

Preplanned Studies

Cooking Oil and Salt Intakes Among Children Aged 6–17 Years — China, 2016–2017

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Summary

What is already known on this topic?

High-level intakes of both cooking oil and salt are issues of concern in China as they can lead to an increased risk of chronic diseases later in life. Reducing intakes of cooking oil and salt should be prioritized in children.

What is added by this report?

Among children aged 6–17 years in China in 2016–2017, the median intake of cooking oil and salt were 27.7 and 6.1 g/d, respectively. The percentages of children with intake of cooking oil and salt that exceeded the recommended guidelines were 50.4% and 67.8%, respectively.

What are the implications for public health practice?

Understanding the consumption levels of cooking oil and salt among children aged 6–17 years in China is vital for reducing associated health effects later in life. This study provided scientific evidence to recommend policymakers formulate effective policies to reduce intake of cooking oil and salt for the target population.

Currently, the intake of cooking salt and oil of Chinese residents are still at a high level. The results of the China Nutrition and Health Surveillance 2010–2013 showed that the average cooking oil and cooking salt intakes of Chinese residents overall were 42.1 and 10.5 g/d, respectively (1). A high intake of cooking oil may lead to an increased risk of chronic diseases such as obesity, cardiovascular disease, fatty liver, etc. (2–3). In addition, a high intake of cooking salt may also lead to an increased risk of other chronic diseases such as hypertension, stroke, gastric cancer, etc. (4–5). This study aimed to estimate the intake of cooking oil and salt among children aged 6–17 years old in China using data from the China Nutrition and Health Surveillance of Children and Lactating Mothers (CNHSCLM) in 2016–2017, to provide scientific evidence for policymakers to formulate effective

policies to reduce intake of cooking oil and salt.

The CNHSCLM was a cross-sectional study, and data from 2016–2017 were used. A multistage stratified random sampling method was used to collect data in 275 monitoring sites in 31 provincial-level administrative divisions (PLADs) (6). The intake data on cooking oil and salt were extracted from the CNHSCLM in this study and assessed over three consecutive days of recording the weight of cooking oil and salt in the family kitchens or school cafeterias, and the total number of diners was recorded. The individual intake of cooking oil and salt was calculated according to the dietary energy ratio of the number of diners and according to the recommended intake of cooking oil and salt in the Dietary Guidelines for Chinese Residents (2016). The recommended intake of cooking oil for children aged 4–10 and 11–17 years were 20–25 and 25–30 g/d, respectively, and participants in the surveillance were placed into groups of low, adequate, and high consumption. The recommended intake of cooking salt for children aged 4–6, 7–10, and 11–17 years were <3, <4, and <5 g/d, respectively, and the participants were divided into adequate and high groups (7). SAS (version 9.4, SAS Institute Inc., Cary, NC, USA) was used to conduct all the analyses. All data were non-normally distributed. The measurement data were described by median and quartile distance. The intake of cooking oil and salt among different age groups, sex, area types, regions (8), and sources were analyzed by Wilcoxon rank-sum test. The data were described by constituent ratio, and the constituent ratio was compared using chi-squared tests. The level of statistical significance was set at $P < 0.05$. The protocol of this study was evaluated and approved by the ethical committee of China CDC (201614).

A total of 16,042 participants were included in this report, including 3,996 participants aged 6–8 years, 4,781 participants aged 9–11 years, 3,802 participants aged 12–14 years, and 3,463 participants aged 15–17 years. These 16,042 participants were distributed as follows: 7,982 males and 8,060 females; 7,524 in

urban areas and 8,518 in rural areas; 5,576 in eastern regions, 4,910 in central regions, and 5,556 in western regions; and 10,865 were evaluated in family kitchens and 5,177 in school cafeterias. The study's population distribution was fully described in Table 1.

As presented in Table 1, the median intake of cooking oil among children aged 6–17 years in China overall in 2016–2017 was 27.7 g/d, and that of children aged 6–8, 9–11, 12–14, and 15–17 years were 24.1, 26.3, 29.6, and 33.3 g/d, respectively. The intake of cooking oil showed differences based on the following factors: males had higher intake than females (29.4 g/d *vs.* 26.3 g/d, $P<0.01$); urban residents had lower intake than rural residents (25.9 g/d *vs.* 29.4 g/d, $P<0.01$); residents in eastern regions had lower intakes than residents in central and western regions (24.3 g/d *vs.* 29.0 g/d *vs.* 30.7 g/d, $P<0.01$); and participants in family kitchens had lower intake than those in school cafeterias (27.0 g/d *vs.* 29.4 g/d, $P<0.05$). The median intake of cooking salt overall was 6.1 g/d, and that of children aged 6–8, 9–11, 12–14, and 15–17 years were

5.2, 6.2, 6.6, and 6.6 g/d, respectively. Intake of cooking salt showed differences based on the following factors: males had higher intake than females (6.4 g/d *vs.* 5.8 g/d, $P<0.01$); urban residents had lower intake than rural residents (5.6 g/d *vs.* 6.4 g/d, $P<0.01$); residents in eastern regions had lower intakes than residents in central and western regions (5.7 g/d *vs.* 6.3 g/d *vs.* 6.3 g/d, $P<0.01$); and participants in family kitchens had lower intake than those in school cafeterias (5.8 g/d *vs.* 6.6 g/d, $P<0.05$).

The results of evaluating intake of cooking oil and salt based on the distributions were illustrated in Table 2. Among children aged 6–17 years in China in 2016–2017, only 10.5% of the children had the recommended intake of cooking oil, with 39.2% of children having lower than the recommended intake and 50.4% of children having higher than recommended intake. The proportions of children aged 6–8, 9–11, 12–14, and 15–17 years having higher than the recommended intake of cooking oil were 47.6%, 50.0%, 49.3%, and 55.2%, respectively.

TABLE 1. The median of intake of cooking oil and salt among children aged 6–17 years in China, 2016–2017 (g/d) [M (P_{25} , P_{75})].

| Variable | N | Cooking oil | Cooking salt |
|--------------------|--------|-------------------------------|----------------------------|
| Total | 16,042 | 27.7(15.5, 44.8) | 6.1(3.8, 9.3) |
| Age groups (years) | | | |
| 6–8 | 3,996 | 24.1(14.1, 38.0)* | 5.2(3.2, 8.1)* |
| 9–11 | 4,781 | 26.3(14.7, 42.2)* | 6.2(3.9, 9.1)* |
| 12–14 | 3,802 | 29.6(16.8, 47.2)* | 6.6(4.2, 9.7)* |
| 15–17 | 3,463 | 33.3(18.3, 53.5)* | 6.6(4.0, 10.0)* |
| Sex | | | |
| Male | 7,982 | 29.4(16.3, 47.5) [†] | 6.4(3.9, 9.8) [†] |
| Female | 8,060 | 26.3(14.8, 42.1) [†] | 5.8(3.6, 8.7) [†] |
| Area type | | | |
| Urban | 7,524 | 25.9(14.5, 42.5) [§] | 5.6(3.4, 8.9) [§] |
| Rural | 8,518 | 29.4(16.5, 47.6) [§] | 6.4(4.1, 9.5) [§] |
| Region | | | |
| Eastern regions | 5,576 | 24.3(13.6, 38.7) [¶] | 5.7(3.5, 8.6) [¶] |
| Central regions | 4,910 | 29.0(17.3, 46.1) [¶] | 6.3(3.9, 9.5) [¶] |
| Western regions | 5,556 | 30.7(16.1, 50.6) [¶] | 6.3(3.9, 9.8) [¶] |
| Source | | | |
| Family kitchen | 10,865 | 27.0(15.7, 44.1)** | 5.8(3.6, 9.0)** |
| School cafeteria | 5,177 | 29.4(14.8, 46.6)** | 6.6(4.2, 9.8)** |

* P -value <0.01 for differences among children aged 6–8, 9–11, 12–14, and 15–17 years.

[†] P -value <0.01 for differences between male and female.

[§] P -value <0.01 for differences between urban and rural areas.

[¶] P -value <0.01 for differences among eastern, central, and western regions.

** P -value <0.05 for differences between family kitchen and school cafeteria.

TABLE 2. Distributions of cooking oil and salt intakes among children aged 6–17 years in China, 2016–2017 (%).

| Variable | Recommended intake of cooking oil | | | Recommended intake of cooking salt | |
|--------------------|-----------------------------------|------------------------|--------------------------|------------------------------------|--------------------------|
| | Low[N(%)] | Adequate[N(%)] | High[N(%)] | Adequate[N(%)] | High[N(%)] |
| Total | 6,286(39.2) | 1,678(10.5) | 8,078(50.4) | 5,174(32.3) | 10,868(67.8) |
| Age groups (years) | | | | | |
| 6–8 | 1,555(38.9)* | 539(13.5)* | 1,902(47.6)* | 1,316(32.9)* | 2,680(67.1)* |
| 9–11 | 1,934(40.5)* | 457(9.6)* | 2,390(50.0)* | 1,415(29.6)* | 3,366(70.4)* |
| 12–14 | 1,552(40.8)* | 375(9.9)* | 1,875(49.3)* | 1,277(33.6)* | 2,525(66.4)* |
| 15–17 | 1,245(36.0)* | 307(8.9)* | 1,911(55.2)* | 1,166(33.7)* | 2,297(66.3)* |
| Sex | | | | | |
| Male | 2,907(36.4) [†] | 825(10.3) [†] | 4,250(53.2) [†] | 2,337(29.3) [†] | 5,645(70.7) [†] |
| Female | 3,379(41.9) [†] | 853(10.6) [†] | 3,828(47.5) [†] | 2,837(35.2) [†] | 5,223(64.8) [†] |
| Area type | | | | | |
| Urban | 3,186(42.3) [§] | 791(10.5) [§] | 3,547(47.1) [§] | 2,769(36.8) [§] | 4,755(63.2) [§] |
| Rural | 3,100(36.4) [§] | 887(10.4) [§] | 4,531(53.2) [§] | 2,405(28.2) [§] | 6,113(71.8) [§] |
| Region | | | | | |
| Eastern regions | 2,552(45.8) [¶] | 655(11.8) [¶] | 2,369(42.5) [¶] | 1,985(35.6) [¶] | 3,591(64.4) [¶] |
| Central regions | 1,764(35.9) [¶] | 533(10.9) [¶] | 2,613(53.2) [¶] | 1,445(29.4) [¶] | 3,465(70.6) [¶] |
| Western regions | 1,970(35.5) [¶] | 490(8.8) [¶] | 3,096(55.7) [¶] | 1,744(31.4) [¶] | 3,812(68.6) [¶] |
| Source | | | | | |
| Family kitchen | 4,226(38.9)** | 1,188(10.9)** | 5,451(50.2)** | 3,625(33.4)** | 7,240(66.6)** |
| School cafeteria | 2,060(39.8)** | 490(9.5)** | 2,627(50.7)** | 1,549(29.9)** | 3,628(70.1)** |

* *P*-value <0.01 for differences among children aged 6–8, 9–11, and 12–14 years.[†] *P*-value <0.01 for differences between male and female.[§] *P*-value <0.01 for differences between urban and rural areas.[¶] *P*-value <0.01 for differences among eastern, central, and western regions.^{**} *P*-value <0.05 for differences between family kitchen and school cafeteria.

Differences in higher than the recommended intake of cooking oil existed for the following factors: males had a higher proportion than females (53.2% *vs.* 47.5%, *P*<0.01); urban residents had a lower proportion than rural residents (47.1% *vs.* 53.2%, *P*<0.01); residents of the eastern regions had lower proportion than those residing in central and western regions (42.5% *vs.* 53.2% *vs.* 55.7%, *P*<0.01); and participants in family kitchens had a lower proportion than those in school canteens (50.2% *vs.* 50.7%, *P*<0.05). The proportion of children overall having intake of cooking salt higher than recommended was 67.8%, and that of children aged 6–8, 9–11, 12–14, and 15–17 years were 67.1%, 70.4%, 66.4%, and 66.3%, respectively. Differences in higher than recommended intake of cooking salt existed for the following factors: males had a higher proportion than females (70.7% *vs.* 64.8%, *P*<0.01); urban residents had a lower proportion than rural residents (63.2% *vs.* 71.8%, *P*<0.01); residents of the eastern regions had lower proportion than those residing in central and western regions (64.4% *vs.*

70.6% *vs.* 68.6%, *P*<0.01); and participants in family kitchens had a lower proportion than those in school cafeterias (66.6% *vs.* 70.1%, *P*<0.01).

DISCUSSION

High intake of cooking oil and salt is closely associated with increased risk of chronic diseases such as obesity, hypertension, cardiovascular disease, etc. (2–5). Therefore, reducing cooking oil and salt is one of the core recommendations in the Dietary Guidelines for Chinese Residents (2016). The National Health Commission (NHC) has launched a special campaign to encourage residents to reduce intake of cooking oil and salt (9). In this study among children aged 6–17 years in China in 2016–2017, the median intake of cooking oil was 27.7 g/d, and the median intake typically increased with age as children aged 6–8, 9–11, 12–14, and 15–17 years had intakes of 24.1, 26.3, 29.3, and 33.3 g/d, respectively. Overall, 50.4% of the children had an intake of cooking oil that

exceeded recommended intake levels. The median intake of cooking salt among this group overall was 6.1 g/d, and the median intake typically increased with age as children aged 6–8, 9–11, 12–14, and 15–17 years had intakes of 5.2, 6.2, 6.6, and 6.6 g/d, respectively. Overall, 67.8% of the children had an intake of cooking salt that exceeded recommended intake levels. These results suggested that the intake of cooking oil and salt in most children in China exceeded the recommended guidelines. Therefore, policymakers and associated stakeholders should continue to aim for reducing the intake of cooking oil and salt, strengthen education regarding related nutrition and health knowledge, and encourage reasonable food choices and improved dietary behavior.

In general, high intake levels of cooking oil and salt in children aged 6–17 years in China were an important issue to be addressed. The effects of government nutrition policies and nutrition education on improving dietary behavior and nutrition status had been recognized (10). Communities, schools, and families should work together to develop feasible and appropriate dietary environments for children.

This study was subject to at least two limitations. First, due to a limitation in the methodology, the intake of cooking oil and salt while eating out, i.e., not eating at home or at school, was not obtained. Second, the total consumption of cooking oil and salt was likely underestimated to a certain extent by using the weight records of the ingredients in the family kitchens or school canteens.

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