

Preplanned Studies

Dietary Sodium-to-Potassium Ratio Among Chinese Adults — China, 1991–2024

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Summary

What is already known about this topic?

Sodium–potassium balance is important for health. The Na/K ratio among Chinese adults has declined but remains above the World Health Organization–recommended level of <1.0.

What is added by this report?

The median Na/K ratio among Chinese adults was 5.2 in 2022–2024, lower than in 1991 but higher than in 2018. Despite the overall downward trend, the proportion with an achieving Na/K ratio <1.0 did not increase significantly.

What are the implications for public health practice?

Continued population-level monitoring is needed. Public health efforts should reduce sodium intake and increase potassium intake to achieve the recommended Na/K ratio level.

28.5% (2,247/7,883) to 46.3% (6,326/13,674), and the proportion with Na/K ratio <1 increased from 1.2% (98/7,883) in 1991 to 1.8% (251/13,642) in 2018 and then decreased to 0.9% (124/13,674) in 2022–2024.

Conclusion: The Na/K ratio showed a decreasing trend among Chinese adults. However, this value is far above the recommended standard. Public health efforts should focus on reducing sodium and increasing potassium intake.

The sodium-to-potassium (Na/K) ratio is a key indicator for assessing the balance of dietary sodium and potassium intake and is a more robust predictor of blood pressure and cardiovascular diseases ([1](#)). Chinese residents have long been confronted with a sodium–potassium imbalance characterized by high sodium and low potassium intakes. Although previous studies have indicated that the Na/K ratio in Chinese adults has declined, it has remained above the World Health Organization (WHO)–recommended level of <1.0 ([2–3](#)). Therefore, it is crucial to monitor the long-term dynamic changes in the Na/K ratio to provide scientific evidence for the formulation of nutrition policies and guidance on healthy diets for residents in China.

This study analyzed data from participants of the China Health and Nutrition Survey (CHNS, 1991–2018) and the China Development and Nutrition Health Impact Cohort Survey (2022–2024). Detailed descriptions of the study design and methodology have been reported elsewhere ([4–5](#)). Participants were adults aged 18 years and above from the survey data of 1991, 1993, 1997, 2000, 2004, 2006, 2009, 2011, 2015, 2018 and 2022–2024. The exclusion criteria included pregnant or lactating women, individuals with implausible energy intake (<600 or >4,000 kcal/day for females and <800 or >5,000 kcal/day for males), and those with missing or implausible dietary sodium or potassium intake (below

ABSTRACT

Introduction: Sodium–potassium balance plays an important role in health. This study aimed to examine long-term trends and the distribution of the dietary sodium-to-potassium (Na/K) ratio among Chinese adults, thereby providing a scientific basis for promoting healthy diets.

Methods: Data were obtained from the China Health and Nutrition Survey (1991–2018) and the China Development and Nutrition Health Impact Cohort Survey (2022–2024). Adults aged 18 years and above were included in the study. The dietary intake of foods and condiments were collected using three consecutive 24-hour dietary recalls combined with a weighing method.

Results: The median dietary Na/K ratio decreased from 6.7 in 1991 to 4.4 in 2018 and then increased to 5.2 in 2022–2024. The proportion of individuals with Na/K ratio ≥ 5 decreased from 70.3% (5,538/7,883) in 1991 to 52.8% (7,224/13,674) in 2022–2024, whereas the proportion with $1 \leq \text{Na/K ratio} < 5$ increased from

the 1st percentile or above the 99th percentile). This study was approved by the Ethics Review Committee of the National Institute for Nutrition and Health, Chinese Center for Disease Control and Prevention (No. 20180314; No. 2022-024). Written informed consent was obtained from all participants prior to the investigation.

Individual dietary intake data were collected through consecutive 3-day 24-hour dietary recalls, which included two weekdays and one weekend day, to account for variations in eating patterns. All interviews were conducted face-to-face in the participants' homes. The household weighing method was employed to measure the consumption of cooking oils and condiments over the same three-day period. Individual intake of dietary sodium and potassium was calculated using the *China Food Composition Table (FCT)*, and

Na/K ratio was subsequently derived.

Given the non-normal distribution of dietary sodium and potassium intake, the Kruskal–Wallis H test was used to assess differences in median Na/K ratio across age groups and education levels, while the Wilcoxon rank-sum test was used to compare the median Na/K ratio between sexes, urban-rural areas, and between northern and southern regions. The Cochran–Mantel–Haenszel and Cochran–Armitage trend tests were used to examine trends in the distribution of demographic characteristics, while the Cochran–Armitage trend test was used to assess changes in the population distribution of Na/K ratio. Furthermore, the Wilcoxon trend test was used to assess trends in Na/K ratio over the survey years. All statistical tests were two-sided, with a significance level set at $\alpha = 0.05$. Analyses were conducted using SAS

TABLE 1. Demographic characteristics of adults aged 18 years and above in China, 1991–2024.

Characteristics	1991	1993	1997	2000	2004	2006	2009	2011	2015	2018	2022–2024	<i>P</i> _{for trend}
Number	7,883	7,360	7,835	8,909	8,318	8,535	9,173	11,762	14,011	13,642	13,674	
Age, years												<0.001
18–44	4,945 (62.7)	4,491 (61.0)	4,298 (54.9)	4,509 (50.6)	3,578 (43.0)	3,475 (40.7)	3,412 (37.2)	4,015 (34.1)	4,626 (33.0)	3,722 (27.3)	3,572 (26.1)	–
45–59	1,750 (22.2)	1,673 (22.7)	2,103 (26.8)	2,743 (30.8)	2,894 (34.8)	2,908 (34.1)	3,265 (35.6)	4,267 (36.3)	4,768 (34.0)	4,604 (33.8)	4,531 (33.2)	–
≥60	1,188 (15.1)	1,196 (16.3)	1,434 (18.3)	1,657 (18.6)	1,846 (22.2)	2,152 (25.2)	2,496 (27.2)	3,480 (29.6)	4,617 (33.0)	5,316 (39.0)	5,571 (40.7)	–
Gender												<0.001
Male	3,852 (48.9)	3,582 (48.7)	3,947 (50.4)	4,437 (49.8)	4,038 (48.6)	4,062 (47.6)	4,461 (48.6)	5,628 (47.9)	6,560 (46.8)	6,342 (46.5)	6,358 (46.5)	–
Female	4,031 (51.1)	3,778 (51.3)	3,888 (49.6)	4,472 (50.2)	4,280 (51.5)	4,473 (52.4)	4,712 (51.4)	6,134 (52.2)	7,451 (53.2)	7,300 (53.5)	7,316 (53.5)	–
Area												<0.001
Urban	2,635 (33.4)	2,310 (31.4)	2,704 (34.5)	3,049 (34.2)	2,914 (35.0)	2,962 (34.7)	3,106 (33.9)	4,795 (40.8)	5,459 (39.0)	5,459 (40.0)	5,033 (36.8)	–
Rural	5,248 (66.6)	5,050 (63.6)	5,131 (65.5)	5,860 (65.8)	5,404 (65.0)	5,573 (65.3)	6,067 (66.1)	6,967 (59.2)	8,552 (61.0)	8,183 (60.1)	8,641 (63.2)	–
Region												<0.001
North	2,896 (36.7)	2,682 (36.4)	2,753 (35.1)	3,864 (43.4)	3,925 (47.2)	3,813 (44.7)	3,985 (43.4)	4,689 (39.9)	5,233 (37.4)	5,313 (39.0)	4,280 (31.3)	–
South	4,987 (63.3)	4,678 (63.6)	5,082 (64.9)	5,045 (56.6)	4,393 (52.8)	4,722 (55.3)	5,188 (56.6)	7,073 (60.1)	8,778 (62.7)	8,329 (61.1)	9,394 (68.7)	–
Educational level												<0.001
Primary school or below	4,490 (56.9)	3,954 (53.7)	4,132 (52.7)	4,155 (46.6)	3,641 (43.8)	3,633 (42.6)	3,884 (42.3)	4,272 (36.3)	4,581 (32.7)	4,133 (30.3)	4,696 (34.3)	–
Junior high school	2,126 (27.0)	2,135 (29.0)	2,172 (27.7)	2,703 (30.3)	2,643 (31.8)	2,592 (30.4)	3,031 (33.0)	3,659 (31.1)	4,427 (31.6)	4,323 (31.7)	4,005 (29.3)	–
Senior high school or above	1,267 (16.1)	1,271 (17.3)	1,531 (19.5)	2,051 (23.0)	2,034 (24.5)	2,310 (27.1)	2,258 (24.6)	3,831 (32.6)	5,003 (35.7)	5,186 (38.0)	4,973 (36.4)	–

Note: Statistical analyses were performed using the Cochran–Mantel–Haenszel trend test for multiple group comparisons and the Cochran–Armitage trend test for two-group comparisons.

–: Not applicable.

(version 9.4, SAS Institute Inc., Cary, NC, USA), and figures were generated using SAS and Microsoft Office Excel (version 2019, Microsoft Corporation, Redmond, WA, USA).

As shown in Table 1, the proportion of individuals aged 18–44 years declined from 62.7% (4,945/7,883) to 26.1% (3,572/13,674) and that of those with a primary school or below fell from 56.9% (4,490/7,883) to 34.3% (4,696/13,674). In contrast, the proportion of individuals aged 45–59 years rose from 22.2% (1,750/7,883) to 33.2% (4,531/13,674), and that of those aged 60 years and above increased from 15.1% (1,188/7,883) to 40.7% (5,571/13,674). Meanwhile, the proportion of individuals with a senior high school or higher increased from 16.1% (1,267/7,883) to 36.4% (4,973/13,674). Regarding regional distribution, the proportion of northern participants initially increased and then decreased, whereas that of southern participants first decreased and then increased. Both the gender and urban-rural population distribution remained generally stable over the observed period.

As shown in Table 2, the median dietary Na/K ratio decreased from 6.7 in 1991 to 4.4 in 2018 and then increased to 5.2 in 2022–2024. The Na/K ratio was generally higher in the oldest age group than in the younger age group, for rural residents than for urban residents. Individuals with higher educational levels exhibited lower Na/K ratios.

As shown in Figure 1, from 1991 to 2024, the proportion of individuals with the optimal ratio (<1.0) remained consistently below 4%. The proportion of individuals with a Na/K ratio ≥ 5 decreased from 70.3% (5,538/7,883) in 1991 to 52.8% (7,224/13,674) in 2022–2024, whereas the proportion of those with $1 \leq \text{Na/K ratio} < 5$ increased from 28.5% (2,247/7,883) to 46.3% (6,326/13,674), and the proportion with a Na/K ratio <1 increased from 1.2% (98/7,883) in 1991 to 1.8% (251/13,642) in 2018 and then decreased to 0.9% (124/13,674) in 2022–2024.

DISCUSSION

Over the past three decades, the dietary sodium-to-potassium (Na/K) ratio among Chinese adults has decreased. During the same period, the distribution of Na/K ratio showed improvement, characterized by a decrease in the proportion of individuals with Na/K ratio above 5 and a concurrent increase in those within 1–5. However, the proportion of individuals with

Na/K ratio below 1.0 — the range most aligned with cardiovascular health recommendations (6) — did not exhibit a significant increase. Notably, the Na/K ratio among adults exhibited a rebound in 2022–2024.

The observed decline in the Na/K ratio among Chinese adults is primarily attributable to a reduction in dietary sodium intake at the population level (2). Condiments are the predominant source of sodium in China, with table salt being the single largest contributor. This downward trend in sodium consumption reflects the effectiveness of sustained national public health campaigns and policies aimed at reducing salt intake (7). However, the stagnation in the proportion of individuals achieving the optimal Na/K ratio suggests that the overall improvement is primarily driven by a moderate reduction in excessive salt consumption, while potassium intake remained insufficient or even declined. Consequently, the dietary pattern remains suboptimal as sodium intake, despite declining, is still excessive and potassium intake continues to fall short of the recommended levels (2).

Despite this positive development, the current Na/K ratio in China remains alarmingly high, substantially exceeding the optimal level recommended by the WHO. The rebound observed between 2022 and 2024 reverses the previous declining trend and underscores the critical need for continuous monitoring of population-level Na/K ratio to ascertain whether the observed shifts are indicative of a reversal or a mere fluctuation, as the etiological factors driving these two phenomena may be distinct.

A downward trend in the Na/K ratio has also been observed in several other countries. Data from the Korea National Health and Nutrition Examination Survey showed that the mean Na/K ratio among Korean adults (aged 19–79 years) decreased from 1.77 in 2007 to 1.32 in 2022 (8). A cohort study based on NIPPON DATA2010 in Japan reported a decrease in mean Na/K ratio from 4.00 in 2010 to 3.38 in 2020 (9). A nationally representative study in Italy indicated that the mean Na/K ratio among adults declined from 3.0 in 2008–2012 to 2.8 in 2018–2019 (10). Compared to these countries, the Na/K ratio in China remains relatively high, indicating that more intensive intervention efforts are warranted.

This study had two limitations. First, with the increasing proportion of people eating away from home, dietary surveys may underestimate the intake of salt and other condiments. Second, low-sodium salt substitutes were not included in the *FCT*, which may

TABLE 2. Trends in dietary sodium-to-potassium ratio among adults aged 18 years and above in China, 1991–2024.

Characteristics	1991		1993		1997		2000		2004		2006		2009		2011		2015		2018		2022-2024		Z	P for trend
	Median (P ₂₅ , P ₇₅)	Mean±SD (P ₂₅ , P ₇₅)	Median (P ₂₅ , P ₇₅)	Mean±SD (P ₂₅ , P ₇₅)	Median (P ₂₅ , P ₇₅)	Mean±SD (P ₂₅ , P ₇₅)	Median (P ₂₅ , P ₇₅)	Mean±SD (P ₂₅ , P ₇₅)	Median (P ₂₅ , P ₇₅)	Mean±SD (P ₂₅ , P ₇₅)	Median (P ₂₅ , P ₇₅)	Mean±SD (P ₂₅ , P ₇₅)	Median (P ₂₅ , P ₇₅)	Mean±SD (P ₂₅ , P ₇₅)	Median (P ₂₅ , P ₇₅)	Mean±SD (P ₂₅ , P ₇₅)	Median (P ₂₅ , P ₇₅)	Mean±SD (P ₂₅ , P ₇₅)	Median (P ₂₅ , P ₇₅)	Mean±SD (P ₂₅ , P ₇₅)				
Total	6.7 (46, 9.5)	7.4±4.3 (4.4, 9.0)	6.4 (4.4, 9.0)	7.1±4.2 (4.0, 9.0)	6.1 (4.0, 9.0)	7.0±4.5 (4.4, 8.8)	6.3 (4.4, 8.8)	7.1±4.2 (4.4, 8.8)	5.3 (3.4, 7.6)	6.1±4.3 (3.3, 6.6)	4.8 (3.3, 6.6)	5.3±2.8 (3.2, 6.4)	4.6 (3.2, 6.4)	5.3±3.3 (3.4, 6.9)	4.8 (3.4, 6.9)	5.7±3.8 (3.0, 6.3)	4.4 (3.0, 6.3)	5.0±2.9 (3.0, 6.4)	4.4 (3.0, 6.4)	5.1±3.1 (3.5, 8.0)	5.2 (3.5, 8.0)	6.7±5.5 (3.5, 8.0)	-56.219	<0.001
Age, years																								
18-44	6.6 (46, 9.4)	7.4±4.1 (4.4, 9.0)	6.5 (4.4, 9.0)	7.1±4.2 (4.0, 9.0)	6.0 (3.9, 8.7)	6.8±4.3 (4.3, 8.5)	6.1 (4.3, 8.5)	6.9±4.0 (3.3, 7.5)	5.2 (3.3, 7.5)	6.0±4.2 (3.3, 6.5)	4.7 (3.3, 6.5)	5.2±2.8 (3.2, 6.2)	4.5 (3.2, 6.2)	5.1±3.2 (3.3, 6.5)	4.6 (3.3, 6.5)	5.5±3.6 (2.9, 5.9)	4.2 (2.9, 5.9)	4.7±2.7 (2.9, 6.3)	4.3 (2.9, 6.3)	5.0±3.0 (3.3, 7.9)	5.0 (3.3, 7.9)	6.6±5.6 (3.5, 8.1)	-48.772	<0.001
45-59	6.6 (45, 9.7)	7.6±4.4 (4.3, 8.8)	6.3 (4.3, 8.8)	6.9±3.9 (4.2, 9.2)	6.3 (4.2, 9.2)	7.1±4.5 (4.5, 8.8)	6.3 (4.5, 8.8)	7.1±4.1 (3.6, 7.7)	5.4 (3.6, 7.7)	6.2±4.1 (3.3, 6.6)	4.8 (3.3, 6.6)	5.3±2.8 (3.2, 6.5)	4.6 (3.2, 6.5)	5.3±3.3 (3.4, 7.0)	4.9 (3.4, 7.0)	5.8±3.8 (3.1, 6.5)	4.6 (3.1, 6.5)	5.1±2.9 (3.1, 6.4)	4.5 (3.1, 6.4)	5.1±3.0 (3.5, 8.1)	5.3 (3.5, 8.1)	6.9±5.8 (3.6, 8.0)	-27.037	<0.001
≥60	7.0 (47, 9.8)	7.7±4.6 (4.6, 9.2)	6.5 (4.6, 9.2)	7.3±4.4 (4.2, 9.4)	6.4 (4.2, 9.4)	7.4±4.9 (4.6, 9.4)	6.8 (4.6, 9.4)	7.7±4.5 (3.3, 7.8)	5.2 (3.3, 7.8)	6.3±4.7 (3.4, 6.9)	4.9 (3.4, 6.9)	5.4±2.9 (3.3, 6.6)	4.7 (3.3, 6.6)	5.4±3.4 (3.4, 7.2)	4.9 (3.4, 7.2)	5.8±3.9 (3.0, 6.5)	4.5 (3.0, 6.5)	5.2±3.1 (3.0, 6.5)	4.5 (3.0, 6.5)	5.2±3.1 (3.6, 8.0)	5.3 (3.6, 8.0)	6.7±5.3 (3.6, 8.0)	-18.974	<0.001
P	0.121	-	0.152	-	<0.001	-	<0.001	-	0.013	-	0.007	-	0.001	-	<0.001	-	<0.001	-	0.007	-	<0.001	-	-	
Gender																								
Male	6.8 (46, 9.6)	7.5±4.2 (4.4, 9.1)	6.6 (4.4, 9.1)	7.1±4.2 (4.0, 9.0)	6.1 (4.0, 9.0)	7.0±4.3 (4.5, 8.7)	6.3 (4.5, 8.7)	7.1±4.1 (3.4, 7.7)	5.3 (3.4, 7.7)	6.1±4.1 (3.3, 6.6)	4.8 (3.4, 6.6)	5.3±2.7 (3.2, 6.4)	4.6 (3.2, 6.4)	5.3±3.3 (3.4, 6.9)	4.9 (3.4, 6.9)	5.7±3.7 (3.0, 6.3)	4.5 (3.0, 6.3)	5.0±2.8 (2.9, 6.3)	4.5 (3.1, 6.4)	5.1±3.0 (3.5, 8.1)	5.3 (3.5, 8.1)	6.8±5.4 (3.6, 8.0)	-39.131	<0.001
Female	6.6 (45, 9.4)	7.4±4.2 (4.4, 8.9)	6.4 (4.4, 8.9)	7.1±4.1 (3.9, 9.0)	6.1 (3.9, 9.0)	7.0±4.6 (4.4, 8.9)	6.3 (4.4, 8.9)	7.1±4.2 (3.4, 7.6)	5.2 (3.4, 7.6)	6.2±4.4 (3.3, 6.6)	4.8 (3.3, 6.6)	5.3±2.9 (3.2, 6.3)	4.5 (3.2, 6.3)	5.2±3.3 (3.3, 6.9)	4.7 (3.3, 6.9)	5.7±3.8 (2.9, 6.3)	4.4 (2.9, 6.3)	5.0±3.0 (3.0, 6.4)	4.4 (3.0, 6.4)	5.1±3.1 (3.4, 7.9)	5.1 (3.4, 7.9)	6.7±5.7 (3.6, 8.3)	-40.248	<0.001
P	0.088	-	0.212	-	0.386	-	0.858	-	0.317	-	0.400	-	0.044	-	0.007	-	0.155	-	0.017	-	0.003	-	-	
Area																								
Urban	6.4 (45, 9.3)	7.2±3.9 (4.3, 8.6)	6.2 (4.3, 8.6)	6.8±3.9 (3.8, 8.6)	5.9 (3.8, 8.6)	6.8±4.6 (4.2, 8.8)	6.2 (4.2, 8.8)	7.0±4.1 (3.3, 7.6)	5.1 (3.3, 7.6)	6.1±4.5 (3.1, 6.4)	4.5 (3.1, 6.4)	5.0±2.7 (3.1, 6.6)	4.6 (3.1, 6.6)	5.4±3.5 (3.1, 6.7)	4.5 (3.1, 6.7)	5.4±3.7 (2.7, 5.8)	4.1 (2.7, 5.8)	4.6±2.7 (2.9, 6.3)	4.1 (2.7, 5.9)	4.7±2.8 (3.2, 7.5)	4.9 (3.2, 7.5)	6.3±5.3 (3.6, 8.3)	-38.163	<0.001
Rural	6.8 (46, 9.6)	7.6±4.4 (4.5, 9.2)	6.6 (4.5, 9.2)	7.2±4.3 (4.1, 9.1)	6.3 (4.1, 9.1)	7.1±4.4 (4.5, 8.8)	6.3 (4.5, 8.8)	7.2±4.2 (3.4, 7.7)	5.4 (3.4, 7.7)	6.2±4.2 (3.5, 6.8)	4.9 (3.5, 6.8)	5.4±2.9 (3.2, 6.3)	4.6 (3.2, 6.3)	5.2±3.2 (3.5, 7.1)	5.0 (3.5, 7.1)	5.9±3.8 (3.2, 6.6)	4.6 (3.2, 6.6)	5.2±3.0 (3.2, 6.7)	4.7 (3.2, 6.7)	5.4±3.2 (3.6, 8.3)	5.4 (3.6, 8.3)	7.0±5.7 (3.6, 8.3)	-40.657	<0.001
P	0.004	-	<0.001	-	<0.001	-	0.020	-	0.014	-	<0.001	-	0.919	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	-	
Region																								
North	6.8 (44, 9.8)	7.6±4.5 (4.0, 9.1)	6.3 (4.0, 9.1)	7.0±4.3 (3.2, 8.5)	5.3 (3.2, 8.5)	6.1 (4.1, 9.0)	6.1 (4.1, 9.0)	7.0±4.4 (3.7, 8.3)	5.7 (3.7, 8.3)	6.7±4.6 (3.2, 6.1)	4.4 (3.2, 6.1)	4.9±2.6 (3.2, 6.5)	4.6 (3.2, 6.5)	5.3±3.3 (3.3, 7.1)	4.8 (3.3, 7.1)	5.8±4.0 (3.2, 6.6)	4.7 (3.2, 6.6)	5.2±3.0 (2.9, 6.3)	4.3 (2.9, 6.3)	4.9±3.0 (3.6, 8.3)	5.5 (3.6, 8.3)	6.9±5.3 (3.6, 8.3)	-28.229	<0.001
South	6.6 (47, 9.3)	7.4±4.1 (4.7, 8.9)	6.6 (4.7, 8.9)	7.1±4.1 (4.4, 9.2)	6.5 (4.4, 9.2)	7.4±4.5 (4.6, 8.7)	6.4 (4.6, 8.7)	7.2±3.9 (3.1, 7.1)	5.0 (3.1, 7.1)	5.6±4.0 (3.5, 7.0)	5.1 (3.5, 7.0)	5.6±3.0 (3.2, 6.4)	4.6 (3.2, 6.4)	5.3±3.2 (3.4, 6.8)	4.8 (3.4, 6.8)	5.6±3.6 (2.9, 6.1)	4.3 (2.9, 6.1)	4.8±2.8 (3.1, 6.5)	4.5 (3.1, 6.5)	5.2±3.1 (3.4, 7.9)	5.1 (3.4, 7.9)	6.7±5.6 (3.6, 8.3)	-49.144	<0.001
P	0.754	-	0.004	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	0.940	-	0.867	-	<0.001	-	<0.001	-	<0.001	-	-	
Educational level																								
Primary school or below	6.7 (46, 9.5)	7.6±4.4 (4.5, 9.2)	6.5 (4.5, 9.2)	7.2±4.2 (4.1, 9.2)	6.4 (4.1, 9.2)	7.2±4.6 (4.5, 9.1)	6.5 (4.5, 9.1)	7.3±4.3 (3.4, 7.7)	5.3 (3.4, 7.7)	6.2±4.4 (3.4, 6.7)	4.9 (3.4, 6.7)	5.4±2.9 (3.3, 6.6)	4.7 (3.3, 6.6)	5.4±3.3 (3.5, 7.3)	5.1 (3.5, 7.3)	6.0±4.0 (3.2, 6.8)	4.8 (3.2, 6.8)	5.3±3.0 (2.9, 6.4)	4.8 (3.2, 6.9)	5.5±3.3 (3.7, 8.6)	5.6 (3.7, 8.6)	7.2±6.0 (3.6, 8.3)	-33.587	<0.001
Junior high school	6.8 (46, 9.8)	7.5±4.1 (4.4, 8.9)	6.4 (4.4, 8.9)	7.1±4.1 (3.9, 8.9)	6.1 (3.9, 8.9)	6.9±4.4 (4.3, 8.7)	6.1 (4.3, 8.7)	7.0±4.2 (3.4, 7.7)	5.4 (3.4, 7.7)	6.2±4.2 (3.4, 6.5)	4.7 (3.4, 6.5)	5.3±2.8 (3.2, 6.4)	4.5 (3.2, 6.4)	5.2±3.2 (3.4, 6.8)	4.8 (3.4, 6.8)	5.7±3.7 (2.9, 6.4)	4.5 (2.9, 6.4)	5.0±3.0 (3.1, 6.5)	4.5 (3.1, 6.5)	5.2±3.0 (3.5, 8.1)	5.2 (3.5, 8.1)	6.8±5.4 (3.6, 8.0)	-28.646	<0.001
Senior high school or above	6.4 (45, 9.0)	7.1±3.8 (4.4, 8.5)	6.2 (4.4, 8.5)	6.9±4.2 (3.8, 8.4)	5.6 (3.8, 8.4)	6.6±4.2 (4.3, 8.4)	6.1 (4.3, 8.4)	6.8±3.9 (3.3, 7.3)	5.1 (3.3, 7.3)	5.9±4.2 (3.3, 6.5)	4.6 (3.2, 6.5)	5.2±2.7 (3.1, 6.2)	4.4 (3.1, 6.2)	5.1±3.3 (3.1, 6.5)	4.5 (3.1, 6.5)	5.3±3.4 (2.8, 5.8)	4.1 (2.8, 5.8)	4.6±2.7 (2.7, 5.9)	4.1 (2.7, 5.9)	4.7±2.9 (3.2, 7.4)	4.9 (3.2, 7.4)	6.3±5.1 (3.6, 8.0)	-25.745	<0.001
P	0.008	-	0.054	-	<0.001	-	<0.001	-	0.002	-	0.013	-	0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	-	

Note: Statistical analyses were performed using the Wilcoxon rank-sum test for two-group comparisons and the Kruskal-Wallis test for multiple group comparisons. The Wilcoxon trend test was used to assess trends in the dietary sodium-to-potassium ratio over the survey years. —: Not applicable.
Abbreviation: SD=standard deviation.

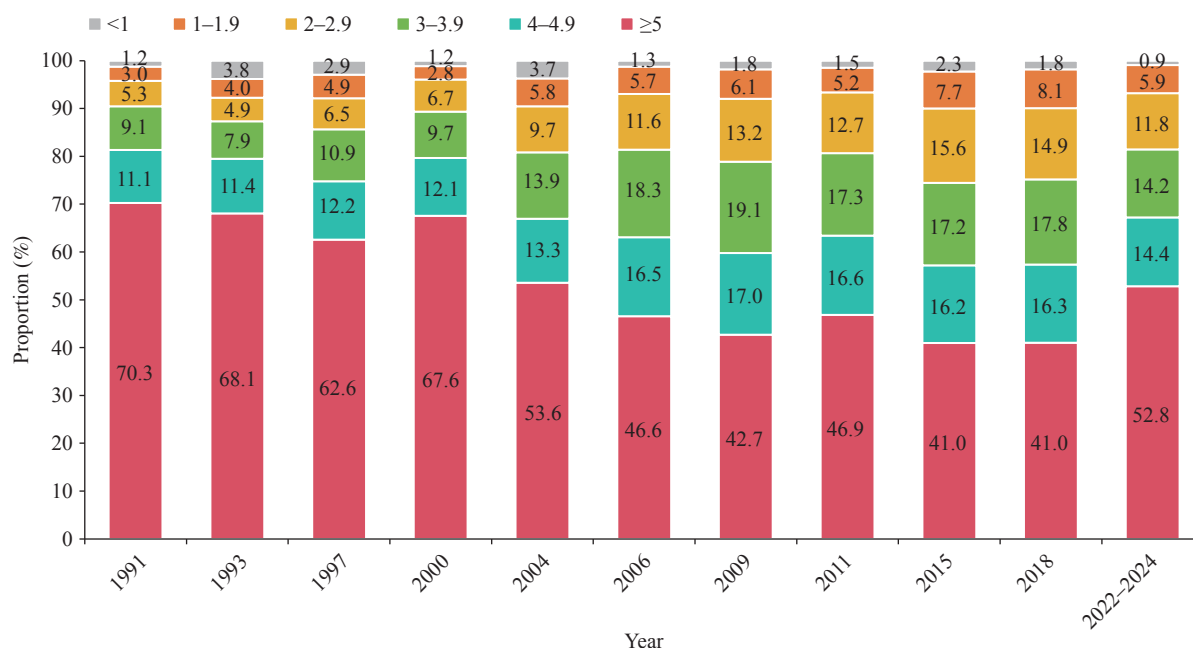


FIGURE 1. Distribution of dietary sodium-to-potassium ratio among adults aged 18 years and above in China, 1991–2024. Note: the Cochran–Armitage trend test was used to assess changes in the population distribution of dietary sodium-to-potassium ratio (all $P_{\text{for trend}} < 0.001$).

have resulted in an overestimation of Na/K ratio.

The declining trend in Na/K ratio over the past three decades reflects the positive impact of national salt-reduction initiatives. However, the persistently high Na/K ratio and recent rebound in 2022–2024 highlight the need for renewed and targeted efforts. Monitoring population-level Na/K ratio is essential for the timely detection of unfavorable trends and for informing adaptive interventions. Restaurants and food enterprises should reduce the amount of salt used for cooked dishes and packaged foods. Furthermore, residents should be encouraged to adopt a balanced diet characterized by low sodium and high potassium intakes. This multilevel, evidence-based approach is critical for effectively lowering the population's Na/K ratio toward the WHO's recommended level, thereby mitigating the associated cardiovascular risks.

Conflicts of interest: No conflicts of interest.

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