

Risk Assessment Studies
Report No. 67

Nutrient Evaluation

SODIUM CONTENT IN DIM SUM

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EXECUTIVE SUMMARY

Excessive sodium intake is closely related to hypertension, which is regarded as a risk factor of certain non-communicable diseases (NCDs). The World Health Organization recommends daily salt intake of less than 5g (i.e. 2,000mg of sodium) for adults. In Hong Kong, the Government also published strategy and action plan to reduce 30% sodium intake in diet by 2025.

In Hong Kong, dim sum is one of the favourite food choices for breakfast and lunch, as well as during holidays in Chinese restaurants. According to the studies from the Centre for Food Safety (CFS), dim sum is the fifth major contributor to the total sodium intake of the adult population.

The objectives of the study are (1) to measure the levels of sodium in dim sum available in the local market; (2) to serve for continuous monitoring of the changes in the sodium contents in dim sum available in the local market; (3) to facilitate the discussion with the trade to provide healthier food products with less sodium contents through recipe reformulation; and (4) to formulate advice to the public so as to lower the sodium intake from consumption of dim sum.

Between May and July 2021, a total of 120 non-prepackaged food samples covering 12 types of dim sum were collected from Chinese restaurants and dim sum shops for analysis of sodium contents. The sodium contents were determined by laboratory analysis by the Food Research Laboratory (FRL) of the CFS. On the other hand, samples of 4 types of sauces were also collected and tested for sodium contents in FRL.

Results showed that the average sodium content of all non-prepackaged dim sum samples was 330mg/100g and the sodium contents ranged from 3.0mg /100g to 680mg /100g. The dim sum types with the highest average sodium contents were shrimp siu mai (590 mg/100g), spring roll with shrimp (480mg/100g) and steamed minced beef ball (440mg/100g). The dim sum types with the lowest average sodium contents were steamed plain rice-roll (66mg/100g), steamed rice-roll with beef (160mg/100g) and steamed rice-roll with barbecue pork (180mg/100g). Individual samples of shrimp siu mai and spring roll with shrimp were considered as “high” in sodium (i.e. over 600mg/100g) according to the information on CFS’ Shopping Card. There were large variation in the sodium contents of samples within same type of certain dim sum. The large variation in sodium contents reflects room for sodium reduction in dim sum.

Some types of dim sum may be served with sauces, either by the food business or added by customers. Consumption of the dim sum with the sauce served may increase the sodium intake by more than 2 times, indicating a large increase in the sodium contents after sauces were added to the dim sum.

Comparing to the previous CFS study, sodium contents of 9 out of 11 types of dim sum were reduced which shows a decreasing trend in the sodium content of the dim sum in the local market.

Conclusion

The sodium contents of certain types of dim sum, such as shrimp siu mai, spring roll with shrimp and steamed minced beef ball were relatively higher. There was a wide variation in sodium contents within each of certain types of dim sum which revealed the possibility of the trade to reduce the sodium contents in these types of dim sum. In addition, adding sauces to dim sum further increased the sodium contents of the food. Lastly, comparing to the previous study, there was a decreasing trend in the sodium contents of dim sum.

Advice to the public

1. Pay attention to the sodium contents in dim sum, choose carefully, and be aware that sodium contents of certain types of dim sum are higher. Maintain a balanced diet with variety.
2. Request the dim sum to be served separately from sauces, and taste before dipping in sauces. Dip lightly in the sauces, if needed.
3. Read the nutrition labels when buying prepackaged dim sum and choose those with lower sodium contents.

Advice to the trade

1. Be aware of the sodium contents of dim sum on sale as it has public health implications.
2. Reduce the sodium contents of dim sum through modification of preparation methods and use of ingredients by making reference to the CFS's "Trade Guidelines for Reducing Sodium in Foods" (e.g. by choosing ingredients with lower sodium content, and using natural ingredients for flavouring and marinating).
3. Serve sauces in separate containers to allow consumers to add sauces based on their preference.
4. Apart from providing the standard portion size of dim sum, offer dim sum in smaller portion size (e.g. provide options for consumers to order by piece) for consumers to choose based on their needs.
5. When setting set menu, prevent combination of dim sum items with higher sodium contents

and offer dim sum items with lower sodium contents more often.

Sodium Content in Dim Sum

OBJECTIVES

This study aims (i) to measure the levels of sodium in dim sum available in the local market, (ii) to serve for continuous monitoring of the changes in the sodium contents in dim sum available in the local market, (iii) to facilitate the discussion with the trade to provide healthier food products with less sodium contents through recipe reformulation, and (iv) to formulate advice to the public so as to lower the sodium intake from consumption of dim sum.

BACKGROUND

2. Table salt is a chemical compound known as sodium chloride (NaCl), which consists of 40% sodium and 60% chloride. Sodium is essential for body functions. It helps to maintain fluid balance and acid-base balance in the body. It is required for nerve transmission and muscle contraction. However, excessive sodium intake is closely related to hypertension¹, which is regarded as a risk factor of certain non-communicable diseases (NCDs) including cardiovascular disease, stroke and coronary heart disease.

3. The World Health Organization (WHO) recommends that the daily intake of salt of an average adult should be less than 5g (i.e. less than 2,000mg of sodium).²

Local Dietary Intakes of Sodium

4. In Hong Kong, according to the Population Health Survey 2014/2015 conducted by the Department of Health, persons aged 15-84 years consumed 8.8g of salt (i.e. around 3,520mg sodium) per day³, which exceeded the WHO's recommendation of salt intake of less than 5g (2,000mg sodium) per day for adult.

5. In May 2018, the Hong Kong Government published “Towards 2025: Strategy and Action Plan to Prevent and Control Non-communicable Diseases in Hong Kong”, which set a list of actions that Hong Kong will pursue to achieve the committed NCD targets towards 2025. One of the 9 local NCD targets includes “A 30% relative reduction in mean population daily intake of salt/sodium”.⁴

Dietary Sources of Sodium of local population

6. According to the studies from the Centre for Food Safety (CFS), the major sources of sodium intake of the local adult population include condiments and sauces (44%), soup (14%), processed meats (8%), bread (6%), dim sum (6%) and Siu mei / Lo mei (4%). Amongst these sources, dim sum is the fifth major contributor to the total sodium intake of the adult population. In Hong Kong, dim sum is one of the favourite food choices for breakfast and lunch, as well as during holidays in Chinese restaurants.

SCOPE OF STUDY

7. This study covered 12 types of non-prepackaged dim sum in six categories (i.e. rice roll (腸粉), steamed bun (蒸包), pan-fried dish (煎點), wrapped rice (包裹米飯), steamed dish (蒸點) and fried dish (炸點)), which were the major consumed dim sum types according to the second Hong Kong Population-based Food Consumption Survey from the CFS, which obtained food consumption information, especially, the types and the amount of food consumed by the Hong Kong adults aged 18 or above.⁵ In addition, 4 types of sauces usually served with non-prepackaged dim sum were also covered. **Table 1** shows the 12 types of dim sum and 4 types of sauce covered in the study.

Table 1. 12 types of dim sum and 4 types of sauce covered in the study

Type of dim sum and sauce	Category
Steamed plain rice-roll (蒸淨腸粉)	Rice-rolls (腸粉)
Steamed rice-roll with beef (蒸牛肉腸粉)	Rice-rolls (腸粉)
Steamed rice-roll with barbecue pork (蒸叉燒腸粉)	Rice-rolls (腸粉)
Steamed bun with barbecue pork (蒸叉燒包)	Steamed bun (蒸包)
Steamed bun with pork and vegetables (蒸菜肉包)	Steamed bun (蒸包)
Pan-fried Turnip cake (煎蘿蔔糕)	Pan-fried dishes (煎點)
Glutinous rice wrapped in lotus leaf (珍珠雞)	Wrapped rice (包裹米飯)
Steamed minced beef ball (蒸牛肉球)	Steamed dishes (蒸點)
Shrimp dumpling/ Har gau (蝦餃)	Steamed dishes (蒸點)
Steamed Fan-guo (蒸粉果)	Steamed dishes (蒸點)
Shrimp siu mai (蝦肉燒賣)	Steamed dishes (蒸點)
Spring roll with shrimp (蝦肉春卷)	Fried dim sum (炸點)
Soy sauce (豉油)	Sauce (醬料)
Worcestershire sauce (喼汁)	Sauce (醬料)
Sesame sauce (芝麻醬)	Sauce (醬料)
Sweet sauce (甜醬)	Sauce (醬料)

METHODOLOGY

Sampling

8. Sampling was conducted between May and July 2021. The samples were collected from various outlets including Chinese restaurants and dim sum shops. 10 samples of each of the 12 types of dim sum were collected, accounting for a total of 120 dim sum samples for the study. All the dim sum samples were collected without any sauce added. In addition, for the sauces commonly served with dim sum as mentioned above, 10 samples of each of the 4 types of sauce were collected. Not more than 3 samples were collected from the same outlet / chained store.

Laboratory Analysis and Data Collection

9. Laboratory analysis of sodium contents of dim sum samples and sauce samples was conducted by the Food Research Laboratory (FRL) of the CFS. Dim sum samples were weighed and only the edible portions were analysed for sodium contents. On the other hand, different samples of the same type of sauce were composited to one specimen for sodium content analysis. The sodium contents of the samples were analysed using inductively coupled plasma-optical emission spectrometry (ICP-OES) after homogenisation and acid digestion.

Data Analysis

10. The sodium contents of the samples were presented as mg/100g of edible portion. Samples with sodium content not more than 120mg per 100g will be considered as “low” in sodium according to the Food and Drugs (Composition and Labelling) Regulations (Cap. 132 W)⁶ while those with sodium content more than 600mg per 100g will be considered as “high” in sodium according to the information on CFS’ Shopping Card⁷. The sodium contents of the samples were also compared with those obtained from previous studies from the CFS for the dim sum of the same types.

11. FRL analysed the sodium contents of non-prepackaged dim sum and sauce samples. The limit of detection (LOD) and limit of quantitation (LOQ) are 0.4mg/100g and 1.0mg/100g respectively.

RESULTS AND DISCUSSIONS

Sodium Content of dim sum

12. A total of 120 samples were collected and tested, which covered 12 types of dim sum in 6 categories. Results showed that the sodium contents of these samples varied among different types of dim sum and within the same type of dim sum. The sodium contents of the 12 types of dim sum are summarised in **Table 2**. The overall average sodium content was 330mg/100g and the sodium contents ranged from 3.0mg/100g to 680mg/100g.

Table 2. Sodium contents of 12 types of dim sum

Type of dim sum	Dim sum category	Number of samples	Sodium content (mg/100g)		
			Average	Minimum	Maximum
Shrimp siu mai	Steamed dishes	10	590	490	680
Spring roll with shrimp	Fried dim sum	10	480	380	670
Steamed minced beef ball	Steamed dishes	10	440	350	540
Shrimp dumpling / Har gau	Steamed dishes	10	430	310	550
Glutinous rice wrapped in lotus leaf	Wrapped rice	10	420	270	510
Pan-fried turnip cake	Pan-fried dishes	10	380	280	450
Steamed bun with barbecue pork	Steamed bun	10	320	240	380
Steamed Fan-guo	Steamed dishes	10	310	150	410
Steamed bun with pork and vegetables	Steamed bun	10	230	140	300
Steamed rice-roll with barbecue pork	Rice-rolls	10	180	83	260
Steamed rice-roll with beef	Rice-rolls	10	160	60	230
Steamed plain rice-roll	Rice-rolls	10	66	3.0	200
Overall		120 (total)	330	3.0	680

Average sodium content of shrimp siu mai ranked the highest followed by spring roll with shrimp

13. Amongst the 12 types of dim sum, the average sodium content of shrimp siu mai was ranked the highest (590mg sodium/100g), followed by spring roll with shrimp (480mg sodium/100g). The sodium contents of 5 samples of shrimp siu mai were ranged from 620mg/100g to 680mg/100g, which were considered as “high” (i.e. sodium content of more than 600mg/100g). In particular, the sample with the sodium content of 680mg/100g was ranked the highest amongst all the 120 samples.

14. For spring roll with shrimp, 2 samples were found to have sodium contents of 640mg/100g and 670mg/100g, which were also considered as “high”. The sample with sodium content of 670mg/100g was ranked the second highest amongst the 120 samples.

Average sodium content of steamed minced beef ball and shrimp dumpling/ har gau ranked the third and fourth

15. The average sodium contents of 2 types of dim sum under the steamed dish category, namely steamed minced beef ball and shrimp dumpling/ har gau, were 440mg/100g and 430mg/100g respectively. They were ranked the third and fourth amongst the 12 types of dim sum.

Rice-rolls generally have lower sodium content

16. The average sodium contents of steamed plain rice-roll, steamed rice-roll with beef and steamed rice-roll with barbecue pork were 66mg/100g, 160mg/100g and 180mg/100g respectively, which were the lowest three types among all the 12 types of dim sum.

17. For steamed plain rice-roll, 9 samples contained sodium contents ranging from 3.0mg/100g to 100mg/100g, and they were considered as “low” in sodium (i.e. sodium content not more than 120mg/100g). In particular, two steamed plain rice-roll samples with sodium contents of 3.0mg/100g and 3.7mg/100g were ranked the lowest and second lowest amongst the 120 samples.

18. 1 sample of steamed rice-roll with beef contained a sodium content 60mg/100g, and 1 sample of steamed rice-roll with barbecue pork contained a sodium content 83mg/100g. They were considered as “low” in sodium (i.e. sodium content not more than 120mg/100g).

Large variation in the sodium content within same type of certain dim sum

19. There were 1 to 2 times difference in the sodium contents when comparing the highest and lowest of the 10 samples within the certain types of dim sum (i.e. steamed fan-guo, steamed bun with pork and vegetables, steamed rice-roll with barbecue pork and steamed rice-roll with beef). Such difference was more than 50 times for steamed plain rice-roll. The large variation in sodium content reflected room for sodium reduction in dim sum.

Decreasing trend in the sodium content of dim sum

20. There were 11 types of dim sum which have been taken for analysis of sodium contents both in this study and previous CFS studies (except steam bun with pork and vegetables which was not covered in previous CFS studies). Comparing the findings from this study with previous study (**Table 3**), a decreasing trend of sodium content was observed for the dim sum samples of the same types in the local market. The sodium contents of 9 types of dim sum samples out of 11 types were reduced.

Table 3. Comparison of sodium content in dim sum with previous CFS studies

Type of dim sum	Sodium content in current study (mg/100g)	Sodium content in previous CFS studies (mg/100g)	Percentage change
Shrimp siu mai	590	630	-6.3%
Spring roll with shrimp	480	690	-30%
Steamed minced beef ball	440	430	+2.3%
Shrimp dumpling	430	470	-8.5%
Glutinous rice wrapped in lotus leaf	420	410	+2.4%
Pan-fried turnip cake	380	420	-9.5%
Steamed bun with barbecue pork	320	370	-14%
Steamed Fan-guo	310	420	-26%
Steamed rice-roll with barbecue pork	180	210	-14%
Steamed rice-roll with beef	160	180	-11%
Steamed plain rice-roll	66	110	-40%

Sodium content of sauce usually served with dim sum

21. Four types of sauces usually served with dim sum were composited to four specimens (i.e. one for each sauce) for laboratory analysis. Their sodium contents are summarised in **Table 4**.

Table 4. Sodium contents of 4 types of sauce

Type of sauce	Sodium content (mg/100g)
Soy sauce	2600
Sweet sauce	2400
Worcestershire sauce	920
Sesame sauce	33

Increase sodium content after adding sauce to dim sum

22. Some types of dim sum may be served with different types of sauces, either by the food business or added by customers (e.g. steamed plain rice-roll served with soy sauce, sesame sauce and sweet sauce, steamed rice-roll with barbecue pork served with soy sauce, steamed minced beef ball served with Worcestershire sauce). Assuming one person consumes the whole dish of steamed plain rice-roll, steamed rice-roll with barbecue pork or steamed minced beef ball without any sauce served, the sodium intakes from each type of dim sum will contribute 9.5%, 18% and 29% to the WHO's recommended daily sodium intake upper limit respectively. If the abovementioned three types of dim sum are consumed after dipping lightly with the sauce served, the sodium intake will increase by 120%, 56% and 10% respectively. If the abovementioned three types of dim sum are consumed after dipping deeply with the sauce served, the sodium intake will increase by 240%, 110% and 17% respectively. (**Table 5**) This findings revealed that adding sauce to dim sum would largely increase the sodium content of food as a whole.

Table 5. Comparison of sodium intake when consuming dim sum with and without sauces served

Dim sum type	Steamed plain rice-roll			Steamed rice-roll with barbecue pork			Steamed minced beef ball		
	Without dipping sauce	Dipping sauce lightly (a)	Dipping sauce deeply (b)	Without dipping sauce	Dipping sauce lightly (c)	Dipping sauce deeply (d)	Without dipping sauce	Dipping sauce lightly (e)	Dipping sauce deeply (f)
Sodium content per dish (mg)	190	420	640	350	550	740	580	630	670
Sodium contribution per dish to WHO's recommended daily sodium intake upper limit	9.5%	21%	32%	18%	28%	37%	29%	32%	34%

Notes:

- (a) Assuming 25% of the sauce served (i.e. 7.5g soy sauce, 1.3g sesame sauce and 1.3g sweet sauce) will be consumed.
- (b) Assuming 50% of the sauce served (i.e. 15g soy sauce, 2.5g sesame sauce and 2.5g sweet sauce) will be consumed.
- (c) Assuming 25% of the sauce served (i.e. 7.5g soy sauce) will be consumed.
- (d) Assuming 50% of the sauce served (i.e. 15g soy sauce) will be consumed.
- (e) Assuming 25% of the sauce served (i.e. 5g Worcestershire sauce) will be consumed.
- (f) Assuming 50% of the sauce served (i.e. 10g Worcestershire sauce) will be consumed.

Contribution to WHO's recommended daily sodium intake upper limit

23. This study stimulated scenarios of consumers eating out in Chinese restaurants and assessed the sodium intake of a consumer under the simulated scenarios. Assuming two consumers ordered two dim sum items for a meal, the sodium intake would be varied depending on the choice of the dim sum and the amount of sauces consumed (**Table 6**).

Table 6. Sodium intake when consuming two dim sum items for a meal for two

Scenarios	Choice of dim sum	Sodium content per dish (mg)	Total sodium content of the meal (mg)	Average sodium intake per consumer (mg)	Contribution to WHO's recommended daily sodium intake upper limit for one consumer
1. Combination of two dim sum items with relatively higher sodium contents	(i) Shrimp siu mai	700	1270	635	32%
	(ii) Spring roll with shrimp	570			
2. Combination of two dim sum items with one with relatively higher sodium content and one with relatively lower sodium content	(i) Shrimp siu mai	700	1050	525	26%
	(ii) Steamed rice-roll with barbecue pork without soy sauce	350			
3. Combination of two dim sum items with relatively lower sodium contents	(i) Steamed rice-roll with barbecue pork without soy sauce	350	580	290	15%
	(ii) Steamed bun with pork and vegetables	230			
4. Combination of two dim sum items with relatively lower sodium contents but one with sauce added	(i) Steamed rice-roll with barbecue pork with soy sauce dipping lightly (i.e. 7.5g soy sauce consumed)	550	780	390	20%
	(ii) Steamed bun with pork and vegetables	230			

24. The average sodium intake per consumer in scenario 1 (two dim sum items with relatively higher sodium contents) will double that in scenario 3 (two dim sum items with relatively lower sodium contents). However, if one of the dim sum in scenarios 3 is consumed with the sauce served as in scenarios 4 (i.e. steamed rice-roll with barbecue pork is consumed after dipping lightly with soy sauce), the average sodium intake per consumer will be increased by 33%. Therefore, the choice of the dim sum and the amount of sauce consumed will greatly affect the sodium intake.

Limitation of the study

25. Only limited samples were collected in each type of dim sum. Therefore, the results of this study could only represent a snapshot of sodium contents in certain types of dim sum.

CONCLUSION AND RECOMMENDATIONS

26. The sodium contents of certain types of dim sum, such as shrimp siu mai, spring roll with shrimp and steamed minced beef ball were relatively higher. There was a wide variation in sodium contents within each of certain types of dim sum which revealed the possibility of the trade to reduce the sodium contents in these types of dim sum. In addition, adding sauces to dim sum further increased the sodium contents of the food. Lastly, comparing to the previous study, there was a decreasing trend in the sodium contents of dim sum.

Advice to the Public

27. The public is advised to:

- (a) Pay attention to the sodium contents in dim sum, choose carefully, and be aware that sodium contents of certain types of dim sum are higher. Maintain a balanced diet with variety.
- (b) Request the dim sum to be served separately from sauces, and taste before dipping in sauces. Dip lightly in the sauces, if needed.
- (c) Read the nutrition labels when buying prepackaged dim sum and choose those with lower sodium contents.

Advice to the Trade

28. Members of the trade are advised to:

- (a) Be aware of the sodium contents of dim sum on sale as it has public health implications.
- (b) Reduce the sodium contents of dim sum through modification of preparation methods and use of ingredients by making reference to the CFS's "Trade Guidelines for Reducing

Sodium in Foods" (e.g. choose ingredients with lower sodium content, use natural ingredients for flavouring and marinating).

(c) Serve sauces in separate containers to allow consumers to add sauces based on their preference.

(d) Apart from providing the standard portion size of dim sum, offer dim sum in smaller portion size (e.g. provide options for consumers to order by piece) for consumers to choose based on their needs.

(e) When setting set menu, prevent combination of dim sum items with higher sodium contents and offer dim sum items with lower sodium contents more often.

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