NIHI
The National Institute for Health Innovation

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND

The Sodium Content of Pre-Packaged Sauces in New Zealand, 2013 – 2019

Report prepared for the Stroke Foundation of New Zealand by the DIET Programme Team at the National Institute for Health Innovation (NIHI)

BACKGROUND

Stroke is New Zealand's (NZ) second single biggest killer and the leading cause of serious adult disability. Each year, over 9,500 New Zealanders experience a stroke.[1] Māori and Pasifika are more likely to experience a stroke than NZ Europeans and also at a much younger age – approximately 15 years younger than NZ Europeans.[2]

Around 90% of the burden of stroke is due to modifiable risk factors.[3] High blood pressure is the leading modifiable risk factor for stroke and the most preventable cause of stroke worldwide. A person with high blood pressure is up to four times more likely to have a stroke than someone with normal or low blood pressure.[4] High dietary sodium intake is associated with high blood pressure and is also directly related to cardiovascular disease risk, including stroke and myocardial infarction.

The most recent estimate of population sodium intakes in NZ, based on the collection of 24hr urine samples, reported a mean sodium excretion of 3,386mg/day (equivalent to 8.5g of salt).[5] The World Health Organization recommends a maximum dietary sodium intake of 2,000 mg/day (5g of salt).[6] In a Western-style diet, around three-quarters of dietary sodium intake comes from pre-packaged processed foods.[7]

Sauces are commonly added to foods during cooking and when serving meals. Pre-packaged sauces are a key source of added sodium. The 2016 Ministry for Primary Industries New Zealand Total Diet Study (NZTDS) reported a 100-fold higher content of sodium in pre-packaged tomato sauce (5,000-10,000mg/kg) compared to fresh tomatoes (12-34mg/kg) as a result of the sauce manufacturing process.[8] The 2019 State of the Food Supply Report from the University of Auckland also revealed that 85% of pre-packaged sauces in New Zealand were ultra-processed, with a mean Health Star Rating (HSR) of 2.4 (SD 1.2) across all products.[9]

NZ does not have a government-led salt reduction programme. The main national initiative to reduce the sodium content of NZ foods and population sodium intake is a voluntary food reformulation programme led by the NZ Heart Foundation, where targets are set to reduce the sodium content of foods in key categories.[10] In Australia, the Healthy Food Partnership Programme, a public-private partnership between government, public health, and food industry, has produced voluntary sodium targets.[11] In 2021, the World Health Organization (WHO) published global sodium targets as a benchmark for countries to improve food environments and reduce sodium intake worldwide.[12]

We aimed to examine the sodium content of pre-packaged sauces available in NZ and identify any changes in sodium content over time (2013 to 2019). We also examined how many products met relevant NZ Heart Foundation,[13] Australian Healthy Food Partnership,[14] and WHO targets.[12]

METHODS

Data Collection

Sodium content data and manufacturer-recommended serving size for pre-packaged sauces in 2013 and 2019 were extracted from the National Institute for Health Innovation (NIHI) Nutritrack database.[15] Nutritrack data are collected each year from four major supermarket stores (Countdown, New World, PAK'nSAVE, Four Square) in Auckland, NZ.[15] Sodium data are collected from product Nutrition Information Panels (NIP) and reported in milligrams (mg) per 100g or per 100mL of sauce.

Product inclusion

We included the following sauce subcategories:

- Asian sauces - fish sauce, oyster sauce, soy sauce, other Asian sauces
- Gravies and stocks
- Pasta sauces – ambient pasta sauces (cream-based, with meat, tomato-based) and fresh pasta sauces (cream-based, tomato-based)
- Table sauces - BBQ sauce, chilli sauce, steak/Worcestershire, tomato sauce

Gravies and stocks sold in powdered/concentrated form that required dilution prior to serving but did not have a NIP that reported their sodium content 'as prepared' (i.e., diluted) were excluded. A total of 10 products (across both 2013 and 2019) were therefore removed from the final dataset for analysis.

Of the remaining gravies and stocks, 52 products reported serving sizes in dry/concentrated forms only and thus were excluded from the serving size analysis.

Categorisation

Sauces were systematically categorised according to the established Nutritrack database classification system. Nutritrack product categories were also matched with the relevant NZ Heart Foundation,[13] Australian Healthy Food Partnership[14], and WHO[12] sodium targets for sauces.

Product data were quality checked before data analysis. Any errors identified were corrected prior to analysis.

Data analysis

The number of products available in each year (2013 and 2019), their pack size, and mean sodium content (mg/100g), and sodium ranges were determined. Mean sodium values for sauces were compared where possible against relevant sodium targets. There were no NZ or Australian sodium targets available for stocks (as prepared and/or as sold). The NZ Heart Foundation sodium target of 680mg/100g for 'Tomato sauce/Ketchup *plastic packaging*' was used as the NZ target for all pre-packaged tomato sauce products in the dataset as there was no easy way to differentiate between tomato sauce products in plastic or glass/canned packaging and it was the higher sodium target of the two (compared to 565mg/100g for 'Tomato sauce/Ketchup *canned/glass packaging*'). The proportions of products meeting targets were derived for each year.

Changes in the serving size and sodium content of products between years were examined using both parametric F-test (ANOVA) and non-parametric Kruskal Wallis tests. Only the Kruskal Wallis test results are reported here. The Chi-square test was used to determine if there were any differences in the proportion of products meeting the targets across the two years.

All statistical analyses were conducted in SAS version 9.4 (SAS Institute Inc., Cary, NC, USA). P-values of <0.05 were considered statistically significant.

KEY FINDINGS

All Sauce Products

- In total, 1,052 pre-packaged sauce products were included in the analysis, representing pre-packaged sauce products available for sale in New Zealand in 2013 (n=503) and 2019 (n=549).
- The average sodium content of all pre-packaged sauce products increased from 1,197mg sodium/100g in 2013 to 1,372mg sodium/100g in 2019 (a 15% increase). The difference was not statistically significant (p=0.51).
- Manufacturer recommended serving sizes in 2019 ranged from 3g to 500g.
- The average recommended serving size for all pre-packaged sauce products decreased from 80g in 2013 to 68g in 2019 (a 15% drop). The difference was statistically significant (p=0.0006).
- In 2019, the average sodium in an average recommended serving of sauce was 383mg per serve.
- The sodium content of sauce products in 2019 ranged widely, with the highest being 11,500mg sodium/100g. This was almost 4,000 times more sodium than that of the lowest sodium sauce (3mg sodium/100g).
    - The highest sodium sauce (11,500mg sodium/100g) was in the Asian sauces category. Based on the sauce's recommended serving size (15g), one serving of this product contains 1,725mg sodium or 86% of the maximum daily recommended intake.[6]

Asian Sauces

- Pre-packaged sauces included in the Asian sauces category were fish sauce, oyster sauce, soy sauce, and 'other Asian' sauces.
- 175 Asian pre-packaged sauces were included in the analysis, representing products available for sale in 2013 (n=78), and 2019 (n=97).
- The average sodium content of Asian sauces increased from 4,438mg sodium/100g in 2013 to 4,759mg sodium/100g in 2019 (a 7% increase). The difference was not statistically significant (p=0.48).
- The average recommended serving size of Asian sauces decreased from 25g in 2013 to 17g in 2019 (a 32% drop). The difference was statistically significant (p=0.008).
- Manufacturer recommended serving sizes in 2019 ranged from 3g to 64g.
- In 2019, the average sodium in an average recommended serving of Asian sauces was 808mg per serve.
- The sodium content of Asian sauces in 2019 ranged widely, with the highest sodium product (fish sauce) containing 11,500mg sodium/100g. This was almost 4000 times more sodium than that of the lowest sodium product (other Asian sauce) (3mg sodium/100g).

Gravies and Stocks

- 211 gravies and stocks were included in the analysis, representing products available for sale in 2013 (n=104) and 2019 (n=107).
- The average sodium content of gravies and stocks "as prepared" decreased from 379mg sodium/100g in 2013 to 346mg sodium/100g in 2019 (a 9% decrease). The difference was statistically significant (p=0.04).
- The average recommended serving size of gravies and stocks "as prepared" increased from 164g in 2013 to 173g in 2019 (a 5% increase). The difference was not statistically significant (p=0.46).
- Manufacturer recommended serving sizes in 2019 ranged from 50g to 500g.
- In 2019, the average sodium in an average recommended serving of gravies and stocks was 402mg per serve.
- The highest sodium product for gravies and stocks in 2019 contained 660mg sodium/100g. This was approximately 12 times greater than the sodium content of the lowest sodium gravy/stock (56mg sodium/100g).

Pasta Sauces

- 340 pre-packaged pasta sauces were included in the analysis, representing products available for sale in 2013 (n=182) and 2019 (n=158).
- The average sodium content of pre-packaged pasta sauces decreased from 424mg sodium/100g in 2013 to 344mg sodium/100g in 2019 (a 19% drop). The difference was statistically significant (p<0.0001).
- The average recommended serving size of pasta sauces decreased from 115g in 2013 to 109g in 2019 (a 5% drop). The difference was statistically significant (p=0.009).
- Manufacturer recommended serving sizes in 2019 ranged from 15g to 188g.
- In 2019, the average sodium in an average recommended serving of pasta sauce was 371mg per serve.
- The sodium content of pre-packaged pasta sauce in 2019 ranged widely, with the highest sodium product (tomato-based ambient pasta sauce) containing 975mg sodium/100g. This represented almost 200 times more sodium than that of the lowest sodium pasta sauce (also a tomato-based ambient pasta sauce) (5mg sodium/100g).

Table Sauces

- The table sauces category included BBQ sauce, chilli sauce, steak/Worcestershire sauces, and tomato sauce.
- 326 table sauces were included in the analysis, representing products available for sale in 2013 (n=139) and 2019 (n=187).
- The average sodium content of table sauces increased from 1,049mg sodium/100g in 2013 to 1072mg sodium/100g in 2019 (a 2% increase). This difference was not statistically significant (p=0.44)
- The average recommended serving size of table sauces decreased from 19g in 2013 to 16g in 2019 (a 16% drop). The difference was not statistically significant (p=0.82).
- Manufacturer recommended serving sizes in 2019 ranged from 5g to 43g.
- In 2019, the average sodium in an average recommended serving of table sauces was 160mg per serve.
- The sodium content of table sauces in 2019 ranged widely, with the highest sodium product (chilli sauce) containing 4,420mg sodium/100g. This represented almost 900 times more sodium than that of the lowest sodium table sauce (also a chilli sauce) (5mg sodium/100g).

Proportion of Sauces Meeting the NZ Heart Foundation Voluntary Targets

- The proportion of pre-packaged NZ sauces which met the July 2021 NZ Heart Foundation sodium targets for cooking sauces (includes Asian sauces and pasta, Indian-style and other sauces), gravies & finishing sauces, and table sauces (tomato sauce/ketchup in plastic packaging) increased from 32.6% in 2013 to 43.1% in 2019. The increase over time in the proportion of pre-packaged sauces meeting NZ targets was statistically significant (p=0.001).
- This was driven mainly by statistically significant increases in the proportion of pasta sauces (p<0.0001) and gravies (p=0.0008) that met sodium targets.

Proportion of Sauces Meeting the Australian Healthy Food Partnership Voluntary Targets

- The proportion of pre-packaged sauces which met the July 2021 Australian Healthy Food Partnership sodium targets for gravies and sauces (includes Asian style cooking sauces, gravies and finishing sauces, and other savoury sauces) increased from 26.6%% in 2013 to 41% in 2019. The increase over time in the proportion of pre-packaged sauces meeting Australian targets was statistically significant (p=0.0002).
- This was driven mainly by statistically significant increases in the proportion of pasta sauces (p<0.0001) that met sodium targets

Proportion of Sauces Meeting the World Health Organization Global Targets

- The proportion of pre-packaged sauces which met the 2021 World Health Organization sodium targets for sauces, dips and dressings (includes bouillon and soup stock [not concentrated], condiments, cooking sauces including pasta sauces and tomato sauces [not concentrated], soy sauce and fish sauce, and other Asian-style sauces) increased from 26.6% in 2013 to 39.3% in 2019. The increase over time in the proportion of pre-packaged sauces meeting global targets was statistically significant (p<0.0001).
- This was driven mainly by statistically significant increases in the proportion of gravies and stocks (p=0.005) and pasta sauces (p<0.0001) that met sodium targets.

CONCLUSIONS

The sodium content of NZ pre-packaged sauces is exceptionally high (average 1,372mg/100mg in 2019) and there is a wide range of sodium content within categories and across brands (from as low as 3mg/100g to as high as 11,500mg/100g in the Asian sauce category). There has been an overall increase in the average sodium content of NZ sauces between 2013 and 2019 with decreases in the sodium content of some sauce categories (mainly pasta sauces but also gravies/stocks) offset by increases or little change in the sodium content of other sauce categories. Approximately four in 10 sauces in 2019 met the Heart Foundation, Australian Healthy Food Partnership, and WHO sodium targets. Increases in the proportions of sauces that met both targets were driven largely by reductions in the sodium content of pasta sauces (19%) and to a lesser extent by decreases in gravies and stocks (9%). Asian sauces are a particular cause for concern with only 4% of products in this category meeting the recommended maximum sodium target of 680mg/100ml set by NZ and Australian sodium reduction target programmes. Government-led sodium targets for sauces are recommended to support larger widespread reductions in sodium content across all categories.

Limitations of the research

The number of pre-packaged sauces in the Nutritrack database is not necessarily representative of all products available in New Zealand because Nutritrack data collections are undertaken in only four major supermarket stores in Auckland during the second quarter of each year.

Some product serving sizes were reported for dry/concentrated forms only, rather than 'as prepared'/diluted forms. As a result, 52 products which reported serving sizes in dry/concentrated forms only were excluded from the serving size analysis. In addition, 10 products were excluded from the final dataset prior to analysis because sodium content was only reported in dry/concentrated form.

Recommendations

For consumers

- Limit use of pre-packaged sauces and replace with fresh home-cooked alternatives e.g., tomato-based sauces can be made using canned tomatoes.
- Read nutrition labels and select lower sodium sauce options.
- Add flavour to meals with ingredients that do not contain salt e.g., herbs, spices, citrus juices, pepper, garlic, ginger, onions.

For the food industry

- The high levels and wide range of sodium content in sauces highlight the need for, and feasibility of, reducing the amount of sodium across all types of sauces.
- Asian sauces are a particular cause for concern with only 4% of products in this category meeting the recommended maximum sodium target of 680mg/100ml set by NZ and Australian sodium reduction target programmes.

For government

- Introduce government-led sodium targets for a range of key food categories in New Zealand, including pre-packaged sauces.
- Regular, independent monitoring of the food supply is essential to ensure that the food industry is making progress towards meeting voluntary targets for sodium reduction.

The analyses are not weighted by sales of sauce products, so it is not possible to estimate the impact of any noted differences on population sodium consumption. Changes in high-volume sales products would have a greater impact on population sodium intakes.

Note

The equivalent salt content (g/100g) for reported sodium values can be estimated by multiplying the sodium content of products (mg/100g) by 2.5 and dividing by 1000.

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APPENDICES

Table 1. Sodium content of sauces in New Zealand, 2013 to 2019

	2013				2019			
	Product count	**Mean sodium (range) mg/100g**	**Mean serving size (range) g**	**Mean sodium/ serving mg[a]**	**Product count**	**Mean sodium (range) (mg/100g)**	**Mean serving size (range) g**	**Mean sodium/ serving mg[a]**
ALL SAUCE PRODUCTS	503[b]	1,197 (1-11,531)	80 (3-500)	453	549[c]	1,372 (3-11,500)	68 (3-500)	383
Asian sauces	78	4,438 (450-11,531)	25 (3-80)	889	97	4,759 (3-11,500)	17 (3-64)	808
Gravies and stocks	104	379 (11-888)	164 (50-500)	441	107	346 (56-660)	173 (50-500)	402
Pasta sauces	182	424 (13-1,340)	115 (26-175)	488	158	344 (5-975)	109 (15-188)	371
Table sauces	139	1,049 (1-4,920)	19 (5-120)	176	187	1,072 (5-4,420)	16 (5-43)	160

Notes: [a]The mean sodium/serving reported in the table is lower than if calculated based on the reported mean sodium (mg/100g) and average serving size (g) values because there is a large variability in both sodium content (1mg/100g-11,531mg/100g in 2013 and 3mg/100g-11,500mg/100g in 2019) and serving size values (3g-500g in 2013 and 2019)

[b]500 products were included in the 2013 mean sodium analysis (2 Asian sauces and 1 table sauce were excluded because they were missing sodium content data). 472 products were included in the 2013 mean serving size analysis (1 Asian sauce, 4 pasta sauces and 1 table sauce were excluded because they were missing serving size data; and 25 gravies and stocks were excluded because they did not report serving size in as prepared/diluted forms)

[c]521 products were included in the 2019 mean serving size analysis (1 table sauce was missing serving size; 27 gravies and stocks were missing serving size in prepared/diluted forms)

Table 2. Number and proportion of sauces that met relevant NZ Heart Foundation sodium targets in 2013 and 2019

		2013			2019		
Food category	**HF recommended maximum sodium level (mg/100g)**	**Total number of products**	**Number of products meeting the NZ target**	**Proportion of products meeting the NZ target**	**Total number of products**	**Number of products meeting the NZ target**	**Proportion of products meeting the NZ target**
Cooking sauces							
Asian sauces	680	76	6	7.9%	97	4	4.1%
Pasta, Indian-style and other sauces	380	182	75	41.2%	158	112	70.9%
Gravies & finishing sauces	450	43	21	48.8%	38	23	60.5%
Table sauce							
Tomato sauce/Ketchup plastic packaging	680	138	41	29.7	187	68	36.4
Total		439	143	32.6%	480	207	43.1%

Table 3. Number and proportion of sauces that met relevant Australian Healthy Food Partnership sodium targets in 2013 and 2019

		2013			2019		
Food category	**HFP recommended maximum level (mg/100g)**	**Total number of products**	**Number of products meeting the Australian target**	**Proportion of products meeting the Australian target**	**Total number of products**	**Number of products meeting the Australian target**	**Proportion of products meeting the Australian target**
Gravies and sauces							
Asian style cooking sauces	680	76	6	7.9%	97	4	4.1%
Gravies and finishing sauces	450	43	21	48.8%	38	23	60.5%
Other savoury sauces	360	182	53	29.1%	158	93	58.9%
Total		301	80	26.6%	293	120	41%

Table 4. Number and proportion of sauces that met relevant World Health Organization global sodium targets in 2013 and 2019

		2013			2019		
Food category	**WHO recommended maximum level (mg/100g)**	**Total number of products**	**Number of products meeting the WHO target**	**Proportion of products meeting the WHO target**	**Total number of products**	**Number of products meeting the WHO target**	**Proportion of products meeting the WHO target**
Sauces, dips and dressings							
Boullion and soup stock (*not concentrated*)	350	104	42	40.4%	107	64	59.8%
Condiments	650	138	40	29%	187	63	33.7%
Cooking sauces including pasta sauces and tomato sauces (*not concentrated*)	330	182	35	19.2%	158	75	47.5%
Soy sauce and fish sauce	4,840	42	10	23.8%	45	10	22.2%
Other Asian-style sauces	680	34	6	17.6%	52	4	7.7%
Total		500	133	26.6%	549	516	39.3%

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