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Introduction
Cardiovascular disease (CVD) remains the leading cause of mortality, responsible for one third of all deaths worldwide [1]. In Australia, about one third of the adult population has been diagnosed with high blood pressure, a main risk factor for CVD, contributing to 32% of total mortality [1, 2]. Sodium is the chemical element responsible for maintaining and regulating blood volume and pressure, in addition to other physiological functions. However, research has shown that over-consumption of sodium, most commonly in the form of sodium chloride, or salt, causes blood pressure to increase [2, 3]. Reducing salt intake is an effective way to lower blood pressure, and has become a priority for curbing the high burden of non-communicable diseases (NCDs) such as CVD. In 2006, the World Health Organization (WHO) set a global target of reducing population salt intake to below 5g/day [4]. In 2013, WHO Member States, including Australia, adopted a global target to reduce mean population salt intake by 30% by 2025 [5].

In Australia, the mean salt intake for adults is approximately 9g/day, nearly twice the WHO recommended target [2]. Nation-wide salt reduction efforts began with the creation of the Food and Health Dialogue (FHD) in 2009, succeeded by the Healthy Food Partnership (HFP) in 2016, identifying nine priority food categories for product reformulation and setting voluntary targets to reduce sodium content in the food supply [6]. In 2015, The Victorian Health Promotion Foundation (VicHealth) formed a partnership with the George Institute for Global Health and the Heart Foundation, creating a taskforce to inform, implement, and evaluate salt reduction initiatives throughout the country.

Changes in sodium levels of Asian style sauces in Australia (2010-2018)

November 2018

Tips for consumers
• Be aware of portion size and try to use sparingly.
• Use natural, no-salt flavourings such as lemon, and herbs and spice including fresh garlic, chilli, ginger and vinegar when preparing Asian style meals.
• Choose 'reduced salt' product and check the label to choose the lower sodium option.
• There is also an app to help make healthier choice. Download the FoodSwitch app, which allows you to scan the barcode of the product and gives you instant, easy to understand nutrition information about the product, and suggest healthier alternatives.

Making it easier than ever before to navigate supermarket shelves and improve food choices.
There's even a SaltSwitch filter to focus on products lower in salt.

App available at: www.foodswitch.com.au

The goal of the Partnership was to reduce population salt intake in Victoria by 1g/day by June 2018 through a combination of consumer and industry reformulation strategies[7]. Previous reports by the Partnership have been conducted to analyse sodium levels across food categories which are commonly consumed and considered high in salt [8]. Sauces and condiments, including Asian style sauces, are considered high sodium products. According to the Australian Health Survey 2011-2012, 40.1% of people surveyed consumed sauces, dips and condiments [9]. In addition, recent market research has indicated a 3% increase in retail value sales of sauces, dressings and condiments in Australia in 2017 [10]. Given the rising popularity of sauces, there is a need to evaluate the current sodium content of these products to inform consumers of the hidden salt in their food, and advise manufacturers on opportunities for reformulation.
As part of the VicHealth Salt Partnership, the aim of this project is to assess current mean sodium levels in Asian style sauces in main supermarkets in Australia, and to track changes in sodium content between 2010, 2013, 2015 and 2018. Although sodium targets for sauces have not been set in Australia, an analysis of compliance with targets set by AWASH (Australian Division of World Action on Salt and Health) was performed to determine how many products meet these targets [11, 12].

**Methods**

**Data Collection**

Food product data was collected in 2018 from four major supermarkets in Australia: Coles, Woolworths, SUPA IGA and Aldi, located in Sydney, NSW. Images of targeted products were recorded, and only items with labelled product and nutrition information were included, including brand name, product name, manufacturer, package size, serving size, and sodium content (per serving, and per 100 g/100mL). The same products available in different pack sizes were recorded as separate entries. For a comparative analysis, product data for years 2010, 2013, and 2015 was extracted from the Australian FoodSwitch database.

**Data Categorisation and product exclusion**

Three main categories of Asian style sauce products were analysed, including soy sauce, fish sauce, and oyster sauce. Products with missing or erroneous information, and duplicate items found in multiple stores, were excluded. All marinades and stir-fry sauces, hoisin sauces, flavoured and sweet soy sauces (including kecap manis), and dipping sauces (e.g. Vietnamese spring roll dipping sauce) were excluded from analysis.

**Analysis**

The total number of products and products per category were recorded. The mean sodium content per 100mL food and range of sodium levels, were determined for all Asian style sauces and each category and presented in mg/100mL and grams of salt. Trends in mean sodium levels between 2010, 2013, 2015 and 2018 were determined. The proportion of products meeting the AWASH salt targets [12, 13] were determined for each category.

Statistical analyses were conducted in Stata 15 [14]. Alpha was set at a 0.05 significance level. One-way ANOVA (post-hoc Scheffe) were performed to compare mean sodium content across the years.

**Key Findings:**

- 157 Asian style sauce products were analysed from 2010-2018, categorized as fish sauce, oyster sauce, and soy sauce.
- 17 products were included in the analysis for 2010, 46 products in 2013, 43 products in 2015, and 51 products in 2018.
- There were no significant changes in the average sodium content of Asian style sauces overall or any of the categories of Asian style sauces between 2010-2018.
- The average sodium content of Asian style sauces in 2018 was 5859mg/100mL [14.7g salt]; (range 1803-10882mg/100mL) [4.5-27.2g salt]
  - Per serving: average 869 mg of sodium [2.2g salt], or 43% recommended daily salt intake
  - Per tablespoon: average 1171mg of sodium [2.9g salt], or 59% of recommended daily salt intake
  - *To convert milligrams of sodium to grams of salt, multiply sodium by 2.5, then divide by 1,000: mg sodium x 2.5 = mg salt/1,000*
  - The largest range in sodium content was found in soy sauces from 3808-8762 mg/100mL [9.5-21.9g salt], followed by oyster sauces 1803-4770 mg/100mL [4.5-11.9g salt], and fish sauces 7992-10882 mg/100mL [19.9-27.2g salt].
  - Serving size ranged from 5mL (1 teaspoon) – 20mL (1 tablespoon)
  - The average serving size for fish sauce was 16mL (15-20mL); oyster sauce 13mL (10-15mL) and 21g (15-37.5g); and soy sauce 14mL (5-20mL)

**Asian style sauces by subcategory**

**Fish sauce**

- Fish sauce had the highest average sodium content of 9637 mg/100mL [24.1g salt]
  - Per serving: average 1530 mg of sodium [3.8g salt], or 77% recommended daily salt intake
  - Per tablespoon: average 1927 mg of sodium [4.8g salt], or 96% recommended daily salt intake

- Highest sodium content was found in Ayam Fish Sauce; 10,882 mg/100mL [27.2g salt]
  - Per serving: 1632 mg of sodium [4.1g salt], or 81% recommended daily salt intake
  - Per tablespoon: 2176 mg of sodium [5.4g salt], or 108% recommended daily salt intake

- Lowest sodium content was found in Squid Brand Fish Sauce; 7992 mg/100mL [19.9g salt]
  - Per serving: 1199 mg of sodium [3.0 g salt], or 60% recommended daily salt intake
  - Per tablespoon: 1598 mg of sodium [4.0g salt], or 79% recommended daily salt intake

**Soy sauce**

- Soy sauces had an average sodium content of 6148 mg/100mL [15.4g salt]
  - Per serving: average 876 mg of sodium [2.2g salt], or 44% recommended daily salt intake
  - Per tablespoon: average 1229 mg of sodium [3.1g salt], or 61% recommended daily salt intake

- Highest sodium content was found in Chang’s Light Soy Sauce; 8762 mg/100mL [21.9g salt]
  - Per serving: 1752 mg of sodium [4.4g salt], or 87% recommended daily salt intake

Changes in the sodium levels of Asian style sauces in Australia (2010-2018)
The George Institute for Global Health
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• Lowest sodium content was found in Kikkoman Naturally Brewed Less Salt Soy Sauce; 3808 mg/100 mL [9.5g salt]
• Per serving: 571 mg of sodium [1.4g salt], or 28% recommended daily salt intake
• Per tablespoon: 762 mg of sodium [1.9g salt], or 38% recommended daily salt intake

Oyster sauce
• Oyster sauces had an average sodium content of 3604 mg/100mL [9.0g salt]
• Per serving: average 570 mg of sodium [1.4g salt], or 28% recommended daily salt intake
• Per tablespoon: average 721 mg of sodium [1.8g salt], or 36% recommended daily salt intake

• Highest sodium content was found in Asia Specialties Oyster Sauce; 4770 mg/100mL [11.9g salt]
• Per serving: 978 mg of sodium [2.4g salt], or 48% recommended daily salt intake
• Per tablespoon: 954 mg of sodium [2.4g salt], or 47% recommended daily salt intake
• Lowest sodium content was found in Pandaroo Oyster Sauce; 1803 mg/100mL [4.5g salt]
• Per serving: 222 mg of sodium [0.6g salt], or 11% recommended daily salt intake
• Per tablespoon: 361 mg of sodium [0.9g salt], or 18% recommended daily salt intake

Sodium targets
• There are no sodium targets for sauces in Australia. However, comparing current sodium levels of these products to the AWASH target, it was found that:
  • In 2018, 39% percent of Asian style sauces met the AWASH target of 4840 mg/100g
  • By category, 0% of fish sauces, 19% of soy sauces, and 100% of oyster sauces met the target

Recommendations
• Government
  • Establish specific salt targets for Asian style sauces in Australia.
  • Create a regulatory monitoring scheme to assess industry compliance with established salt targets.
  • Increase consumer awareness campaigns to inform about the health benefits of reducing salt intake.
• Industry:
  • Gradually reformulate high salt products to lowest levels of salt possible.
  • Explore opportunities to produce ‘reduced salt’ sauce products

Conclusions
No significant change in the average sodium content of categorized Asian style sauces was observed between 2010-2018. However, the high salt content of these products is apparent, with only 31% of products meeting AWASH targets. The variability of sodium levels within sub-categories and across different brands of products, may mislead consumers’ food choices, and requires greater transparency. However, these findings suggest that reformulation of high-sodium products is achievable. Specific, government established sodium targets for different categories of Asian style sauces can encourage the food industry to reformulate, assisting with national salt reduction efforts.

About the WHO Collaborating Centre on Population Salt Reduction
The WHO Collaborating Centre on Population Salt Reduction (WHO CC SALT) has a global remit with a focus on Australia, the Western Pacific and South East Asian Regions. It is currently involved in projects in Australia, the Pacific islands, Mongolia, Vietnam, Cambodia, Indonesia, China and India. WHO CC SALT is working with the World Health Organization to develop a range of tools and resources to support countries to develop and implement salt reduction strategies. WHO CC SALT is funded through a mixture of short and longer term contracts and research grants including National Health and Medical Research Council project and partnership grants and contract funding from the Victorian Health Foundation and the World Health Organization.

Limitations of the research:
The number of products captured by the FoodSwitch data do not necessarily represent a complete coverage of all products within Australia, but rather those captured at specific time points during surveys, and limited to a subset of food retailers. The data captured and compared is ‘as given on pack’. No distinction has been made between raw and cooked nutrition information in this survey.

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References
### Table 1: Average salt content (sodium mg/100mL; salt g) per subcategory of Asian style sauces, 2010-2018

<table>
<thead>
<tr>
<th>Year</th>
<th>Product count</th>
<th>Mean (Range)</th>
<th>2010: Sodium, mg/100g (Salt, g/100g)</th>
<th>2013: Sodium, mg/100g (Salt, g/100g)</th>
<th>2015: Sodium, mg/100g (Salt, g/100g)</th>
<th>2018: Sodium, mg/100g (Salt, g/100g)</th>
<th>% Change</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian style sauce</td>
<td>17</td>
<td>5330 (13.3)</td>
<td>2951-8689</td>
<td>5487 (13.7)</td>
<td>2550-9115</td>
<td>5475 (13.7)</td>
<td>1803-8762</td>
<td>9%</td>
</tr>
<tr>
<td>Fish sauce</td>
<td>02</td>
<td>6061 (15.2)</td>
<td>3434-8689</td>
<td>7004 (17.5)</td>
<td>4279-9115</td>
<td>6792 (16.9)</td>
<td>4279-7803</td>
<td>55%</td>
</tr>
<tr>
<td>Oyster sauce</td>
<td>05</td>
<td>3505 (8.8)</td>
<td>2951-4377</td>
<td>3619 (9.1)</td>
<td>2550-4918</td>
<td>3508 (8.8)</td>
<td>1803-4443</td>
<td>1%</td>
</tr>
<tr>
<td>Soy sauce</td>
<td>10</td>
<td>6097 (15.2)</td>
<td>3390-7619</td>
<td>5841 (14.6)</td>
<td>3390-8762</td>
<td>6004 (15)</td>
<td>3810-8762</td>
<td>0%</td>
</tr>
</tbody>
</table>

*2010 vs 2018, p<0.05 is significant. ANOVA conducted. No significant results. Difference between 2010 and 2018 and corresponding p-value adjusted for multiple comparison.

### Table 2: Comparison of sodium content in Asian style sauces in 2018 against the AWASH salt target of 4840 mg/100g

<table>
<thead>
<tr>
<th>Asian style sauces</th>
<th>N</th>
<th>N meeting target</th>
<th>Percentage meeting target (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian style sauces</td>
<td>51</td>
<td>16</td>
<td>39%</td>
</tr>
<tr>
<td>Fish sauce</td>
<td>06</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Oyster sauce</td>
<td>14</td>
<td>14</td>
<td>100%</td>
</tr>
<tr>
<td>Soy sauce</td>
<td>31</td>
<td>06</td>
<td>19%</td>
</tr>
</tbody>
</table>

### Table 3: Serve size of Asian style sauces by weight or volume, as specified on product label (g or mL)

<table>
<thead>
<tr>
<th>Asian style sauces</th>
<th>N</th>
<th>Mean salt (g/100g)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish sauce (ml)</td>
<td>06</td>
<td>16 mL</td>
<td>15-20 mL</td>
</tr>
<tr>
<td>Oyster sauce (g)</td>
<td>08</td>
<td>21 g</td>
<td>15-37.5 g</td>
</tr>
<tr>
<td>Oyster sauce (ml)</td>
<td>06</td>
<td>13 mL</td>
<td>10-15 mL</td>
</tr>
<tr>
<td>Soy sauce (ml)</td>
<td>31</td>
<td>14 mL</td>
<td>5-20 mL</td>
</tr>
</tbody>
</table>
## Asian style sauces: Highest and Lowest Sodium Content

November 2018

### Top five Asian sauces with the highest salt content

<table>
<thead>
<tr>
<th>Product Name (including brand)</th>
<th>Manufacturer</th>
<th>Serving Size</th>
<th>Sodium (mg/100g)</th>
<th>Sodium (mg/serve)</th>
<th>Salt (g/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ayam Fish Sauce</td>
<td>A Clouet (Australia) Pty Ltd</td>
<td>15</td>
<td>10882 [27.2]</td>
<td>1632 [4.1]</td>
<td>2176 [5.4]</td>
</tr>
<tr>
<td>Asia Specialities Fish Sauce</td>
<td>Aldi</td>
<td>15</td>
<td>10500 [26.3]</td>
<td>1575 [3.9]</td>
<td>2100 [5.3]</td>
</tr>
<tr>
<td>Chang’s Light Soy Sauce*</td>
<td>Cypress &amp; Sons Pty Ltd</td>
<td>20</td>
<td>8762.9200mg/100g [21.9]</td>
<td>1752 1840mg/serve [4.4]</td>
<td>1752 [4.4]</td>
</tr>
</tbody>
</table>

*Sodium content reported in mg/100g was converted to mg/100mL using an AUSNUT density conversion to maintain consistency in the comparative analysis. Original measures of sodium provided as indicated on label.

### Top 5 Asian sauces with the lowest salt content

<table>
<thead>
<tr>
<th>Product Name (including brand)</th>
<th>Manufacturer</th>
<th>Serving Size</th>
<th>Sodium (mg/100g)</th>
<th>Sodium (mg/serve)</th>
<th>Salt (g/100g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pandaroo Oyster Sauce</td>
<td>Yuen’s Market Trading co.</td>
<td>12</td>
<td>1803 2200 mg/100g [4.5]</td>
<td>216 330 mg/serve [0.5]</td>
<td>361 [0.9]</td>
</tr>
<tr>
<td>Ong’s Oyster Sauce</td>
<td>Oriental Merchant Pty Ltd</td>
<td>15</td>
<td>2550 3111 mg/100g [6.4]</td>
<td>383 560 mg/serve [1.0]</td>
<td>510 [1.3]</td>
</tr>
<tr>
<td>Amoy Oyster Sauce</td>
<td>Amoy Food Ltd</td>
<td>31</td>
<td>3057 3730 mg/100g [7.6]</td>
<td>948 1400 mg/serve [2.4]</td>
<td>611 [1.5]</td>
</tr>
<tr>
<td>Chang’s Original Oyster Sauce</td>
<td>Cypress &amp; Sons Pty Ltd</td>
<td>12</td>
<td>3279 [8.2]</td>
<td>394 [1.0]</td>
<td>656 [1.6]</td>
</tr>
</tbody>
</table>

*Sodium content reported in mg/100g was converted to mg/100mL using an AUSNUT density conversion to maintain consistency in the comparative analysis. Original measures of sodium provided as indicated on label.