dietetics

MDPI

Article

Na and K Content and Na/K Ratio of Ramen Dishes Served in Ramen Restaurants in Kyoto City, Japan

Nagako Okuda [1,*], Hiroko Kojima [2], Tomomi Nagahata [1] and Akira Okayama [3]

[1] Division of Applied Life Sciences, Graduate School of Life and Environmental Sciences, Kyoto Prefectural University, 1-5 Hangi-cho, Shimogamo, Sakyo-ku, Kyoto 606-8522, Japan; nagahata@kpu.ac.jp
[2] Kirindo Co., Ltd., 4-5-36 Miyahara, Yodogawa-ku, Osaka 532-0003, Japan
[3] The Research Institute of Strategy for Prevention, 10-14 Tomizawa-cho, Nihonbashi, Chuo-ku, Tokyo 103-0006, Japan; aokayama@jrisp.com
* Correspondence: okuda.nagako@gmail.com

Abstract: Salt intake, specifically NaCl, should be reduced to prevent hypertension. Ramen often contains high-NaCl soup in Japan, but there are no reports of the actual sodium (Na) or potassium (K) contents. We visited ramen restaurants in Kyoto that had received high ratings on review sites and sampled the soups and toppings (n = 52). The Na and K concentrations were measured using ion electrodes, and the NaCl and K contents per serving and Na/K ratio were calculated. The results were compared among different types of "tare" (thick seasonings) (salt, soy sauce, and miso) and different types of broth (chicken, pork bone, and fish). The average NaCl and K contents per serving were 6.53 ± 1.48 g and 448 ± 141 mg, respectively, and Na/K was 10.7 ± 4.3 mmol/mmol. Considering the different broths, the Na/K ratio was the lowest for fish (9.6 ± 5.2), followed by chicken (10.0 ± 3.1) and pork bone (13.2 ± 4.8). Ramen dishes were high in both Na and the Na/K ratio. The low Na/K of fish soup ramen was thought to be due to the higher K content extracted from dried fish. Depending on the broth, it is possible to reduce the Na/K ratio.

Keywords: ramen; restaurant food; hypertension; salt; Na; K; Japan

check for updates

Received: 24 January 2025
Revised: 14 February 2025
Accepted: 16 May 2025
Published: 3 June 2025

Citation: Okuda, N.; Kojima, H.; Nagahata, T.; Okayama, A. Na and K Content and Na/K Ratio of Ramen Dishes Served in Ramen Restaurants in Kyoto City, Japan. *Dietetics* **2025**, *4*, 21. https://doi.org/10.3390/dietetics4020021

Copyright: © 2025 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

High salt (NaCl) intake is prevalent in many countries, which may lead to hypertension and cardiovascular diseases [1,2]. However, the decreasing trend of salt intake of individuals is not clear in recent decades [3]. In many industrialized countries, the consumption of restaurant meals and processed foods is increasing while the consumption of home-cooked meals is decreasing [4,5]. Restaurant meals and processed foods are likely to contain high salt content in anticipation of customer preferences, whereas the use of high-salt condiments can be adjusted in home cooking. The reduction in salt content in restaurants and processed foods remains an important issue.

Although Japanese diets are often considered healthy because of their low fat content, they comprise higher salt contents than Western diets [6,7]; the average salt intake of adults was 9.8 g/day per capita in Japan in 2023 [8]. A previous study examining the association between 24 h urinary sodium (Na) excretion and food intake in Japan showed that people with higher urinary Na excretion were more likely to have a Japanese diet (i.e., higher rice and miso soup intake) [9]. Noodle intake, typically served in bowls with soup, known as ramen, soba, and udon, was also higher in the group with a higher urinary Na

excretion. Notably, ramen restaurants are common in Japan, and although there are few survey results, the number of ramen restaurants in Japan was estimated to be around 15,000 to 25,000 [10,11]. A positive association between the number of ramen restaurants per capita and age-adjusted stroke mortality rate among prefectures in Japan was previously reported [12]. For people who habitually eat ramen, the salt content of the ramen may affect their salt intake, but there are few reports on the actual salt content. The salt content of miso soup, which is often eaten with Japanese food and contributes to salt intake in Japanese [9], was surveyed and reported to be 1.51% in the 1950s [13], and in a recent study, it was reported to be 1.0% [14]. It is also necessary to check the salt content of ramen.

Ramen noodles are served with toppings and soaked in soup, usually consumed alone without other dishes. Hence, ramen dishes generally contain insufficient amounts of vegetables, which are an important source of potassium (K) and recommended for hypertension prevention [15]. Furthermore, the average intake of K is lower in Japanese populations than in Western countries [6,7]; the average intake for Japanese adults was reported to be 2275 mg/day in 2023 [8], which has gradually been decreasing in recent years [16]. A previous study evaluating 24 h urinary K excretion found that people with lower K excretion were associated with higher noodle consumption [17]. To make the appropriate dietary choices, it is necessary to know the amount of K in foods. The foods that are high in K are vegetables, fruits, dairy products, and soy products [17], but there is little information about the amount of K in ramen served in restaurants.

In the present study, we estimated the Na and K contents per serving, as well as the Na/K ratio, based on measurements of the Na and K concentrations of ramen sampled from ramen restaurants in Kyoto City, Japan.

2. Materials and Methods

2.1. Selection of the Ramen Restaurants and Sampling

We used the online restaurant review website Tabelog.com provided by Kakaku.com, Inc. (Tokyo, Japan) to search for reputable ramen restaurants in Kyoto City (between July and December 2023). We visited the most reputable restaurants and bought soups and toppings from the restaurants that agreed to be measured, bringing these samples back to the laboratory. If ramen with different flavored soups was served, each ramen soup was obtained. We did not obtain noodles because they are starchy and difficult to measure using blended suspensions.

2.2. Measurements of Na and K

After separately weighing each serving of soup and topping, approximately 3 times the amount of water was added, and they were thoroughly ground in a blender. The aqueous component was obtained after centrifugation at 1500× *g* for 5 min and subjected to measurement using ion electrodes (LAQUAtwin Na-11 and LAQUAtwin K-11, Horiba, Ltd., Kyoto, Japan); calibrations were performed for each sample using standard solutions. Each sample was preliminarily diluted within the range of a suitable concentration for the measurement (300–500 ppm), and the concentration was determined using the recovery method. Each sample was measured twice, and the average values were used to calculate the NaCl and K contents per serving, as well as the Na/K ratio. For the calculations, 23.0, 39.1, and 35.5 were used as the atomic weights of Na, K, and Cl, respectively.

2.3. Statistics

At ramen restaurants, each restaurant makes the broth by boiling the ingredients. When serving ramen to customers, a soup is made by mixing "tare" (a high-salt seasoning) with broth. For the analysis, soups were classified according to the tare (salt, soy sauce,

or miso) and the broth (chicken, pork bone, or fish). The classification of the ramen was determined by checking the menu or asking the restaurant staff. The distribution of the categorical variable was tested using Fisher's exact test. The mean values of continuous variables were compared by analysis of variance with Bonferroni post hoc analysis. A p-value < 0.05 (two-sided) was considered significant. All statistical analyses were performed using SPSS V25 (IBM Japan Corp., Tokyo, Japan).

3. Results

A total of 34 ramen restaurants were visited and asked to participate. Among them, 24 agreed to cooperate, and we obtained 53 ramen samples (including soups and toppings). One sample could not be measured properly, and, thus, the results of 52 ramen measurements were used for the analysis. Table 1 shows the types of tare and soup broths. Soy sauce was the most common type of tare used (63.5%), whereas salt (29.2%) and miso (15.4%) were used less frequently. Chicken was the most common type of broth used (46.2%), followed by pork bone (34.6%) and fish (19.2%). There were no differences between the combinations of tare and broth (p = 0.192).

Table 1. Types of tare and broths used for the ramen soups.

	Type of Broth						p	Total	
	Chicken		Pork Bone		Fish				
	n	(%)	n	(%)	n	(%)		n	(%)
Type of tare									
Soy sauce	15	(62.5)	12	(66.7)	6	(60.0)	0.192	33	(63.5)
Salt	7	(29.2)	1	(5.6)	3	(30.0)		11	(21.2)
Miso	2	(8.3)	5	(27.8)	1	(10.0)		8	(15.4)
Total	24	(100.0)	18	(100.0)	10	(100.0)		52	(100.0)

p-value obtained using Fisher's exact test.

When all ramen samples (soup and topping) were averaged, the mean ± SD values for the NaCl (g) per serving, K (mg) per serving, and Na/K ratio (mmol/mmol) were 6.53 ± 1.48, 448 ± 141, and 10.7 ± 4.3, respectively. Table 2 shows the average NaCl and K contents, as well as the Na/K ratio, of the ramen soups and toppings according to the type of tare. Although the miso soup contained a higher amount of NaCl per serving (6.76 ± 1.76), there was no significant difference in the mean K content or the mean Na/K ratio among the three types of tare.

When classified according to the type of soup broth, significant differences were observed in the mean NaCl and K contents, as well as the Na/K ratio (Table 3). The mean NaCl per serving of pork bone soup (6.80 ± 1.36 g) was significantly higher than that of chicken soup (5.57 ± 1.26 g, p = 0.011) and fish soup (5.09 ± 1.01 g, p = 0.004). The mean K concentration was higher for fish soup (144 ± 79 mg/100g) than for pork bone soup (86 ± 32 mg/100g, p = 0.042) and chicken soup (93 ± 40.4 mg/100g, p = 0.109). The total amount of soup and topping per serving was the largest for pork bone ramen (460 ± 91 g), followed by chicken ramen (407 ± 57 g) and fish ramen (383 ± 51 g). The mean NaCl per serving of the total ramen (soup and toppings) was observed in the same order, with 7.56 ± 1.4, 6.12 ± 1.28, and 5.68 ± 1.06 g in each serving of pork bone-, chicken-, and fish-based ramen, respectively. Similarly, the Na/K ratio was the highest for pork bone ramen (13.2 ± 4.8), followed by chicken (10.0 ± 3.1) and fish (8.2 ± 3.8).

Table 2. NaCl and K content and Na/K ratio of ramen according to type of tare used for the soups.

	Soy Sauce (a) (n = 33)		Salt (b) (n = 11)		Miso (c) (n = 8)		*p* *	*p* **		
	Mean	(SD)	Mean	(SD)	Mean	(SD)		a vs. b	b vs. c	a vs. c
Soup										
Amount per serving (g)	331	(50)	290	(51)	329	(52)	0.067	0.070	0.285	1.000
NaCl (g)										
per 100 g	1.83	(0.44)	1.75	(0.28)	2.06	(0.40)	0.240	1.000	0.302	0.494
per serving	5.95	(1.23)	5.10	(1.46)	6.76	(1.61)	0.034	0.223	0.031	0.398
K (mg)										
per 100 g	91	(39)	107	(45)	101	(29)	0.467	0.725	1.000	1.000
per serving	294	(120)	309	(138)	331	(103)	0.731	1.000	1.000	1.000
Na/K ratio (mmol/mmol)	16.6	(11.4)	13.0	(6.1)	15.9	(9.6)	0.595	0.934	1.000	1.000
Topping										
Amount per serving (g)	102	(56)	77	(19)	114	(47)	0.217	0.414	0.332	1.000
NaCl (g)										
per 100 g	0.69	(0.34)	0.89	(0.49)	0.70	(0.35)	0.309	0.397	0.869	1.000
per serving	0.60	(0.27)	0.64	(0.36)	0.81	(0.63)	0.332	1.000	0.888	0.418
K (mg)										
per 100 g	156	(59)	201	(70)	128	(40)	0.029	0.110	0.033	0.681
per serving	145	(60)	149	(49)	139	(57)	0.930	1.000	1.000	1.000
Na/K ratio (mmol/mmol)	3.3	(2.3)	3.1	(1.7)	3.9	(2.1)	0.687	1.000	1.000	1.000
Total (soup and topping)										
Amount per serving (g)	433	(72)	366	(62)	443	(75)	0.021	0.027	0.069	1.000
NaCl (g)										
per 100 g	1.53	(0.31)	1.56	(0.24)	1.72	(0.34)	0.320	1.000	0.803	0.402
per serving	6.55	(1.29)	5.74	(1.41)	7.57	(1.83)	0.026	0.309	0.022	0.216
K (mg)										
per 100 g	103	(37)	127	(36)	108	(26)	0.165	1.000	1.000	1.000
per serving	439	(154)	459	(126)	471	(106)	0.826	1.000	1.000	1.000
Na/K ratio (mmol/mmol)	11.1	(4.2)	9.0	(3.5)	11.6	(5.1)	0.293	0.461	0.553	1.000

*, obtained by analysis of variance; **, obtained by Bonferroni post hoc analysis.

Table 3. NaCl and K content and Na/K ratio of ramen according to the type of broth used for the soups.

	Chicken (a) (n = 24)		Pork Bone (b) (n = 18)		Fish (c) (n = 10)		*p* *	*p* **		
	Mean	(SD)	Mean	(SD)	Mean	(SD)		a vs. b	b vs. c	a vs. c
Soup										
Amount per serving (g)	322	(55)	335	(52)	298	(42)	0.108	1.000	0.240	0.706
NaCl (g)										
per 100 g	1.76	(0.42)	2.04	(0.36)	1.6	(0.56)	0.026	0.087	0.148	1.000
per serving	5.57	(1.26)	6.80	(1.36)	5.09	(1.01)	0.006	0.011	0.004	0.944
K (mg)										
per 100 g	93	(40)	86	(32)	144	(79)	0.001	1.000	0.042	0.109
per serving	290	(111)	284	(110)	411	(192)	0.027	1.000	0.212	0.225
Na/K ratio (mmol/mmol)	14.9	(7.3)	19.8	(13.9)	9.6	(5.2)	0.028	0.329	0.056	0.711
Topping										
Amount per serving (g)	85	(41)	125	(61)	85	(23)	0.018	0.025	0.101	1.000
NaCl (g)										
per 100 g	0.71	(0.38)	0.74	(0.39)	0.77	(0.40)	0.926	1.000	1.000	1.000
per serving	0.55	(0.29)	0.79	(0.46)	0.59	(0.22)	0.090	0.100	0.008	1.000
K (mg)										
per 100 g	184.2	(59.4)	117.3	(37.3)	185.5	(67.9)	< 0.001	0.001	0.008	1.000
per serving	149.1	(58.2)	135.1	(56.9)	152.2	(53.5)	0.663	1.000	1.000	1.000
Na/K ratio (mmol/mmol)	2.7	(1.4)	4.2	(2.2)	3.3	(3.0)	0.067	0.063	0.725	1.000
Total (soup and topping)										
Amount per serving (g)	407	(57)	460	(91)	383	(51)	0.013	0.055	0.023	1.000
NaCl (g)										
per 100 g	1.51	(0.25)	1.68	(0.4)	1.49	(0.29)	0.051	0.213	0.339	1.000
per serving	6.12	(1.28)	7.56	(1.4)	5.68	(1.06)	< 0.001	0.003	0.002	1.000

Table 3. *Cont.*

	Chicken (a) (n = 24)		Pork Bone (b) (n = 18)		Fish (c) (n = 10)		*p* *	*p* **		
	Mean	(SD)	Mean	(SD)	Mean	(SD)		a vs. b	b vs. c	a vs. c
K (mg)										
per 100 g	109.8	(35.0)	92.9	(26.2)	136.3	(39.5)	0.041	0.328	0.005	0.116
per serving	438.8	(132.3)	419.6	(121.0)	522.3	(177.9)	0.164	1.000	0.197	0.344
Na/K ratio (mmol/mmol)	10.0	(3.1)	13.2	(4.8)	8.2	(3.8)	0.004	0.036	0.006	0.661

*, obtained by analysis of variance; **, obtained by Bonferroni post hoc analysis.

4. Discussion

This study focused on ramen, a popular dish among both Japanese citizens and foreigners visiting Japan, to determine the NaCl and K contents of the food served at restaurants. The average NaCl content per serving of ramen (soup and topping) was 6.53 g, which is higher than the target values reported by the World Health Organization (WHO; < 5 g/day) [18] and the Dietary Reference Intake for Japanese (DRIJ; < 6 g/day) [19]. The average K content was 448 mg/serving, which is lower than one-third, or one meal's worth, of the target intake recommended by the WHO (3510 mg/day) [20] and DRIJ (3000 mg/day for men and 2600 mg/day for women) [19]. The average Na/K (mmol/mmol) of ramen was 10.7, which is higher than the average dietary Na/K of Japanese adults (2.9), calculated from results reported in the National Health and Nutrition Survey Japan in 2023 [8]. Overall, ramen is high in NaCl and has a high Na/K ratio; people who eat ramen may want to consider leaving the soup and eating dishes rich in K, such as vegetables, to help improve their Na/K ratio.

Herein, the ramen soups were classified into three categories according to tare and three categories according to broth. No difference in NaCl content or Na/K was observed based on the type of tare. However, there were differences in the NaCl content and Na/K of the soup depending on the broth. The NaCl concentration was higher in pork bone soup than in fish soup and chicken soup, and the K concentration was higher in fish soup. Differences in K concentrations may be related to differences in the broth ingredients. In fish broth, fish flakes, dried fish, and scraps are used, whereas pork bone broth and chicken broth are made from bones with bone marrow and a small amount of fatty tissue and skeletal muscle attached [21]. The K concentration is high in the intracellular fluid and is more abundant in muscle tissue than in adipose tissue in animals. Therefore, the use of fish flakes, dried fish, and scraps may have resulted in a higher K concentration in the fish broth. In addition, fish soup exhibited a lower NaCl concentration than other soups.

In recent years, large-scale intervention studies have been conducted using K-substitute salts, in which the NaCl is partially replaced with K-based salt, showing a blood pressure-lowering effect and cardiovascular disease prevention effect [22,23]. In these studies, using K-substitute salt may have made it possible to reduce the Na intake without making the food taste less salty, owing to the similar salty flavor of K-based salts [24]. In the present study, the NaCl concentration of the fish soup was lower than in other soups and the K concentration was higher, potentially because the saltiness of K-based compounds in the fish soup reduces the need for much salt. Previously, it was reported that using a strong bonito broth could reduce the salt content of miso soup [25], in which a simple conductivity meter was used, and the K concentration was not measured. The umami of bonito broth is often said to complement the saltiness, but bonito broth may have a high K concentration, and this may contribute to its flavor.

The use of K-substitute salts has been effective in intervention studies, and K substitution in other high-salt seasonings may also be effective. In Japan, a pilot intervention study was conducted on home-cooked meals using K-substitute seasonings (low-Na/K

seasonings) for soy sauce and miso, and a significant decrease in the urinary Na/K ratio was reported [26]. Notably, ramen is a popular dish throughout Japan, and it is also one of the main menu items found in company and student cafeterias. In many cases, the ramen served in these cafeterias uses pre-made ramen soup produced by seasoning manufacturers. A previous study reported that using low-Na/K soy sauce and miso, as well as low-Na/K noodle soup, in Japanese company cafeterias may help reduce the intake of Na, increase the intake of K, and reduce the dietary Na/K ratio [27]. If even a partial amount of low-Na/K seasoning is used in the ramen soup at a ramen restaurant, it is possible to provide ramen that is more considerate of the customer's health.

In this study, the noodles were not examined due to the difficulty in measuring their contents because of their high starch content. In ramen restaurants, they boil the raw ramen noodles in hot water without added salt, drain the water, and soak them in the soup. Raw ramen noodles contain a certain amount of NaCl (1.0 g/100 g) and K (350 mg/100 g) [28], but most of this dissolves into the hot water during the boiling process. Raw ramen noodle is commonly delivered to restaurants in bundles of one portion (usually 130g), and the one bundle of noodles is used for one serving of ramen dish. Thus, there should be no significant difference in the amount of noodles for one serving among ramen restaurants. The amount of NaCl and K contained in one portion of boiled ramen noodle (200 g) was estimated to be 0.4 g and 120 mg, respectively [28]. In this study, the amount of Na and K in the boiled noodles was not considered.

The soups and toppings contained a certain amount of fat depending on the ramen, but when the ground and diluted samples were centrifuged to collect the aqueous component for measurement, the oily part was not considered. Therefore, considering the potential fat content, the NaCl and K concentrations may be higher than the present estimates. However, this difference occurred equally across the measurements of Na and K in a given sample, and it should not affect the resulting Na/K ratio.

In 1950, regional differences in NaCl intake in Japan were significant, with 26 g/day reported for the northeast region and 14 g/day reported for the western region [29]. Although the difference has narrowed, there may still be a difference of around 1 g [30]. In prefectures with high NaCl intake [30], the age-adjusted mortality rate from stroke is relatively high [31], and these areas also correspond to areas with a high number of ramen restaurants per capita [12]. In the present study, we surveyed ramen restaurants in Kyoto City, often considered the gateway to western Japan, which is said to prefer relatively light flavors, but the potential differences among regions remain to be clarified. In each region of Japan, some types of ramen dishes are more popular, and most regions have a unique style, but the basic format (soup, toppings, and noodles) is the same. Hence, it should be possible to compare the amount of NaCl and K in a standardized way by obtaining the soup and toppings. If there are differences in the average NaCl content depending on the region, this may indicate the saltiness preferences of the people who live there.

In this study, we found that a single serving of ramen served in restaurants contains excessive salt and insufficient K and, therefore, may not be good for preventing hypertension. Furthermore, depending on the restaurant and the menu, some dishes may contain a lot of high-energy, saturated fatty acids, such as roasted pork or pork back fat. These characteristics may also affect blood pressure through obesity and atherosclerosis [32].

One of the strengths of this research is that we obtained actual dishes from ramen restaurants and directly measured the Na and K concentrations, considering that nutritional facts are not provided in most cases, except for large chain restaurants. In many reports concerning local NaCl reduction activities, the NaCl contents of miso soup have often been determined using a simple conductivity meter, and, therefore, the measurements were affected by other ions, such as K^+ and Ca^{2+}. Herein, we used ion electrode methods to

selectively measure Na^+ and K^+, and we estimated the amount of NaCl and K per serving, as well as the Na/K ratio. One limitation of this study is that we chose ramen restaurants that had received high ratings on review sites. The results may have differed if we had included other ramen restaurants in the evaluation. Nonetheless, our results may reflect the saltiness preferences of the local people who eat at highly rated ramen restaurants. Furthermore, we did not consider the fat content of the soup or toppings. Given that fat intake is related to obesity and blood pressure elevation, further studies should consider fat content along with Na and K contents. Moreover, people do not always drink all of the soup in their ramen, and, thus, the actual amount of salt consumed by users may be less than the amount measured in this study.

5. Conclusions

The average NaCl content of a single serving of ramen from restaurants in Kyoto was as high as the daily target recommended by the WHO, and the Na/K ratio was also high. Comparing the different types of broth, the Na/K ratio of the fish soup was lower than that of the pork bone and chicken soups, likely due to the high K concentration of the fish-related ingredients. To help suppress the risk of elevated blood pressure, it may be effective to consider the type of broth, use low-Na/K seasonings, or increase the consumption of foods high in K. The amount of Na and K in other high-salt restaurant foods, such as udon noodles, also needs to be investigated in future research.

Author Contributions: Conceptualization, N.O. and A.O.; methodology, A.O.; formal analysis, N.O.; investigation, H.K.; data curation, N.O.; writing—original draft preparation, N.O.; writing—review and editing, T.N. and A.O.; supervision, A.O.; project administration, N.O.; funding acquisition, N.O. All authors have read and agreed to the published version of the manuscript.

Funding: This research was partially funded by a grant-in-aid for Scientific Research (C) from the Japan Society for the Promotion of Science (JSPS KAKENHI Grant Number 20K10510).

Institutional Review Board Statement: Not applicable.

Data Availability Statement: Data are available upon reasonable request.

Acknowledgments: The authors would like to thank the ramen restaurants that agreed to participate in the study and the late Kazuyoshi Itai for his support in planning the study.

Conflicts of Interest: The authors declare no conflicts of interest. Authors H.K. and A.O. are employed by companies Kirindo Co., Ltd. and The Research Institute of Strategy for Prevention, respectively. Authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Abbreviations

The following abbreviations are used in this manuscript:

WHO	World Health Organization
DRIJ	Dietary Reference Intake for Japanese

References

1. Powles, J.; Fahimi, S.; Micha, R.; Khatibzadeh, S.; Shi, P.; Ezzati, M.; Engell, R.E.; Lim, S.S.; Danaei, G.; Mozaffarian, D.; et al. Global, regional and national sodium intakes in 1990 and 2010: A systematic analysis of 24 h urinary sodium excretion and dietary surveys worldwide. *BMJ Open* **2013**, *3*, e003733. [CrossRef] [PubMed]
2. The Global Cardiovascular Risk Consortium. Global Effect of Modifiable Risk Factors on Cardiovascular Disease and Mortality. *N. Engl. J. Med.* **2023**, *389*, 1273–1285. [CrossRef] [PubMed]
3. WHO. WHO Global Report on Sodium Intake Reduction. Available online: https://www.who.int/publications/i/item/9789240069985 (accessed on 15 January 2025).

4. Monteiro, C.A.; Moubarac, J.C.; Levy, R.B.; Canella, D.S.; Louzada, M.; Cannon, G. Household availability of ultra-processed foods and obesity in nineteen European countries. *Public Health Nutr.* **2018**, *21*, 18–26. [CrossRef] [PubMed]
5. Shinozaki, N.; Murakami, K.; Asakura, K.; Masayasu, S.; Sasaki, S. Consumption of highly processed foods in relation to overall diet quality among Japanese adults: A nationwide study. *Public Health Nutr.* **2023**, *26*, 1784–1797. [CrossRef] [PubMed]
6. INTERSALT Cooperative Research Group. INTERSALT: An international study of electrolyte excretion and blood pressure. Results for 24 hour urinary sodium and potassium excretion. *BMJ* **1988**, *297*, 319–328. [CrossRef] [PubMed]
7. Zhou, B.F.; Stamler, J.; Dennis, B.; Moag-Stahlberg, A.; Okuda, N.; Robertson, C.; Zhao, L.; Chan, Q.; Elliott, P. Nutrient intakes of middle-aged men and women in China, Japan, United Kingdom, and United States in the late 1990s: The INTERMAP study. *J. Hum. Hypertens.* **2003**, *17*, 623–630. [CrossRef] [PubMed]
8. Ministry of Health, Labour and Welfare. National Health and Nutrition Survey Japan. 2023. Available online: https://www.mhlw.go.jp/content/10900000/001338334.pdf (accessed on 22 December 2024). (In Japanese).
9. Okuda, N.; Okayama, A.; Miura, K.; Yoshita, K.; Saito, S.; Nakagawa, H.; Sakata, K.; Miyagawa, N.; Chan, Q.; Elliott, P.; et al. Food sources of dietary sodium in the Japanese adult population: The international study of macro-/micronutrients and blood pressure (INTERMAP). *Eur. J. Nutr.* **2017**, *56*, 1269–1280. [CrossRef] [PubMed]
10. Kubo, T. Number of Ramen Restaurants by Prefecture. Available online: https://todo-ran.com/t/kiji/11806 (accessed on 22 December 2024). (In Japanese).
11. Statistics Bureau; Ministry of Internal Affairs and Communications. Economic Census. 2021. Available online: https://www.stat.go.jp/data/e-census/2021/kekka/index.html (accessed on 22 December 2024). (In Japanese).
12. Matsuzono, K.; Mieno, M.; Fujimoto, S. Ramen restaurant prevalence is associated with stroke mortality in Japan: An ecological study. *Nutr. J.* **2019**, *18*, 53. [CrossRef] [PubMed]
13. Sasaki, N.; Fukushi, S.; Ukai, H. On the geographic distribution of salt concentration of "Miso-soup" in Japan. *Med. Biol.* **1960**, *55*, 12–15. (In Japanese)
14. Ono, H.; Ogami, Y.; Ono, A. Changes in Salt Content and Salt Concentration in Soup. *Kawasaki Med. Welf. J.* **2022**, *32*, 165–170. (In Japanese)
15. Aburto, N.J.; Hanson, S.; Gutierrez, H.; Hooper, L.; Elliott, P.; Cappuccio, F.P. Effect of increased potassium intake on cardiovascular risk factors and disease: Systematic review and meta-analyses. *BMJ* **2013**, *346*, f1378. [CrossRef] [PubMed]
16. Ministry of Health, Labour and Welfare. National Health and Nutrition Survey Japan. 2019. Available online: https://www.mhlw.go.jp/stf/newpage_14156.html (accessed on 26 November 2024). (In Japanese).
17. Okuda, N.; Okayama, A.; Miura, K.; Yoshita, K.; Miyagawa, N.; Saitoh, S.; Nakagawa, H.; Sakata, K.; Chan, Q.; Elliott, P.; et al. Food Sources of Dietary Potassium in the Adult Japanese Population: The International Study of Macro-/Micronutrients and Blood Pressure (INTERMAP). *Nutrients* **2020**, *12*, 787. [CrossRef] [PubMed]
18. WHO. Guideline: Sodium Intake for Adults and Children. Available online: https://www.who.int/publications/i/item/9789241504836 (accessed on 22 December 2024).
19. Ministry of Health, Labour and Welfare. Dietary Intakes for Japanese. 2025. Available online: https://www.mhlw.go.jp/stf/newpage_44138.html (accessed on 22 December 2024). (In Japanese).
20. WHO. Guideline: Potassium Intake for Adults and Children. Available online: http://www.who.int/nutrition/publications/guidelines/potassium_intake/en/ (accessed on 22 December 2024).
21. Asahiya Shuppan Editorial Department. *Cooking Techniques of Ramen*, 2nd ed.; Asahiya Shuppan: Tokyo, Japan, 2021. (In Japanese)
22. Neal, B.; Wu, Y.; Feng, X.; Zhang, R.; Zhang, Y.; Shi, J.; Zhang, J.; Tian, M.; Huang, L.; Li, Z.; et al. Effect of Salt Substitution on Cardiovascular Events and Death. *N. Engl. J. Med.* **2021**, *385*, 1067–1077. [CrossRef] [PubMed]
23. Yuan, Y.; Jin, A.; Neal, B.; Feng, X.; Qiao, Q.; Wang, H.; Zhang, R.; Li, J.; Duan, P.; Cao, L.; et al. Salt substitution and salt-supply restriction for lowering blood pressure in elderly care facilities: A cluster-randomized trial. *Nat. Med.* **2023**, *29*, 973–981. [CrossRef] [PubMed]
24. Greer, R.C.; Marklund, M.; Anderson, C.A.M.; Cobb, L.K.; Dalcin, A.T.; Henry, M.; Appel, L.J. Potassium-Enriched Salt Substitutes as a Means to Lower Blood Pressure: Benefits and Risks. *Hypertension* **2020**, *75*, 266–274. [CrossRef] [PubMed]
25. Seto, Y.; Sawada, T.; Endo, K. Salt-reduction Effect of Stock in Miso Soup. *J. Cook. Sci. Jpn.* **2003**, *36*, 219–224. (In Japanese)
26. Okuda, N.; Miura, M.; Itai, K.; Morikawa, T.; Sasaki, J.; Asanuma, T.; Fujii, M.; Okayama, A. Use of Lightly Potassium-Enriched Soy Sauce at Home Reduced Urinary Sodium-to-Potassium Ratio. *J. Food Nutr. Sci.* **2019**, *1*, 27–36. [CrossRef]
27. Okuda, N.; Higashiyama, A.; Tanno, K.; Yonekura, Y.; Miura, M.; Kuno, H.; Nakajima, T.; Nagahata, T.; Taniguchi, H.; Kosami, K.; et al. Na and K Intake from Lunches Served in a Japanese Company Cafeteria and the Estimated Improvement in the Dietary Na/K Ratio Using Low-Na/K Seasonings and Dairy to Prevent Hypertension. *Nutrients* **2024**, *16*, 1433. [CrossRef] [PubMed]
28. Ministry of Education, Culture, Sports, Science and Technology; Science and Technology Council; Resources Research Subcommittee. *Standard Tables of Food Composition in Japan*; 2020 Edition (8th Revision); National Gazette Sales Cooperative Association: Tokyo, Japan, 2020. (In Japanese)

29. Takahashi, E.; Sasaki, N.; Takeda, J.; Ito, H. The geographic distribution of cerebral hemorrhage and hypertension in Japan. *Hum. Biol.* **1957**, *29*, 139–166. [PubMed]
30. Ministry of Health, Labour and Welfare. National Health and Nutrition Survey Japan. 2010. Available online: https://www.mhlw.go.jp/bunya/kenkou/eiyou/h22-houkoku.html (accessed on 26 November 2024). (In Japanese).
31. Ministry of Health, Labour and Welfare. Special Report on Demographic Statistics, Age-Adjusted Death Rates by Prefecture. 2020. Available online: https://www.mhlw.go.jp/toukei/saikin/hw/jinkou/other/20sibou/index.html (accessed on 22 December 2024). (In Japanese).
32. Savica, V.; Bellinghieri, G.; Kopple, J.D. The effect of nutrition on blood pressure. *Annu. Rev. Nutr.* **2010**, *30*, 365–401. [CrossRef] [PubMed]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.