



The Sodium Content of Crisps and Savoury Snacks 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 11,000 strokes occur amongst New Zealanders.¹ Māori and Pasifika are more likely to experience a stroke than NZ Europeans and also tend to experience stroke at a much younger age – about 15 years younger than NZ Europeans.²

Approximately 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 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 3386mg/day (equivalent to 8.5g of salt).⁵ The World Health Organization recommends a maximum dietary sodium intake of 2000 mg/day (5g of salt).⁶ In a Western style diet, around three-quarters of dietary sodium intake comes from processed foods.⁷

Pre-packaged savoury snacks are commonly consumed in New Zealand. An online survey found that in the first NZ Covid-19 lockdown, 33% of adult respondents (n=3028) reported that they increased their intake of salty snacks during the lockdown.⁸ Another study found that New Zealand children consume snack foods on average 1.2 (95%CI 0.9, 1.6) times per day, with Māori and Pacific children consuming less healthful snacks on average compared to Pākehā children.⁹

The range of savoury snacks marketed as 'healthier' has expanded to cater for the more health-conscious consumer. 'Healthier' options include legume chips, vegetable chips and wholegrain chips. However, the sodium content of these products compared with traditional snack options (e.g., corn chips, potato chips and extruded snacks) has not been examined.

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 for participating companies 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 also produced voluntary sodium targets.¹¹

We aimed to examine the sodium content of pre-packaged crisps and savoury snacks sold in NZ and to identify any changes in sodium content over time (2013 to 2019). We also examined how many products met relevant NZ Heart Foundation¹² and the Australian Healthy Food Partnership targets.¹³

METHODS

Data Collection

Sodium content data, manufacturer recommended serving size, and pack size for pre-packaged crisps and savoury snacks in 2013 and 2019 were extracted from the National Institute for Health Innovation (NIHI) Nutritrack database.¹⁴ Nutritrack data are collected each year from four major supermarket stores (Countdown, New World, Pak'n'Save, Four Square) in Auckland, NZ.¹⁴ Sodium data are collected from product Nutrition Information Panels (NIP) and reported in milligrams (mg) per 100g of food.

Product inclusion

We included the following subcategories:

- Corn chips
- Extruded snacks
- Gluten-free corn chips
- Gluten-free snacks
- Popcorn
- Potato crisps
- Pretzels
- Salt and vinegar snacks
- Snack packs
- Wholegrain chips
- Other snack foods (cassava chips, legume-based snacks [e.g., wasabi peas], other snacks [e.g., bagel crisps, noodle snacks, nut mix, onion rings, pappadums, pork rinds, prawn crackers, seaweed, soy mix, vegetable chips], and rice crackers)

Variety snack packs which contained diverse products with variable sodium content for each were excluded from this analysis. This was a total of 42 products in both 2013 and 2019. Products without valid information on sodium content were also excluded (n=16).

Categorisation

Snack foods were systematically categorised according to the established Nutritrack database classification system. Nutritrack product categories were also matched with the NZ Heart Foundation¹² and/or Australian Healthy Food Partnership¹³ sodium targets for savoury snacks where relevant targets exist.

Product data were quality checked before data analysis. Any errors identified were corrected prior to data 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 snack foods were compared where possible against the relevant NZ (Heart Foundation)¹² and Australian (Healthy Food Partnership)¹³ voluntary sodium targets. There were no sodium targets for available for the following crisps and savoury snack subcategories: snack packs, other snacks, pretzels, gluten-free snacks and gluten-free corn chips. The proportions of products meeting targets were derived for each year.

Changes in the pack size and sodium content of products between years (except gluten-free corn chips due to the small number of products in 2013, n=1) were examined using both parametric F-test (ANOVA) and non-parametric Kruskal Wallis tests. Since the results of both tests were consistent, only the ANOVA test results are reported here. The Chi-square test (or Fisher's exact test with small cell counts <5) was used to determine if there were any differences in the proportion of products meeting the targets across the two years. Due to the small number of products, no further regression analysis was conducted.

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 Crisps and Savoury Snack Products

- In total, 888 crisps and savoury snack products were included in the analysis, representing savoury snack food products available for sale in New Zealand in 2013 (n=388) and 2019 (n=500).
- The average pack size of all savoury snack products decreased from 154g in 2013 to 117g in 2019 (a 24% drop). The difference was statistically significant (p=0.0002).
- The average sodium content of all savoury snack products decreased from 676mg sodium/100g in 2013 to 640mg sodium/100g in 2019 (a 5% drop). The difference was statistically significant (p=0.004).
- Manufacturer recommended serving sizes in 2019 ranged from 2g to 185g. The average recommended serving size was 32g.
- In 2019, the average sodium in an average recommended serving of snack food products was 197mg per serve.
- The sodium content of savoury snack products in 2019 ranged widely, with the highest being 3000mg sodium/100g. This represented 7500 times more sodium than that of the lowest sodium savoury snack (0.4mg sodium/100g).
 - The highest sodium savoury snack (3000mg sodium per 100g) was in the 'other snack foods' category. Based on the recommended serving size (70g), one serving of this product contains 2100mg sodium, 5% more than the maximum daily recommended intake.⁶

Corn Chips

- 95 corn chips were included in the analysis, representing products available for sale in 2013 (n=46), and 2019 (n=49).
- The average pack size of corn chips decreased from 227g in 2013 to 185g in 2019 (a 19% decrease). The difference was statistically significant (p=0.02).
- The average sodium content of corn chips decreased from 545mg sodium/100g in 2013 to 431mg sodium/100g in 2019 (a 21% drop). The difference was statistically significant (p=0.01).
- Manufacturer recommended serving sizes in 2019 ranged from 18g to 80g. The average recommended serving size was 37g.
- In 2019, the average sodium in an average recommended serving of corn chips was 149mg per serve.
- The sodium content of corn chips in 2019 ranged widely, with the highest sodium product containing 898mg sodium/100g. This was nearly 150 times more sodium than that found in the lowest sodium corn chips (6mg sodium/100g).

Extruded Savoury Snacks

- 80 extruded snacks were included in the analysis, representing products available for sale in 2013 (n=48) and 2019 (n=32).
- The average pack size of extruded snacks increased from 131g in 2013 to 149g in 2019 (a 14% increase). The difference was not statistically significant (p=0.87).
- The average sodium content of extruded snacks increased from 864mg sodium/100g in 2013 to 965mg sodium/100g in 2019 (a 12% increase). The difference was not statistically significant (p=0.60).
- Manufacturer recommended serving sizes in 2019 ranged from 12g to 125g. The average recommended serving size was 34g.
- In 2019, the average sodium in an average recommended serving of extruded snacks was 288mg per serve.
- The highest sodium content for extruded snacks in 2019 was 1910mg/100g. This was nearly 11 times the sodium content of the lowest sodium extruded snack (180mg sodium/100g).

Gluten-free Corn Chips

- 17 gluten-free corn chips were included in the analysis, representing products available for sale in 2013 (n=1) and 2019 (n=16).
- The average pack size of gluten-free corn chips increased from 150g in 2013 to 186g in 2019 (a 24% increase).
- The average sodium content of gluten-free corn chips decreased from 700mg sodium/100g in 2013 to 340mg sodium/100g in 2019 (a 51% drop). Statistical significance could not be assessed because of the small number of products in 2013.
- Manufacturer recommended serving sizes in 2019 ranged from 25g to 60g. The average recommended serving size was 37g.
- In 2019, the average sodium in an average recommended serving of gluten-free corn chips was 115mg per serve.
- The sodium content of gluten-free corn chips in 2019 ranged widely, with the highest sodium product containing 717mg sodium/100g. This represented nearly 360 times more sodium than that of the lowest sodium gluten-free corn chips (2mg sodium/100g).

Other Gluten-free Savoury Snacks

- The gluten-free snacks category was a heterogenous range of crisps and savoury snack food products (excluding gluten-free corn chips).
- 49 gluten-free snacks were included in the analysis, representing products available for sale in 2013 (n=6) and 2019 (n=43).
- The average pack size of gluten-free snacks decreased from 155g in 2013 to 104g in 2019 (a 33% decrease). This difference was statistically significant (p=0.03).
- The average sodium content of gluten-free snacks decreased from 579mg sodium/100g in 2013 to 540mg sodium/100g in 2019 (a 7% drop). This difference was not statistically significant (p=0.68)
- Manufacturer recommended serving sizes in 2019 ranged from 12.5g to 50g. The average serving size was 31g.
- The average sodium in an average recommended serving of 'other' gluten-free snacks was 180mg per serve.
- The sodium content of gluten-free snacks in 2019 ranged widely, with the highest sodium product containing 2510mg sodium/100g. This represented 23 times more sodium than that in the lowest sodium gluten-free snack (107mg sodium/100g).

Popcorn

- 86 popcorn products were included in the analysis, representing products available for sale in 2013 (n=23) and 2019 (n=63).
- The average pack size of popcorn decreased from 175g in 2013 to 153g in 2019 (a 13% decrease). The difference was not statistically significant (p=0.39).
- The average sodium content of popcorn products decreased from 674mg sodium/100g in 2013 to 530mg sodium/100g in 2019 (a 21% decrease). The difference was not statistically significant, (p=0.10).

- Manufacturer recommended serving sizes in 2019 ranged from 12 to 50g. The average serving size was 25g.
- The average sodium in an average recommended serving of popcorn was 135mg per serve.
- The sodium content of popcorn in 2019 ranged widely, with the highest sodium product containing 1390mg sodium/100g. This was 3475 times more sodium than that in the lowest sodium popcorn (0.4mg sodium/100g).

Potato Crisps

- 229 potato crisp products were included in the analysis, representing products available for sale in 2013 (n=122) and 2019 (n=107).
- The average pack size of potato crisps decreased from 138g in 2013 to 131g in 2019 (a 5% decrease). The difference was statistically significant (p=0.03).
- The average sodium content of potato crisps decreased slightly from 552mg sodium/100g in 2013 to 549mg sodium/100g in 2019 (a 1% decrease). The difference was not statistically significant, (p=0.79).
- Manufacturer recommended serving sizes in 2019 ranged from 18 to 40g. The average serving size was 32g.
- The average sodium in an average recommended serving of potato crisps was 174mg per serve.
- The highest sodium potato crisp in 2019 contained 836mg/100g. This was 7 times the sodium content of the lowest sodium potato crisps (120mg sodium/100g).

Pretzels

- 27 pretzels were included in the analysis, representing products available for sale in 2013 (n=12) and 2019 (n=15).
- The average pack size of pretzels decreased from 214g in 2013 to 207g in 2019 (a 3% decrease). The difference was not statistically significant (p=0.94).
- The average sodium content of pretzels decreased from 1172mg sodium/100g in 2013 to 1141mg sodium/100g in 2019 (a 3% decrease). The difference was not statistically significant (p=0.79).
- Manufacturer recommended serving sizes in 2019 ranged from 18 to 55g. The average serving size was 29g.
- The average sodium in an average recommended serving of pretzels was 334mg per serve.
- The highest sodium pretzel product in 2019 contained 1600mg/100g. This was twice the sodium content of the lowest sodium pretzels (765mg sodium/100g).

Salt and Vinegar Snacks

- 46 salt and vinegar snacks were included in the analysis, representing products available for sale in 2013 (n=25) and 2019 (n=21).
- The average pack size of salt and vinegar snacks decreased from 144g in 2013 to 125g in 2019 (a 13% decrease). The difference was not statistically significant (p=0.17).
- The average sodium content of salt and vinegar snacks decreased from 895mg sodium/100g in 2013 to 748mg sodium/100g in 2019 (a 16% decrease). The difference was statistically significant (p=0.01).
- Manufacturer recommended serving sizes in 2019 ranged from 18 to 40g. The average serving size was 32g.
- The average sodium in an average recommended serving of salt and vinegar snacks was 241mg per serve.
- The highest sodium salt and vinegar snack product in 2019 was 1168mg/100g. This was almost 4 times the sodium content of the lowest sodium salt and vinegar snacks (300mg sodium/100g).

Snack Packs

- The types of foods included in the snack packs category were cheese and crackers, tuna and beans, and other crackers and dip (e.g. cheese sauce, peanut butter) snacks.
- 57 snack packs were included in the analysis, representing products available for sale in 2013 (n=19) and 2019 (n=38).
- The average pack size of snack packs decreased from 152g in 2013 to 116g in 2019 (a 24% decrease). The difference was statistically significant (p=0.04).
- The average sodium content of snack packs increased from 698mg sodium/100g in 2013 to 714mg sodium/100g in 2019 (a 2% increase). The difference was not statistically significant (p=0.71).

- Manufacturer recommended serving sizes in 2019 ranged from 19 to 185g. The average serving size was 53g.
- The average sodium in an average recommended serving of snack packs was 328mg per serve.
- The highest sodium snack pack product in 2019 contained 1335mg/100g. This was almost 4 times the sodium content of the lowest snack packs (340mg sodium/100g).

Wholegrain Chips

- 21 wholegrain chips were included in the analysis, representing products available for sale in 2013 (n=10) and 2019 (n=11).
- The average pack size of wholegrain chips increased from 125g in 2013 to 132g in 2019 (a 6% increase). The difference was not statistically significant (p=0.88).
- The average sodium content of wholegrain chips increased from 469mg sodium/100g in 2013 to 600mg sodium/100g in 2019 (a 28% increase). The difference was not statistically significant (p=0.26).
- Manufacturer recommended serving sizes in 2019 ranged from 15 to 40g. The average serving size was 33g.
- The average sodium in an average recommended serving of wholegrain chips was 182mg per serve.
- The highest sodium wholegrain chip product in 2019 contained 1130mg/100g. This was almost 4 times the sodium content of the lowest sodium wholegrain chips (294mg sodium/100g).

Other Savoury Snack Foods (Cassava Chips, Legume-based Snacks e.g. Wasabi Peas, Other Snacks, Rice Snacks)

- 180 other savoury snack foods were included in the analysis, representing products available for sale in 2013 (n=75) and 2019 (n=105).
- The average pack size of other savoury snack foods decreased from 142g in 2013 to 117g in 2019 (an 18% decrease). The difference was statistically significant (p=0.04).
- The average sodium content of other savoury snack foods increased from 715mg sodium/100g in 2013 to 766mg sodium/100g in 2019 (a 7% rise). The difference was not statistically significant, however (p=0.80).
- Manufacturer recommended serving sizes in 2019 ranged from 2g to 85g. The average recommended serving size was 27g.
- The average sodium in an average recommended serving of other snack foods in 2019 was 197mg per serve.
- The sodium content of other savoury snack foods in 2019 ranged widely, with the highest sodium product containing 3000mg sodium/100g. This was 38 times more sodium than that in the lowest sodium other savoury snack food (80mg sodium/100g).

Proportion of Crisps and Savoury Snacks Meeting the NZ Heart Foundation Voluntary Targets

- The proportion of eligible crisps and savoury snacks foods which met the relevant 2021 NZ Heart Foundation sodium targets for savoury snacks (extruded/pelleted snacks, popcorn, potato & other vegetable crisps, salt and vinegar snacks, and sheeted/reformed snacks) increased from 42.2% in 2013 to 51.6% in 2019 (a 9.4% increase). The increase over time in the proportion of crisps and savoury snacks meeting the New Zealand targets was statistically significant (p=0.03).
- This was driven mainly by statistically significant increases in the proportion of salt and vinegar snacks (p=0.03) and sheeted/reformed snacks (p=0.02) that met targets.

Proportion of Crisps and Savoury Snacks Meeting the Australian Healthy Food Partnership Voluntary Targets

- The proportion of eligible snack foods which met the relevant Australian Healthy Food Partnership sodium targets for savoury snacks (extruded and pelleted snacks, popcorn, potato snacks, salt and vinegar snacks, and vegetable, grains, and other snacks) increased from 32% in 2013 to 46.6% in 2019 (a 14.6% increase). The increase over time in the proportion of crisps and savoury snacks meeting the Australian targets was statistically significant (p=0.0005).
- This was driven mainly by statistically significant increases in the proportion of salt and vinegar snacks (p=0.01), and vegetables, grains and other snacks (p=0.01) that met targets.

CONCLUSIONS

The sodium content of NZ crisps and savoury snack foods is high (average 640mg/100g in 2019) and there is a wide range of sodium content within categories and across brands (from as low as 0.4mg/100g to as high as 3000mg/100g). There have been statistically significant decreases in the average pack size (24%) and sodium content (5%) of NZ snack foods between 2013 and 2019. Approximately half of NZ snack foods in 2019 met the Heart Foundation and/or the Australian Healthy Food Partnership voluntary sodium targets. Increases over time in the proportions of crisps and savoury snack foods that met targets were driven largely by reductions in the sodium content of salt and vinegar products (16%). Government-led sodium targets for savoury snack foods are recommended to support larger widespread reductions in sodium content across all categories.

Limitations of the research

The number of crisps and savoury snack products 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.

Nutritrack snack product categories did not align well with one Heart Foundation target category (sheeted/reformed snacks) so some relevant products could not be compared with that target.

The results are not weighted by sales of crisps and savoury snack 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 obviously 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.

Recommendations

For consumers

- Limit intake of pre-packaged crisps and savoury snacks and increase intake of whole, fresh alternatives.
- Be aware of packet sizes. Large packs can contain high levels of sodium per serve.
- Read nutrition labels and select lower sodium options.

For the food industry

- The high levels and wide range of sodium content in crisps and savoury snacks highlight the need for, and feasibility of, reducing the amount of sodium in snack foods.

For government

- Introduce government-led sodium targets for a range of key food categories in New Zealand
- 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.

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APPENDICES

Table 1. Sodium content crisps and savoury snacks in New Zealand, 2013 to 2019

	2013					2019				
	Product count	Average pack size (g)	Mean sodium (range) (mg/100g)	Average serving size (g)	Mean sodium/serving (mg)	Product count	Average pack size (g)	Mean sodium (range) (mg/100g)	Average serving size (g)	Mean sodium/serving (mg)
ALL SNACK FOOD PRODUCTS	388 ^a	154	676 (0-1778)	34	222	500	117	640 (0-3000)	32	197
<i>Corn chips</i>	46	227	545 (0-935)	36	196	49	185	431 (6-898)	37	149
<i>Extruded snacks</i>	48	131	864 (300-1535)	33	276	32	149	965 (180-1910)	34	288
<i>Gluten-free corn chips</i>	1	150	700 (700)	50	350	16	186	340 (2-717)	37	115
<i>Gluten-free snacks</i>	6	155	579 (247-1340)	45	252	43	104	540 (107-2510)	31	180
<i>Popcorn</i>	23	175	674 (0-1210)	27	197	63	153	530 (0-1390)	25	135
<i>Potato crisps</i>	122	138	552 (110-1260)	33	183	107	131	549 (120-836)	32	174
<i>Pretzels</i>	12	214	1172 (917-1567)	38	435	15	207	1141 (765-1600)	29	334
<i>Salt and vinegar snacks</i>	25	144	895 (390-1210)	34	306	21	125	748 (300-1168)	32	241
<i>Snack packs</i>	19	152	698 (432-1100)	48	288	38	116	714 (340-1335)	53	328
<i>Wholegrain chips</i>	10	125	469 (305-591)	34	160	11	132	600 (294-1130)	33	182
<i>Other snack foods</i>	75	142	715 (0-1778)	30	198	105	117	766 (80-3000)	27	197

	2013					2019				
	Product count	Average pack size (g)	Mean sodium (range) (mg/100g)	Average serving size (g)	Mean sodium/serving (mg)	Product count	Average pack size (g)	Mean sodium (range) (mg/100g)	Average serving size (g)	Mean sodium/serving (mg)
Cassava chips	9	149	1022 (790-1200)	18	188	12	149	1075 (790-1400)	18	195
Legume-based snacks (e.g. wasabi peas)	11	144	619 (300-1778)	29	180	22	119	599 (250-1355)	28	153
Other snacks	44	132	725 (0-1700)	34	219	53	104	824 (120-3000)	28	226
Rice snacks	11	171	518 (5-840)	26	144	18	129	596 (80-2087)	28	166

^aNote: 387 products were included in the average pack size analysis (1 potato crisp product missing pack size) and 386 products were included in the average serving size analysis (1 corn chips and 1 other snack foods missing serving size)

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

Food category	HF recommended maximum sodium level (mg/100g)	2013			2019		
		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
<i>Savoury snacks</i>							
Extruded/pelleted snacks	770	48	26	54.2%	32	13	40.6%
Popcorn	390	23	7	30.4%	63	30	47.6%
Potato & other vegetable crisps	520	133	60	45.1%	118	61	51.7%
Salt and vinegar snacks	740	25	5	20%	21	11	52.4%
Sheeted/reformed snacks	520	46	18	39.1%	49	31	63.3%
Total		275	116	42.2%	283	146	51.6%

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

Food category	HFP recommended maximum level (mg/100g)	2013			2019		
		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
<i>Savoury snacks</i>							
Extruded and pelleted snacks	720	48	19	39.6%	32	13	40.6%
Popcorn	360	23	7	30.4%	63	30	47.6%
Potato snacks	500	123	41	33.3%	107	46	43%
Salt and vinegar snacks	810	25	5	20%	21	12	57.1%
Vegetable, grains, other snacks	450	56	16	28.6%	60	31	51.7%
Total		275	88	32%	283	132	46.6%

NIHI

At NIHI we measure our success by our contribution to improving people's health in New Zealand and around the globe.

We discover, develop, test, and deliver innovative approaches to today's most pressing health problems.

Our work is focused on preventing disease, improving people's health, reducing health inequities, and enabling the delivery of more effective and equitable healthcare.

We provide independent scientific evidence that supports individuals, communities, clinicians, and policymakers.

Supported by The University of Auckland and Auckland UniServices Limited infrastructures, we are experts in providing researchers with complex project management, IT, data management and analytics support, delivery of commercial health projects and commercialisation/deployment of health initiatives.

Our NIHI team consists of: academic researchers who identify areas of potential research, design studies and analyse and communicate the results; project managers who ensure projects are delivered on time, scope and budget; developers who build and maintain our products; data managers who are responsible for reporting and data; and biostatisticians who help us analyse the data we collect.

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