced a lack of high-quality protein, calcium, vitamins, and essential fatty acids, so increasing the variety of available food should be a priority as the communities return to normalcy. In addition, high-quality protein plays an important role in improving immunity of the

TABLE 2. Intake frequency of specific foods and reductions* among elderly participants during the period of community closure.

| Food items | Gender (%) | | Age group (%) | | | Healthy status[†] (%) | | Total (%) |
|---|---|---|---|---|---|---|---|---|
| | Male | Female | 60–69 years | 70–79 years | 80 years and above | Yes | No | |
| **Rice/wheat products** | | | | | | | | |
| ≥ once/day | 92.5 | 76.6 | 79.7 | 82.5 | 92.9 | 83.1 | 84.5 | 83.8 |
| 1–6 times/week | 7.5 | 12.5 | 16.3 | 10.0 | − | 11.9 | 8.6 | 10.3 |
| 1–3 times/month | − | 4.7 | 2.0 | 5.0 | − | 3.4 | 1.7 | 2.6 |
| ≤ once/month | − | 6.2 | 2.0 | 2.5 | 7.1 | 1.6 | 5.2 | 3.3 |
| Reduction | 5.7 | 21.9[§] | 14.3 | 17.5 | 10.7 | 15.3 | 13.8 | 14.5 |
| **Coarse grains** | | | | | | | | |
| ≥ once/day | 24.5 | 17.1 | 22.5 | 17.5 | 21.4 | 22.0 | 19.0 | 20.5 |
| 1–6 times/week | 20.8 | 26.6 | 16.2 | 37.5 | 17.9 | 15.3 | 32.8 | 23.9 |
| 1–3 times/month | 17.0 | 26.6 | 28.6 | 15.0 | 21.4 | 22.0 | 22.3 | 22.2 |
| ≤ once/month | 37.7 | 29.7 | 32.7 | 30.0 | 39.3 | 40.7 | 25.9 | 33.4 |
| Reduction | 24.5 | 46.9[§] | 36.7 | 45.0 | 25.0 | 37.3 | 36.2 | 36.8 |
| **Potatoes** | | | | | | | | |
| ≥ once/day | 17.0 | 15.6 | 16.3 | 20.0 | 10.7[§] | 17.0 | 15.5 | 16.2 |
| 1–6 times/week | 39.6 | 40.7 | 44.9 | 47.5 | 21.4 | 37.3 | 43.1 | 40.2 |
| 1–3 times/month | 30.2 | 28.1 | 28.6 | 27.5 | 32.1 | 30.5 | 27.6 | 29.1 |
| ≤ once/month | 13.2 | 15.6 | 10.2 | 5.0 | 35.8 | 15.2 | 13.8 | 14.5 |
| Reduction | 34.0 | 39.1 | 36.7 | 40.0 | 32.1 | 44.1 | 29.3 | 36.8 |
| **Fresh vegetables** | | | | | | | | |
| ≥ once/day | 88.7 | 76.6 | 83.7 | 75.0 | 89.3 | 81.4 | 82.8 | 82.1 |
| 1–6 times/week | 11.3 | 15.6 | 14.3 | 20.0 | 3.6 | 15.3 | 12.1 | 13.7 |
| 1–3 times/month | − | 6.3 | 2.0 | 5.0 | 3.6 | 3.3 | 3.5 | 3.3 |
| ≤ once/month | − | 1.5 | − | − | 3.5 | − | 1.6 | 0.9 |
| Reduction | 32.1 | 34.4 | 30.6 | 40.0 | 28.6 | 30.5 | 36.2 | 33.3 |
| **Fresh fruits** | | | | | | | | |
| ≥ once/day | 32.1 | 26.6 | 32.7 | 22.5 | 32.1 | 28.8 | 29.3 | 29.1 |
| 1–6 times/week | 43.4 | 32.8 | 42.9 | 37.5 | 28.6 | 33.9 | 41.4 | 37.6 |
| 1–3 times/month | 18.9 | 29.7 | 20.4 | 27.5 | 28.6 | 28.8 | 20.7 | 24.8 |
| ≤ once/month | 5.6 | 10.9 | 4.0 | 12.5 | 10.7 | 8.5 | 8.6 | 8.5 |
| Reduction | 45.3 | 59.4 | 51.0 | 60.0 | 46.4 | 52.5 | 53.5 | 53.0 |
| **Eggs** | | | | | | | | |
| ≥ once/day | 71.7 | 56.3 | 63.3 | 62.5 | 64.3 | 57.6 | 69.0 | 63.3 |
| 1–6 times/week | 24.5 | 31.3 | 28.6 | 27.5 | 28.5 | 33.9 | 22.4 | 28.2 |
| 1–3 times/month | 1.9 | 9.4 | 6.1 | 7.5 | 3.6 | 5.1 | 6.9 | 6.0 |
| ≤ once/monthh | 1.9 | 3.0 | 2.0 | 2.5 | 3.6 | 3.4 | 1.7 | 2.5 |
| Reduction | 7.6 | 20.3 | 16.3 | 17.5 | 7.1 | 22.0 | 6.9[§] | 14.5 |
| **Aquatic food products**** | | | | | | | | |
| ≥ once/dayy | 11.3 | 9.4 | 10.2 | 10.0 | 10.7 | 11.9 | 8.6 | 10.3 |
| 1–6 times/week | 35.9 | 23.4 | 30.6 | 25.0 | 32.1 | 32.2 | 25.9 | 29.1 |
| 1–3 times/month | 39.6 | 39.1 | 38.8 | 42.5 | 35.8 | 33.9 | 44.8 | 39.2 |
| ≤ once/month | 13.2 | 28.1 | 20.4 | 22.5 | 21.4 | 22.0 | 20.7 | 21.4 |
| Reduction | 67.9 | 73.4 | 71.4 | 75.0 | 64.3 | 66.1 | 75.9 | 70.9 |

TABLE 2. (Continued)

| Food items | Gender (%) | | Age group (%) | | | Healthy status† (%) | | Total (%) |
|---|---|---|---|---|---|---|---|---|
| | Male | Female | 60–69 years | 70–79 years | 80 years and above | Yes | No | |
| Red meat and poultry | | | | | | | | |
| ≥ once/day | 52.8 | 34.4¶ | 42.9 | 40.0 | 46.4 | 35.6 | 50.0 | 42.7 |
| 1–6 times/week | 34.0 | 20.3 | 30.6 | 22.5 | 25.0 | 30.5 | 22.4 | 26.5 |
| 1–3 times/month | 7.6 | 31.3 | 20.4 | 20.0 | 21.4 | 18.6 | 22.4 | 20.5 |
| ≤ once/month | 5.6 | 14.0 | 6.1 | 17.5 | 7.2 | 15.3 | 5.2 | 10.3 |
| Reduction | 34.0 | 42.2 | 40.8 | 37.5 | 35.7 | 44.1 | 32.8§ | 38.5 |
| Milk | | | | | | | | |
| ≥ once/day | 20.8 | 9.4 | 14.3 | 7.5 | 25.0 | 11.9 | 17.2 | 14.5 |
| 1–6 times/week | 22.6 | 25.0 | 22.5 | 25.0 | 25.0 | 20.3 | 27.6 | 23.9 |
| 1–3 times/month | 20.8 | 23.4 | 26.5 | 25.0 | 10.7 | 20.3 | 24.1 | 22.2 |
| ≤ once/month | 35.8 | 42.2 | 36.7 | 42.5 | 39.3 | 47.5 | 31.1 | 39.4 |
| Reduction | 24.5 | 45.3 | 38.8 | 40.0 | 25.0 | 39.0 | 32.8 | 35.9 |
| Soybeans | | | | | | | | |
| ≥ once/day | 9.4 | 3.1 | 6.1 | 2.5 | 10.7 | 6.8 | 5.2 | 6.0 |
| 1–6 times/week | 24.5 | 17.2 | 22.5 | 17.5 | 21.4 | 23.7 | 17.2 | 20.5 |
| 1–3 times/month | 39.6 | 32.8 | 30.6 | 42.5 | 35.7 | 33.9 | 37.9 | 35.9 |
| ≤ once/month | 26.5 | 46.9 | 40.8 | 37.5 | 32.2 | 35.6 | 39.7 | 37.6 |
| Reduction | 69.8 | 71.9 | 73.5 | 80.0 | 53.6 | 64.4 | 77.6 | 70.9 |

*: The proportion of the elderly whose food intake frequency less than they did before community closure.
†: Healthy status was defined as whether the elderly had living with chronic diseases.
§: Comparison of each variable in different subgroups, $p<0.05$.
¶: Comparison of each variable in different subgroups, $p<0.01$.
**: Aquatic food products included freshwater fish, marine fish, shrimp, crab, shellfish and other animal aquatic products excluding seaweed, kale, etc.

TABLE 3. Elderly participants failing to reach the recommended intake levels of specific foods during the period of community closure* (%)

| Food items | Gender | | Age group | | | Healthy status† | | Total |
|---|---|---|---|---|---|---|---|---|
| | Male | Female | 60–69 years | 70–79 years | 80 years and above | Yes | No | |
| Rice/wheat products | 7.6 | 23.4§ | 20.4 | 17.5 | 7.1 | 17.0 | 15.5 | 16.2 |
| Coarse grains | 75.5 | 82.8 | 77.6 | 82.5 | 78.6 | 78.0 | 81.0 | 79.5 |
| Potatoes | 83.0 | 84.4 | 83.7 | 80.0 | 89.3 | 83.1 | 84.5 | 83.8 |
| Fresh vegetables | 11.3 | 23.4 | 16.3 | 25.0 | 10.7 | 18.6 | 17.2 | 18.0 |
| Fresh fruits | 67.9 | 73.4 | 67.4 | 77.5 | 67.9 | 71.2 | 70.7 | 70.9 |
| Eggs | 28.3 | 43.8 | 36.7 | 37.5 | 35.7 | 42.4 | 31.0 | 36.8 |
| Aquatic food products¶ | 52.8 | 67.2 | 59.2 | 65.0 | 57.1 | 55.9 | 65.5 | 60.7 |
| Red meat and poultry | 13.2 | 45.3** | 26.5 | 37.5 | 28.6 | 33.9 | 27.6 | 30.8 |
| Milk | 79.3 | 90.6 | 85.7 | 92.5 | 75.0 | 88.1 | 82.8 | 85.5 |
| Soybeans | 66.0 | 79.7 | 71.4 | 80.0 | 67.9 | 69.5 | 77.6 | 73.5 |

*: the recommended intake frequency of rice/wheat products, coarse grains, potatoes, fresh vegetables, fresh fruits, eggs, and milk were more than once a day, while intake of aquatic products, red meat, poultry, and soybeans of more than once a week were defined as meeting the recommendations.
†: Health status was defined as whether the elderly were living with chronic diseases.
§: Comparison of each variable in different subgroups, $p<0.05$.
¶: Aquatic food products included freshwater fish, marine fish, shrimp, crab, shellfish and other animal aquatic products excluding seaweed, kale, etc.
**: Comparison of each variable in different subgroups, $p<0.01$.

elderly during the pandemic (*2*). Fish, poultry, eggs, milk, lean meat, and soybean products are primary sources of high-quality protein, but marinated/processed fish and meat products should be avoided for the potential of increasing cardiovascular disease risk in the elderly.

Elderly individuals often suffer from hypertension, diabetes, or other non-communicable cardiovascular diseases and must take multiple medications regularly. They paid more attention to their health in case of emergencies, so drug stockpiles and medical resources should always be prioritized by themselves or by the community (*3*). However, their nutritional status was often neglected, and food intake correspondingly decreased, especially when combined with digestive dysfunction and loss of appetite during the pandemic. For elderly with hypertension or diabetes, adequate coarse grains, vegetables, and soybeans could benefit for their blood glucose and blood pressure (*4–5*). Chinese dietary guidelines also recommended that a daily diet should contain an adequate amount of these plant-based foods (*2*).

There are some limitations in our study. First, although there was variation in age, gender, education, lifestyles, and other characteristics of the elderly involved in our study, findings from this survey were not representative of the elderly living in closed communities in Wuhan. Second, given the self-reported information nature of this survey, the results were subjected to some level of recall bias or mistakes. Third, data in this study were based on information provided by participants, so the results were also influenced by some level of subjectivity. Nevertheless, the study reflected the nutritional and health status of the elderly during the COVID-19 pandemic and can be used to inform elderly individuals' health maintenance and promotion in Wuhan.

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## REFERENCES

1. World Health Organization. Report of the WHO-China joint mission on coronavirus disease 2019 (COVID-19), February 16-24, 2020. https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf. [2020-04-28].
2. Chinese Nutrition Society. Dietary guideline of the elderly in China 2016. Beijing: People's Medical Publishing House, 2016 . (In Chinese).
3. Wu J. An important but overlooked measure for containing the COVID-19 epidemic: protecting patients with chronic diseases. China CDC Weekly 2020; 2(15): 249-50. http://weekly.chinacdc.cn/en/article/id/45571a77-8d7a-4c78-82cb-463c72f0e7c8.
4. Micha R, Shulkin ML, Peñalvo JL, Khatibzadeh S, Singh GM, Rao M, et al. Etiologic effects and optimal intakes of foods and nutrients for risk of cardiovascular diseases and diabetes: systematic reviews and meta-analyses from the Nutrition and Chronic Diseases Expert Group (NutriCoDE). PLoS One 2017; 12(4): e0175149. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5407851/.
5. Bechthold A, Boeing H, Schwedhelm C, Hoffmann G, Knüppel S, Iqbal K, et al. Food groups and risk of coronary heart disease, stroke and heart failure: a systematic review and dose-response meta-analysis of prospective studies. Crit Rev Food Sci Nutr 2019; 59(7): 1071-90. https://pubmed.ncbi.nlm.nih.gov/29039970/.