Changes in Sodium levels of processed foods among the international Food and beverage association member companies in Australia:2013-2017

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Abbreviations: ATNF, Access to Nutrition Foundation; IFBA, International Food and Beverage Alliance; WHO, World Health Organization

ABSTRACT

Excess dietary sodium is a modifiable cause of high blood pressure. The World Health Organization has targeted a 30% reduction in mean population sodium consumption by 2025. In 2008, members of the International Food and Beverage Alliance (IFBA) made commitments to lower sodium content in their products. The aim of this study was to determine the difference in sodium levels between 2013 and 2017 in foods and beverages produced by companies that are IFBA members (n=10) and non-IFBA members (n=6) that were included in the 2018 Global Access to Nutrition Index operating in Australia. Independent Samples T tests and Mann Whitney U tests were used to test the differences in sodium levels. There was no clear difference in sodium content between 2013 and 2017 detectable for the IFBA members (mean difference 17mg/100g, 95% confidence interval (CI), -82 to +48; p=0.612; median difference 27mg/100g, p=0.582). For the non-IFBA companies there was a decrease in median sodium content (-30mg/100g; P=0.002) but not mean sodium content (-52mg/100g, 95% CI -106 to +3; p=0.064). IFBA commitments to reduce the sodium content of foods appear to have had slow progress in Australia. Stronger implementation and monitoring programs are needed to drive industry action.

Key words: Dietary sodium, Food industry, International Food and Beverage Alliance, Packaged and processed food composition

1. Introduction

Excess dietary sodium is a major modifiable cause of high blood pressure and is likely an important cause of cardiovascular disease (Melaku et al. 2018) (Strazzullo et al. 2009). Across many countries, population level sodium intake is currently too high (Galletti et al. 2014) (Villani et al. 2012) (Charlton et al. 2005). As a result of the relationship between excess sodium intake and high blood pressure and cardiovascular disease, the World Health Organization (WHO) recommends a maximum population intake of 2000 mg of sodium per person per day (5 g salt) (World Health Organization 2013). In addition, the National Academies of Sciences, Engineering and Medicine recently updated the Dietary Reference Intakes for sodium in adults to Adequate Intake of 1500 mg per day and Chronic Disease Risk Reduction Intake of 2300 mg per day (The National Academies of Sciences 2019). Most dietary sodium in high-income countries derives from processed and packaged foods (Anderson et al. 2010) (Brown et al. 2009). The WHO has identified reduction of average sodium intake by 30% by 2025 globally as a key measure to reduce cardiovascular disease (World Health Organization 2018), and has made recommendations to the food industry to reduce the level of sodium in existing products and also to formulate new products with lower levels of sodium (World Health Organization 2004).

In response to demands from governments and the WHO to improve the healthiness of the food supply, major global food manufacturers established the International Food and Beverage Alliance (IFBA) in 2008, consisting of 12 major global food and non-alcoholic beverage companies (International Food and Beverage Alliance 2018). IFBA members have committed to improve health through product reformulation, responsible marketing, increased access to nutrition information and promotion of healthy and active lifestyles.

There is limited reporting on implementation or monitoring of impact of the IFBA commitments. IFBA progress reports identified that the goals for reducing sodium differed

between companies depending upon the nature of their product portfolios (International Food and Beverage Alliance 2018). There is limited reporting on if and by how much IFBA companies have actually reduced sodium in their products, making it unclear whether such voluntary pledges by food companies can be an effective model for improving the healthfulness of the food supply.

Here we capitalised on a unique opportunity provided by The FoodSwitch program in Australia to objectively measure the compliance of IFBA member companies with their sodium-reduction commitments (Dunford et al. 2014). Data for this study were those utilised for the Access to Nutrition Foundation (ATNF)'s Global Index which examines the healthfulness of food and beverage products from the world's largest manufacturers (Access to Nutrition Foundation 2019). The aim of the current study was to determine the difference in sodium levels between 2013 and 2017 in foods and beverages produced by IFBA members and non-IFBA members operating in Australia.

2. Methods

We compared sodium levels in selected food categories using data captured within the FoodSwitch database compiled by The George Institute in 2013 and 2017.

2.1 Companies included

The current project assessed the sodium content of products from 16 Australian manufacturers. These companies included 10 that are members of IFBA and six that are non-IFBA members. Companies were all included in the Access to Nutrition's 2018 Global Index, and had products available in 2013 and 2017 Australian FoodSwitch databases.

2.2 Food composition database

To access product nutrition information, The George Institute for Global Health 2013 and 2017 FoodSwitch branded food composition databases were used (Dunford, Trevena et al.

2014). The FoodSwitch database contains information for packaged food products including their list of ingredients, Nutrition Information Panel data, photographic images and assorted text-based fields for data extracted from the food product images (Dunford, Trevena et al. 2014). In 2013, and again in 2017, a team of trained researchers visited the same four grocery retail stores (Coles, Woolworths, ALDI, IGA) in Sydney, Australia between July and September and collected nutrition information for all packaged food and beverage products in the store. Data were obtained directly from the mandatory Nutrition Information Panel on pack. Where exactly the same product was for sale in more than one supermarket, it was recorded only once and, likewise, where the same product was presented in different pack sizes, only one entry was recorded. For each food product the manufacturer, brand and product name, as well as the sodium content per 100g or per 100mL were recorded. Data were entered into an electronic database according to standardized procedures. For this analysis, products that reported sodium concentrations 'as prepared' were excluded from analysis (n=14).

2.3 Categorization of foods

Foods were categorized according to one of 21 categories within the Euromonitor International food and beverage categorization system (Euromonitor International 2018). Euromonitor is a privately-owned market research firm that provides data and analysis on market sizes, market shares and trends in a range of industries, including food. Products that do not carry a nutrition label such as seasonings, spices, coffee and tea were excluded from the analysis. In addition, products from unknown manufacturers and manufacturers not included in the 2018 Global Access to Nutrition Index, duplicate products, and products with no sodium values were excluded.

2.4 Outcomes

The outcomes assessed were mean (standard deviation, SD) and median (interquartile range, IQR) sodium concentration per 100g (or 100mLs for liquids) of products in each year

and the differences between 2013 and 2017 expressed as the mean (α0.05) and median differences in sodium concentration per 100g (or 100mLs for liquids).

2.5 Data analysis

Data were distributed using box plots and histograms **(Supplementary Figures S1)**. Means (SD) as well as medians (IQR) of all products sampled were calculated and reported in all cases since some data were significantly skewed. Differences between 2013 and 2017 were calculated as mean differences (95% confidence intervals, CI) as well as median differences to accommodate skewed distributions. Independent Samples T test and Mann Whitney U test were used to test the differences in sodium levels between 2013 and 2017. Data were reported separately for each company, for IFBA companies combined, for non-IFBA companies combined and for all companies combined. Additional analyses were conducted for food categories for all companies combined where there were more than 10 products in the category in both 2013 and 2017. Statistical analysis was performed using the Statistical Package for the Social Sciences (IBM Corp., SPSS for Windows Version 25, Armonk, New York, USA).

3. Results

There were 10 IFBA and six non-IFBA companies included in this study with varying specificity of sodium reduction targets documented by the IFBA members **(Table 1)**. For the included companies there were a total of 4595 products (n=3015 IFBA and n=1580 non-IFBA) available across 2013 (n=2462) and 2017 (n=2133) for data analysis. The dominant types of food categories included; 'Sauces, Dressings and Condiments, 'Confectionery', 'Dairy', 'Savoury Snacks', 'Soup', and 'Sweet Biscuits, Snack Bars and Fruit Snacks' **(Table 2)**

3.1 Differences in sodium content between 2013 and 2017

For all companies combined, there was no detectable difference in sodium content in 2013 compared to 2017 with a mean difference of -28mg/100g, (95% CI -75 to +19; p=0.238) and a median difference of -14mg/100g (p=0.150) **(Table 3)**.

For the 10 IFBA companies there was also no detectable difference in mean (-17mg/100g, 95% CI -82 to +48; p=0.612) or median (27mg/100g; p=0.582) sodium content between 2013 and 2017 (Table 3). For the non-IFBA companies there was no detectable difference in mean sodium content (-52mg/100g, 95% CI -106 to +3; p=0.064) but median sodium content levels were lower in 2017 compared to 2013 (-30mg/100g; p=0.002). Of the 16 companies included, there were only two companies (Danone and Kraft Heinz) that had a significant decrease in mean and/or median sodium content of products between 2013 and 2017 **(Table 4 and 5)**.

3.2 Differences in sodium content of products between 2013 and 2017 by food category

For all companies combined, there was a significant decrease in sodium content between 2013 and 2017 in five food categories **(Table 6)**. These were: *Juice* (median difference -4mg/100g; p<0.001); *Processed Meat and Seafood* (mean difference -136mg/100g, 95% CI -236 to -35; p=0.009; median difference -90mg/100g; p=0.014); *Ready Meals* (mean difference -147mg/100g, 95% CI -273 to -20; p=0.024; median difference -290mg/100g; p=0.018,); *Savoury Snacks* (mean difference -130mg/100g, 95% CI -206 to -55; p=0.001; median difference -119mg/100g; p<0.001;); and *Soup* (median difference -10mg/100g; p<0.001).

For the IFBA companies, significant decreases in sodium content between 2013 and 2017 were observed in *Savoury Snacks* for PepsiCo (median difference -78mg/100g; p=0.020), and *Soup* for Unilever (mean difference -23mg/100g, 95% CI -33 to -12; p<0.001; median difference -20mg/100g; p<0.001) **(Supplementary Table S1)**.

For the non-IFBA companies significant reductions were observed for the Campbell's *Savoury Snacks* (mean difference -126mg/100g, 95% CI -198 to -55; p=0.001; median

difference -156mg/100g; p=0.001), and *Soup* (mean difference -15mg/100g, 95% CI -27 to -3; p=0.015; median difference -17mg/100g; p=0.028). Kraft Heinz also reduced the sodium content of *Juice* (median difference -3mg/100g; p<0.001), *Processed Fruit and Vegetables* (median difference -175mg/100g; p=0.012), and *Processed Meat and Seafood* (mean difference -135mg/100g, 95% CI -236 to -35; p=0.009; median difference -90mg/100g; p=0.014). There was only one significant increase in the sodium content of a food category and that was for of *Juice*s made by Campbell's (median difference 19mg/100g; p=0.003).

4. Discussion

There was no evidence that the 2008 commitments made by IFBA members to the United Nations have resulted in reduced sodium levels in Australian foods and beverages in 2017. While there are data indicating action by some companies in select product categories, the extent of implementation has been too small to have a substantive impact on the overall sodium levels in foods and beverages marketed by the IFBA membership evaluated in this study. Amongst the non-IFBA companies chosen for comparison there was some limited evidence of a reduction in sodium, with several companies having successfully targeted specific product categories. However, the magnitude of change was small and it is unlikely that significant health gains have been achieved through either blood pressure lowering or the prevention of cardiovascular disease.

The primary reason for the failure of the IFBA member commitments to translate into reduced levels of sodium in the Australian food supply is likely the voluntary nature of the program and the absence of any sanction for failure to deliver. This is compounded by the lack of any commercial incentive for IFBA members to reduce sodium and the limited supportive action provided by the Australian government (Jones et al. 2016). While many countries, including Australia, report that they have salt reduction initiatives in place (Webster et al. 2011), the mechanisms for implementation are typically weak, scope is often narrow and there

is an absence of financial or regulatory support to ensure programs are delivered with fidelity. Mandatory programs, standardised targets and transparent and objective monitoring have been identified as ways of increasing the likelihood that sodium reduction efforts will be more effective (Swanepoel et al. 2017). Australia prioritised sodium reduction within the 2009 Food and Health Dialogue objectives and targeted breads, breakfast cereals and processed meats with some initial success (Trevena et al. 2014), though the program subsequently lapsed. The replacement program for the Food and Health Dialogue – the Healthy Food Partnership - has yet to agree an action plan for sodium reduction and there is little evidence of current action on salt levels in Australian foods.

Mandatory sodium reduction legislation has been introduced in some countries. For instance South Africa became the first country to pass legislation on sodium reduction targets for multiple processed food categories in 2013 (South African Government. Department of Health 2013). Food categories targeted include bread, breakfast cereals and porridges, spreads, savoury snacks, flavoured potato crisps, processed meat, dry soup powders, dry gravy powders, dry instant savoury sauces and powders, stock cubes, stock powders or stock pastes (South African Government. Department of Health 2013), which have been identified as leading contributors to dietary sodium in South Africa. During the initial implementation stage 67% of products were reported to meet the maximum sodium limits (Peters et al. 2017). In the US, the National Salt Reduction Initiative was created in 2009 with the aim of creating voluntary sodium targets for the food industry in order to reduce sodium levels across 62 packaged food categories and 25 categories of restaurant food (City of New York 2018). From 2009 to 2014, there was a 6.8% reduction in sodium levels in almost half of all food categories (Curtis et al. 2016).

In the current study, large variations in sodium content were apparent within product categories highlighting the potential for the manufacture and marketing of products with lower

levels of sodium, as well as the opportunity for reformulation of products with currently high levels of sodium to lower sodium content. While technical challenges are encountered at low levels of sodium content for some food categories (Desmond 2006), salt reduction programmes such as that done in the UK have shown the feasibility of sodium reduction in processed foods and have lowered population salt intake within the last decade (Wyness et al. 2012).

There were substantial differences in the sodium levels of products provided by the included companies. In part this reflects the different product types provided by the companies but there were also differences in the sodium levels of otherwise comparable products provided by different companies. This observation illustrates limited coordination across companies, and reflects both the competitive nature of the food industry and the lack of government coordination of salt reduction efforts. Standardization of sodium targets across industry sectors has been identified as goal for the Healthy Food Partnership (Jones, Magnusson et al. 2016) that will be important to ensure that engagement is achieved not just with the large food companies, but also the small and medium enterprises that manufacture and retail a diverse range of products across the country.

Strengths of this study include the large number of products available for analysis and the standardized processes used for data collection, in the same supermarkets, over the two time points. The presentation of both mean and median differences provides readers with an objective view of the impact of the skewed nature of some of the data on the estimates of change – mostly the directions of change were comparable whether based on comparisons of means or medians. The study also had several limitations. While large overall, for some manufacturers the number of products was small and this limited the statistical power to detect differences in sodium levels between years. We did many statistical tests without formal adjustment for multiplicity, but interpreted the findings cautiously in light of the multiple comparisons made. The analyses are based on packaged foods sampled across metropolitan

areas in Sydney, Australia, and the findings may not be generalizable to all products in Australia or the products sold by the same manufacturers in overseas jurisdictions. Nevertheless, the supermarket chains from which the data were sampled are the leading food retailers in Australia and have 90% of market share for grocery sales (Roy Morgan 2017). While this study assessed change in sodium content from 2013, which was the most reliable data that was available for analysis, it would have been ideal to assess change from 2008 when the IFBA member companies made their sodium reduction commitments. Finally, this investigation only assessed differences in sodium content and additional exploration of changes in other nutrients such as saturated fat and sugar might also be informative.

5. Conclusion

We could find no evidence that IFBA member commitments to reduce sodium in foods and beverages had any substantive impact in Australia. There is little reason to anticipate effects in other jurisdictions, though comparable studies in other countries are required. Findings for particular companies and selected food categories suggest that sodium reduction is technically possible but more effective implementation strategies will be required to ensure that widespread reduction in sodium levels are achieved - governments need to take leadership and design frameworks that will ensure action by the industry, even if non-mandatory implementation methods are employed.

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Table 1
Companies included and their commitments to sodium reduction.

IFBA[a]	Commitment to sodium reduction	Target date
Coca-Cola	No specific target identified	N/A
Danone	Reduce sodium in savory meals and dishes to ≤ 0.3 g/100 g. All finger foods (biscuits, cookies, rusks, snacks) to have total salt ≤ 0.75 g/100 g	2020
Ferrero	All products to contain less than 150 mg/100 g sodium	Not identified
General Mills	Reduce sodium levels by 5 % or more per serving	Not identified
Kellogg	Reduce sodium levels in 85 % of cereals to less than 150 mg/30 g serving	2020
Mars	20 % reduction of sodium levels in all products	2021
Mondelez	Sodium reduction by 10 % in all products	2020
Nestlé	Sodium reduction by 20 % in all products	2020
PepsiCo	75 % of products not to exceed 1.3 mg of sodium per calorie	2025
Unilever	75 % of all products to have salt levels enabling intakes of 5 g salt per day	2020
Non-IFBA		
Aiia	No specific target identified	N/A
Campbell's	No specific target identified	N/A
Kraft Heinz	No specific target identified	N/A
Lactalis	No specific target identified	N/A
Meiji	No specific target identified	N/A
Suntory	No specific target identified	N/A

[a] International Food and Beverage Alliance. Source: https://ifballiance.org/commitments/product-formulation-and-innovation.

Table 2
Food categories included in the analysis.

Food Category	Number (%)	
	2013 (n = 2465)	2017 (n = 2130)
Sauces, Dressings and Condiments	509 (20.7)	417 (19.5)
Confectionery	383 (15.6)	353 (16.5)
Dairy	273 (11.1)	224 (10.5)
Savoury Snacks	186 (7.6)	163 (7.6)
Soup	186 (7.6)	141 (6.6)
Sweet Biscuits & Snack Bars	183 (7.4)	167 (7.8)
Breakfast Cereals	97 (3.9)	96 (4.5)
Processed Fruit and Vegetables	95 (3.9)	73 (3.4)
Juice	90 (3.7)	78 (3.7)
Ice Cream and Frozen Desserts	77 (3.1)	67 (3.1)
Rice, Pasta and Noodles	73 (3.0)	61 (2.9)
Carbonates	51 (2.1)	38 (1.8)
Sports and Energy Drinks	41 (1.7)	35 (1.6)
Other Hot Drinks	38 (1.5)	23 (1.1)
Ready Meals	37 (1.5)	67 (3.1)
Spreads	36 (1.5)	38 (1.8)
Baked Goods	32 (1.3)	40 (1.9)
RTD[a] Tea	16 (0.6)	10 (0.5)
Bottled Water	9 (0.4)	8 (0.4)
RTD Coffee	3 (0.1)	0
Concentrates	2 (0.1)	3 (0.1)

[a] RTD, Ready to Drink.

Table 3
Mean and median differences in sodium content (mg per 100 g/mL) between 2013 and 2017 for IFBA companies, non-IFBA companies and all companies.

					Difference 2017 to 2013			
			2013	2017	Median	Mean (95 % CI)	Change between 2013 and 2017 (%)	P-value[*,†]
IFBA companies (n = 10)	2013 n = 1603[#]	Mean ± SD	463 ± 906	446 ± 904		−17 (–82, 48)	−3.7	0.612
	2017 n = 1412	Median (IQR)	200 (50–470)	227 (55–465)	27		13.5	0.582
Non-IFBA companies (n = 6)	2013 n = 859	Mean ± SD	411 ± 563	359 ± 537		−52 (-106, 3)	−12.7	0.064
	2017 n = 721	Median (IQR)	290 (59–540)	260 (41–487)	-30		−10.3	**0.002**
All companies (n = 16)	2013 n = 2462	Mean ± SD	445 ± 803	417 ± 800		−28 (–75, 19)	−6.3	0.238
	2017 n = 2133	Median (IQR)	258 (53–490)	244 (52–470)	−14		−5.4	0.150

* Mann-Whitney *U* test or Independent samples *t*-test.
# Represents number of products.
† Nutritionally significant changes were considered in changes that were ± 10 % based on criteria used in comparable studies. Results that are nutritional significant AND statistically significant (P < 0.05) are bolded.

Table 4
Mean and median differences in sodium content (mg per 100 g/mL) between 2013 and 2017 for all products available for each IFBA company.

IFBA Companies			2013	2017	Difference 2017 to 2013 Median	Mean (95 % CI)	Change between 2013 and 2017 (%)	P-value[*,†]
Coca-Cola	2013 n = 101[#]	Mean ± SD	12 ± 16	12 ± 14		0 (-4, 5)	0	0.943
	2017 n = 66	Median (IQR)	6 (3–11)	6 (5–13)	0		0	0.377
Danone	2013 n = 7	Mean ± SD	75 ± 5	50 ± 31		−25 (–50, 1)	−33.3	0.059
	2017 n = 8	Median (IQR)	77 (68–77)	66 (17–69)	−11		−14.3	**0.004**
Ferrero	2013 n = 15	Mean ± SD	61 ± 44	69 ± 63		7 (-31, 46)	13.1	0.705
	2017 n = 20	Median (IQR)	38 (33–113)	51 (11–117)	13		34.2	0.831
General Mills	2013 n = 66	Mean ± SD	383 ± 201	433 ± 280		49 (–27, 126)	13.1	0.205
	2017 n = 189	Median (IQR)	355 (245–482)	336 (256–537)	−19		−5.4	0.875
Kellogg	2013 n = 82	Mean ± SD	316 ± 202	289 ± 168		−27 (–86, 31)	−8.5	0.357
	2017 n = 77	Median (IQR)	275 (178–466)	260 (193–360)	−15		−5.5	0.480
Mars	2013 n = 273	Mean ± SD	630 ± 907	525 ± 721		−105 (-247,36)	−16.7	0.145
	2017 n = 249	Median (IQR)	380 (66–888)	350 (65–765)	−30		−7.9	0.253
Mondelez	2013 n = 263	Mean ± SD	188 ± 253	194 ± 237		6 (-37, 50)	3.2	0.782
	2017 n = 233	Median (IQR)	81 (50–224)	77 (50–263)	−4		−4.9	0.958
Nestlé	2013 n = 368	Mean ± SD	565 ± 1370	568 ± 1520		3 (-221, 227)	0.5	0.981
	2017 n = 278	Median (IQR)	94 (46–290)	97 (44–245)	3		3.2	0.673
PepsiCo	2013 n = 152	Mean ± SD	550 ± 508	505 ± 367		−45 (–146, 57)	−8.2	0. 387
	2017 n = 141	Median (IQR)	494 (300–610)	475 (389–576)	−19		−3.8	0.858
Unilever	2013 n = 276	Mean ± SD	636 ± 996	646 ± 1087		9 (-169, 188)	1.6	0.917
	2017 n = 251	Median (IQR)	340 (106–610)	290 (90–595)	−50		−14.7	0.156
SUBTOTAL	2013 n = 1603	Mean ± SD	463 ± 906	446 ± 904		−17 (–82, 48)	−3.7	0.612
	2017 n = 1412	Median (IQR)	200 (50–470)	227 (55–465)	27		13.5	0.582

* Mann-Whitney *U* test or Independent Samples *t*-test. P < 0.05 considered statistically significant. #Represents number of products.
† Nutritionally significant changes were considered in changes that were ± 10 % based on criteria used in comparable studies. Results that are nutritional significant AND statistically significant (P < 0.05) are bolded.

Table 5
Mean and median differences in sodium content (mg per 100 g/mL) between 2013 and 2017 for all products available for each non-IFBA company.

Non-IFBA Companies			2013	2017	Difference 2017 to 2013 Median	Mean (95 % CI)	Change between 2013 and 2017 (%)	P-value[*,†]
Arla	2013 n = 17[#]	Mean ± SD	553 ± 394	668 ± 419		115 (–160, 392)	20.8	0.402
	2017 n = 19	Median (IQR)	600 (335–670)	600 (360–1200)	0		0.0	0.531
Campbell's	2013 n = 265	Mean ± SD	392 ± 278	377 ± 230		−15 (–61, 31)	−3.8	0.524
	2017 n = 207	Median (IQR)	295 (237–498)	292 (241–490)	−3		−1.0	0.999
Kraft Heinz	2013 n = 344	Mean ± SD	421 ± 592	325 ± 590		−96 (–187, –4)	−22.8	**0.041**
	2017 n = 301	Median (IQR)	290 (10–486)	210 (4–363)	−80		−27.6	**< 0.001**
Lactalis	2013 n = 124	Mean ± SD	214 ± 385	165 ± 332		−49 (–144,45)	−22.9	0.301
	2017 n = 105	Median (IQR)	61 (53–80)	58 (41–71)	−3		−4.9	0.107
Meiji	2013 n = 3	Mean ± SD	342 ± 26	290 ± 1		−52 (–115, 10)	−15.2	0.076
	2017 n = 2	Median (IQR)	328 (325-N/A)[~]	290 (289-N/A)	−38		−11.6	0.200
Suntory	2013 n = 106	Mean ± SD	632 ± 978	601 ± 880		−32 (–299, 235)	−4.9	0.815
	2017 n = 87	Median (IQR)	524 (85–701)	510 (101–655)	−14		−2.7	0.861
SUBTOTAL	2013 n = 859	Mean ± SD	411 ± 563	359 ± 537		−52 (–106, 3)	−12.7	0.064
	2017 n = 721	Median (IQR)	290 (59–540)	260 (41–487)	−30		−10.3	**0.002**

* Mann-Whitney *U* test or Independent Samples *t*-test. P < 0.05 considered statistically significant.
# Represents number of products.
~ N/A, value not generated due to the low number of products.
† Nutritionally significant changes were considered in changes that were ± 10 % based on criteria used in comparable studies. Results that are nutritional significant AND statistically significant (P < 0.05) are bolded.

Table 6
Mean difference of sodium content (mg per 100 g/mL) between 2013 and 2017 for products by food category.

Category#			2013	2017	Difference 2017-2013 Median	Mean (95 % CI)	Change between 2013 and 2017 (%)	P-value*†
Baked Goods	2013 n = 32"	Mean ± SD	428 ± 240	429 ± 236		1 (-112, 113)	0.2	0.991
	2017 n = 40	Median (IQR)	419 (200–629)	418 (206–569)	−1		−0.2	0.932
Breakfast Cereals	2013 n = 97	Mean ± SD	195 ± 179	186 ± 159		−9 (–56, 39)	−4.6	0.720
	2017 n = 96	Median (IQR)	170 (30–322)	170 (30–304)	0		0	0.891
Carbonates	2013 n = 51	Mean ± SD	8 ± 8	9 ± 6		1 (-3, 3)	12.5	0.867
	2017 n = 38	Median (IQR)	6 (1–12)	8 (5–10)	2		33.3	0.557
Confectionery	2013 n = 383	Mean ± SD	84 ± 96	83 ± 86		−2 (–15, 12)	−1.2	0.805
	2017 n = 353	Median (IQR)	75 (24–102)	68 (25–106)	−6		−9.3	0.655
Dairy	2013 n = 273	Mean ± SD	336 ± 473	296 ± 416		−42 (–121, 38)	−11.9	0.303
	2017 n = 224	Median (IQR)	71 (54–360)	70 (47–360)	−1		−1.4	0.251
Ice Cream and Frozen Desserts	2013 n = 77	Mean ± SD	61 ± 40	58 ± 38		−3 (-16, 10)	−4.9	0.681
	2017 n = 67	Median (IQR)	57 (41–74)	55 (35–75)	−2		−3.5	0.847
Juice	2013 n = 90	Mean ± SD	18 ± 44	19 ± 54		1 (-13, 17)	5.6	0.822
	2017 n = 78	Median (IQR)	8 (5–15)	4 (1–67	−4		−50.0	**< 0.001**
Other Hot Drinks	2013 n = 38	Mean ± SD	47 ± 50	64 ± 59		17 (–11, 45)	36.2	0.231
	2017 n = 23	Median (IQR)	40 (12–51)	49 (43–70)	9		22.5	0.090
Processed Fruit and Vegetables	2013 n = 95	Mean ± SD	122 ± 158	109 ± 153		−13 (-61, 35)	−10.7	0.595
	2017 n = 73	Median (IQR)	10 (5-300)	7 (5–243)	−3		−30.0	0.446
Processed Meat/ Seafood	2013 n = 45	Mean ± SD	414 ± 174	279 ± 239		−136 (–236, –35)	−32.6	**0.009**
	2017 n = 31	Median (IQR)	390 (305–482)	300 (21–470)	−90		−23.1	**0.018**
Ready Meals	2013 n = 37	Mean ± SD	714 ± 291	565 ± 337		−147 (–273, –20)	−20.9	**0.024**
	2017 n = 67	Median (IQR)	705 (375–940)	415 (275–900)	−290		−41.1	**0.018**
Rice, Pasta and Noodles	2013 n = 73	Mean ± SD	358 ± 310	286 ± 190		−72 (–158, 15)	−20.1	0.103
	2017 n = 61	Median (IQR)	310 (221–394)	260 (210–329)	−50		−16.1	0.107
RTD Tea	2013 n = 16	Mean ± SD	12 ± 14	9 ± 3		−3 (–13, 6)	−25.0	0.491
	2017 n = 10	Median (IQR)	5 (5-12)	10 (6–11)	5		100.0	0.484
Sauces, Dressings and Condiments	2013 n = 509	Mean ± SD	1165 ± 1411	1144 ± 1480		−22 (–209, 166)	−1.8	0.821
	2017 n = 417	Median (IQR)	622 (413–1200)	601 (409–1072)	−21		−3.4	0.457
Savoury Snacks	2013 n = 186	Mean ± SD	764 ± 410	633 ± 307		−130 (–206, –55)	−17.1	**0.001**
	2017 n = 163	Median (IQR)	670 (518–867)	551 (472–757)	−119		−17.1	**< 0.001**
Soup	2013 n = 186	Mean ± SD	340 ± 461	284 ± 66		−9 (–22, 4)	−16.5	0.172
	2017 n = 141	Median (IQR)	294 (271–320)	284 (260–290)	−10		−3.4	< 0.001
Sports and Energy Drinks	2013 n = 41	Mean ± SD	47 ± 22	47 ± 21		0 (-10, 10)	0	0.990
	2017 n = 35	Median (IQR)	51 (30–54)	51 (28–51)	0		0	0.632
Spreads	2013 n = 36	Mean ± SD	381 ± 992	461 ± 1057		80 (-395, 556)	21.0	0.738
	2017 n = 38	Median (IQR)	10 (10–348)	38 (10–361)	28		280.0	0.136
Sweet Biscuits & Snack Bars	2013 n = 183	Mean ± SD	227 ± 125	242 ± 185		−15 (–19, 48)	6.6	0.390
	2017 n = 167	Median (IQR)	219 (140–321)	205 (112–319)	−14		−6.4	0.750
Total	2013 n = 2462	Mean ± SD	445 ± 803	417 ± 800		−28 (-74, 18)	−6.3	0.236
	2017 n = 2134	Median (IQR)	258 (53–490)	243 (52–470)	−15		−5.8	0.149

#Categories included if they had more than 10 products in both 2013 and 2017. *Mann-Whitney *U* test or Independent samples *t*-test. "Represents number of products. †Nutritionally significant changes were considered in changes that were ± 10 % based on criteria used in comparable studies. Results that are nutritional significant AND statistically significant ($P < 0.05$) are bolded. RTD, Ready to Drink.

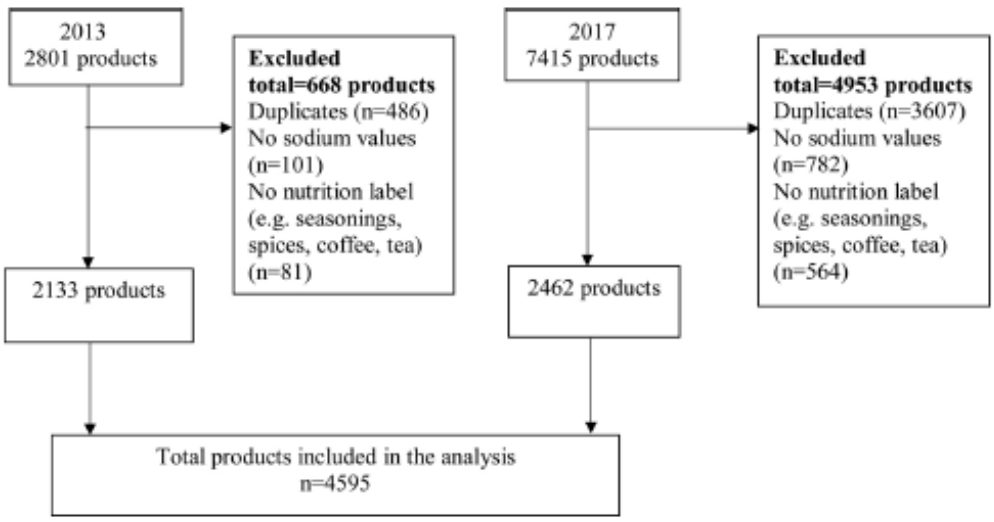

Fig. 1. Flow diagram showing the products that were included in the analysis.

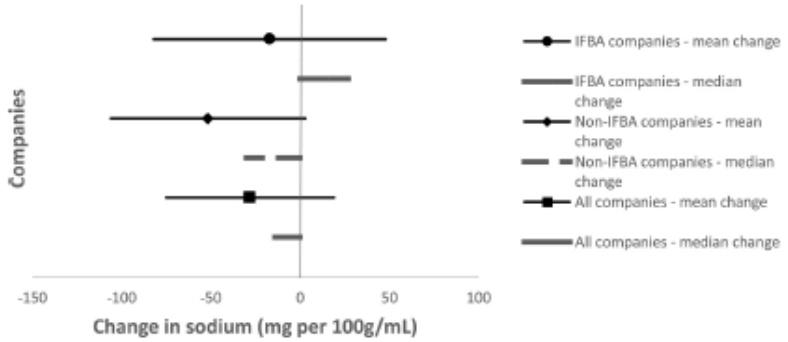

Fig. 2. Forest plot of effect size of sodium content between 2013 and 2017 in all companies. Grey boxes extend from line of unity to median difference. Black lines are centred at mean difference with horizontal line extending to 95 % confidence intervals.

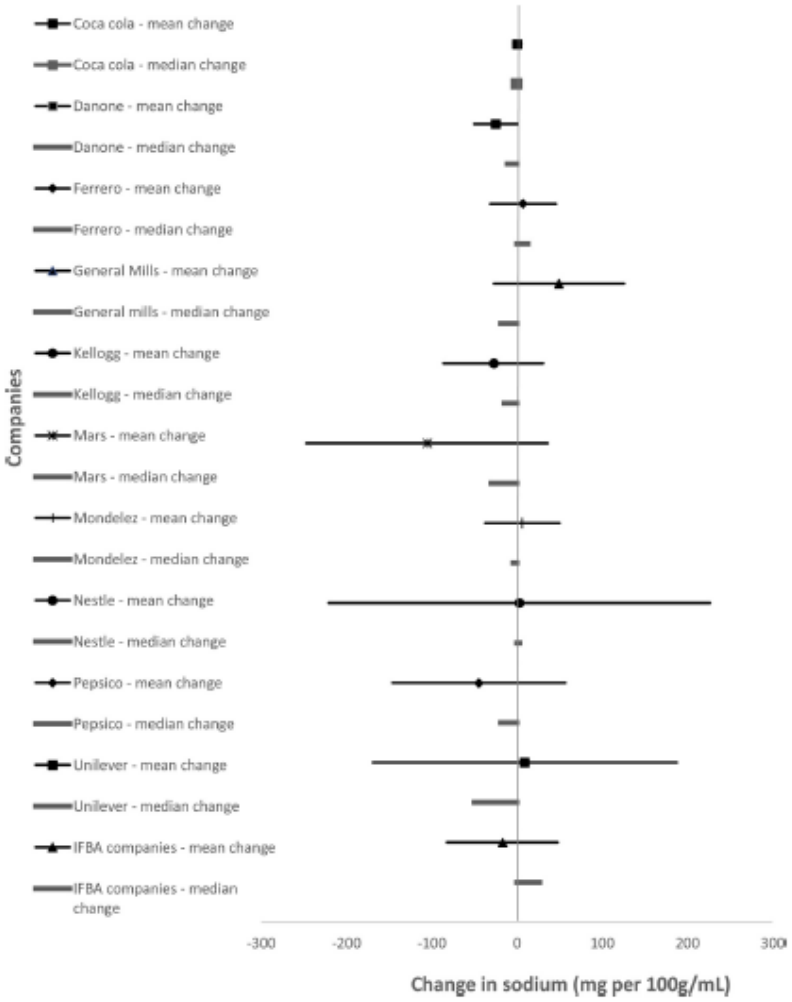

Fig. 3. Forest plot of effect size of sodium content between 2013 and 2017 in IFBA companies. Grey boxes extend from line of unity to median difference. Black lines are centred at mean difference with horizontal line extending to 95 % confidence intervals.

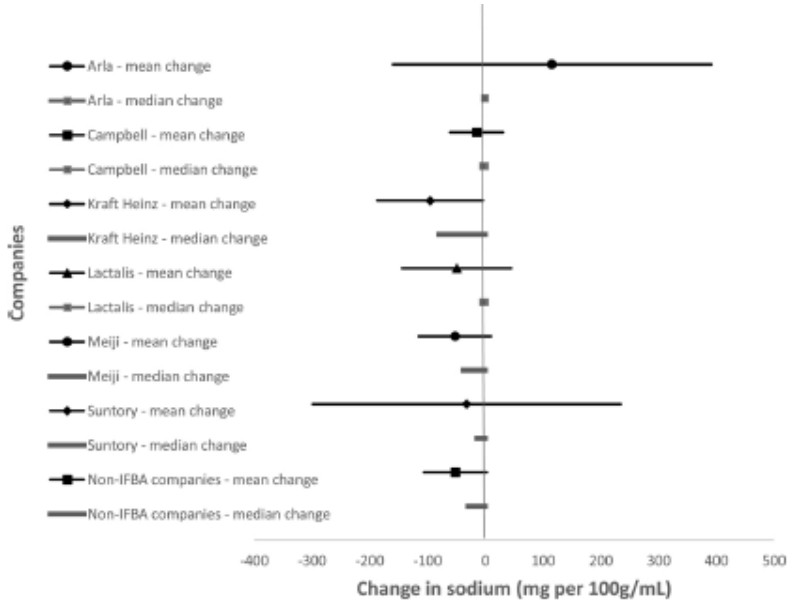

Fig. 4. Forest plot of effect size of sodium content between 2013 and 2017 in non-IFBA companies. Grey boxes extend from line of unity to median difference. Black lines are centred at mean difference with horizontal line extending to 95 % confidence intervals.

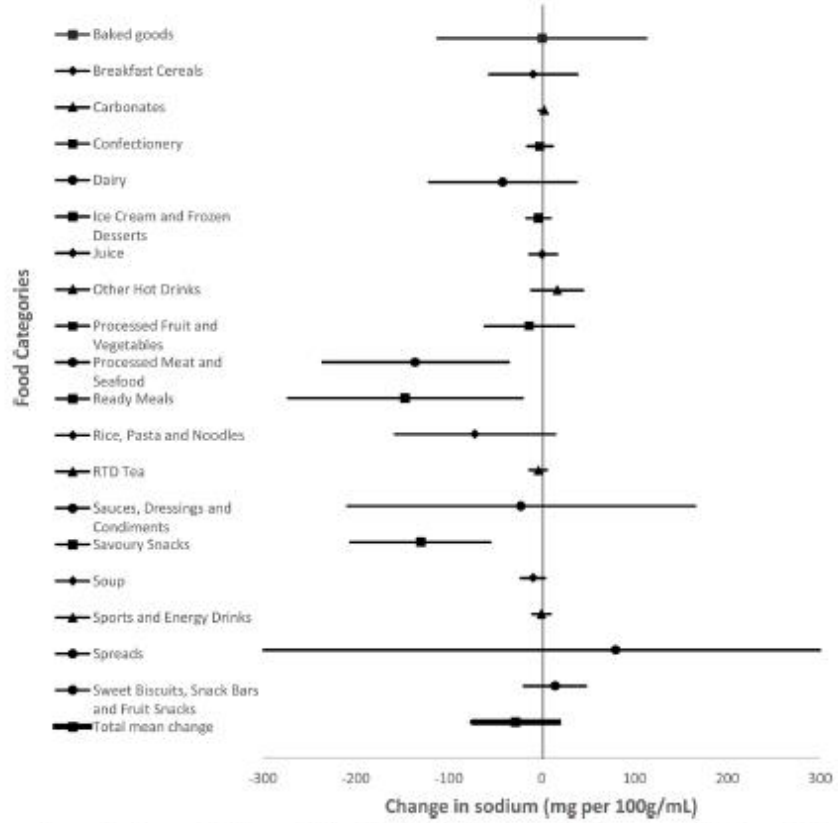

Fig. 5. Forest plot of mean change of sodium content between 2013 and 2017 in food categories. The lines are centred at mean difference with horizontal line extending to 95 % confidence intervals.

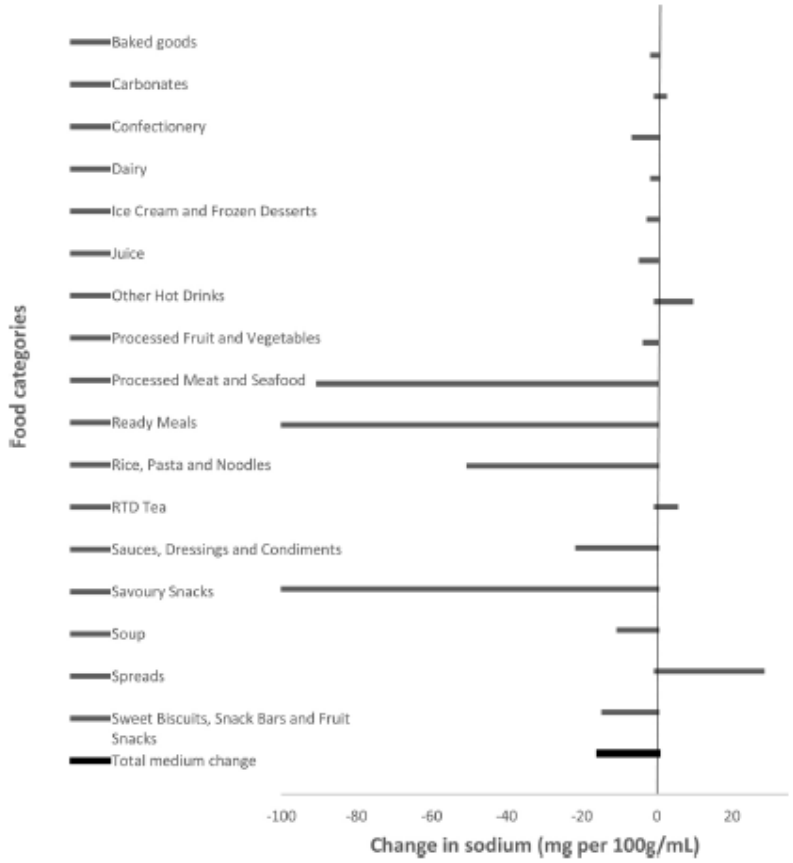

Fig. 6. Forest plot of median change of sodium content between 2013 and 2017 in all companies. The boxes extend from line of unity to median difference.