

2018

# How healthy are New Zealand food environments?

A comprehensive assessment 2014-2017



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## Report

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THE UNIVERSITY OF  
**AUCKLAND**  
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Benchmarking food environments

**How healthy are New Zealand food environments?  
A comprehensive assessment 2014-2017**

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# Executive Summary

## What is the problem?

New Zealand has the third highest rate of overweight and obesity for adults and children within OECD countries. Dietary risk factors, including high body mass index, are by far the biggest contributor of health loss in New Zealand (18.6%) ahead of smoking as the next largest contributor (9.1%). Unhealthy diets are heavily influenced by unhealthy, obesogenic food environments, which in turn are influenced by the degree to which healthy food policies are implemented. Thus, it is important to closely monitor and benchmark progress on implementing recommended food policies and improving food environments to support and evaluate government and private sector actions to reduce obesity, diet-related non-communicable diseases (NCDs) and their inequalities. No country has yet undertaken a comprehensive, national food environments and policies survey, making this study an international first.

## What did we do?

From 2014 to 2017, we conducted a comprehensive, national food policies and environments study, using INFORMAS methodology. INFORMAS is the International Network for Food and Obesity/NCDs Research, Monitoring and Action Support and it has developed study protocols to measure and benchmark food environments and policies globally. We created the full picture of the healthiness of New Zealand food environments by conducting multiple sub-studies using INFORMAS protocols on: healthy food policy implementation by the Government (in 2014 and 2017); commitments and disclosure of the top 25 food companies to improve population nutrition; food composition (in 13 280 foods); food labelling; food marketing to children (television, websites, magazines, food packages, social media, and in and around schools); food provision (819 schools, 28 hospitals, 70 sport centres); food retail (9674 food outlets in communities nationally and inside 204 supermarkets); and food prices (healthy versus less healthy foods, meals, and diets). We used a range of New Zealand and international systems to classify foods as 'healthier' and 'less healthy' depending on the food environment surveyed.



# What did we find?

## 1. Government implementation of healthy food policies

In 2014 and 2017, public health experts (n=56 and 71 respectively) rated the extent of implementation of 23 policy and 24 infrastructure support good practice indicators compared to international best practice. Overall implementation scores were moderate at 43% in 2014 and 48% in 2017. Priority recommendations from the 2017 experts for the Government were:

- **Food composition:** Set targets for nutrients of concern (sodium, saturated fat, sugar)
- **Food labeling:** Strengthen the Health Star Rating System (HSR) and make it mandatory
- **Food marketing:** Regulate unhealthy food marketing to children in all media
- **Food prices:** Implement a 20% tax on sugary drinks
- **Food provision:** Ensure healthy foods in schools and early childhood education centres
- **Leadership:**
  - Strengthen the child obesity plan;
  - Set a target for reducing child obesity;
  - Set targets for intake of nutrients of concern (sodium, saturated fat, sugar);
  - Translate Eating Guidelines in the social, environment and cultural contexts
- **Monitoring:** Conduct a new national children's nutrition survey
- **Funding:** Increase population nutrition promotion funding to at least 10% of health care and productivity costs of overweight and obesity.

## 2. Food company commitments to improving population nutrition

The comprehensiveness and transparency of commitments of the 25 largest NZ food companies (supermarkets, food and beverage manufacturers, quick service restaurants) was assessed. There was a wide range of scores from 0% to 75% with the top five being Nestlé, Fonterra, Coca-Cola, Mars, and Unilever. The bottom five were Goodman Fielder, Hellers, Griffin's Foods, Pita Pit and Domino's. Insufficient commitments on food reformulation and restricting marketing to children and young people were prominent.

## 3. Composition of packaged foods

Analyses of over 13,000 NZ packaged foods (2014-2016) showed that 83% were classified as ultra-processed (industrially processed from multiple food-derived ingredients and additives), 71% were classified as not suitable for marketing to children using WHO-Europe nutrient criteria, and 59% had a HSR of <3.5 stars. Overall, the composition of packaged foods is relatively unhealthy.

## 4. Labelling of packaged foods

The HSR labelling system was introduced in June 2014, but by March 2016, only 5% of products carried the HSR label. Those that displayed the HSR label were healthier (median HSR of 4 stars) than those which did not show the label (2.5 stars). Over one third (35%) of all products carried nutrition claims (45% on healthier foods, 26% on less healthy foods) and 15% carried a health claim (23% on healthier foods and 7% on less healthy foods). Almost all (96%) breakfast cereal products displayed a claim with an average of four claims per product. There has been slow uptake of the HSR by companies, yet nutrition claims promoting the "healthiness" of products are widespread, even on less healthy products.

## 5. Unhealthy food marketing to children

### Television

Average of 8.0 unhealthy food ads per hour during child peak viewing times (6-9pm).

### Magazines

43% of branded food references in teen magazines were for unhealthy foods.

### Company websites

18.6% of food company websites had a designated children's section.

### Company Facebook pages

Popular fast food and packaged food brands used promotional strategies (41% of posts) and premium offers (34% of posts) as marketing techniques to appeal to children and adolescents.

### Sports sponsorship

9.6% of the sponsors of clubs for popular children's sports were food or beverage companies.

## Food packages

Of the 21% of breakfast cereals displaying promotional characters, 48% were for 'cereals for kids', and of those, 72% featured on 'less healthy' cereals.

## Around schools

A median of 9 ads for unhealthy foods per km<sup>2</sup> around schools.

## Overall

Overall, children were targeted for promotions for unhealthy foods through all media channels showing the failure of the self-regulatory system in place to protect children and young people.

## 6. Food provision in settings

### Schools

Only 40% of schools had a written food policy and these policies had very low strength scores (average 3%) and comprehensiveness scores (average 16%); 42% of schools sold sugar-sweetened beverages; 68% of primary/intermediate schools and 23% of secondary schools reported being water/milk only schools; 96.5% of schools used unhealthy foods for fundraising; 58% of schools participated in food provision programs (e.g. fruit in schools) and 52% participated in nutrition programs (e.g. Health Promoting Schools). There is substantial scope to improve school food policies and practices for healthier school food environments.

### Hospitals

All District Health Boards (DHBs) committed to remove sugar-sweetened beverages by January 2016 from their hospitals and premises and to develop healthy food service policies. An analysis of DHB policies in 2017 found an average strength score of 58% and comprehensiveness score of 70%. DHBs are on a strong path to improve their food environments, but on average, 54% of all foods offered were classified as unhealthy. Differing contractual arrangements for food provision on their premises created some heterogeneity in progress.

### Other

53% of sport and recreation centres sold sugar-sweetened beverages. In 74% of non-chain fast food and takeaway outlets, over half the beverages for sale were sugar-sweetened.

## Government food policies

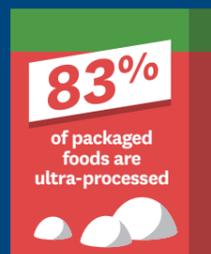
- Health claims regulations
- Government transparency
- Monitoring Systems for obesity & NCDs
- Fiscal policies
- Local zoning laws
- Nutrition impact of trade policies

## Local nutrition policies



95% of District Health Boards have a written nutrition policy  
40% of schools reported they have a written nutrition policy

## Food supply



34% is the median score for food company commitments to healthy reformulation of products

## Retail food environments



25% of promotions in supermarket flyers are for junk foods and drinks



Two-thirds of food promotions in takeaway outlets are for unhealthy food and meals



In supermarkets, for every 1m of shelf of unhealthy food there is 0.4m of healthy food (using indicators of healthy and unhealthy food). In the most deprived areas this is 0.38m and 0.44m in least deprived areas.

## Food labelling

26% of less healthy packaged foods have a nutrition claim on the front-of-pack



2.5 Median HSR if NOT shown on label

4 Median HSR if shown on label

Less healthy foods are less likely to carry a Health Star Rating (HSR) on the label

## Cost of diets



36% of the cost of the current NZ diet is for unhealthy food and drinks

While, on average, current, less healthy diets tend to be cheaper than healthy diets, there was a lot of variation of costs

## Food prices

Price increases over 10 years were similar for healthy foods (20.2%) and unhealthy foods (20.6%)



## Food marketing to children

8 ads per hour for unhealthy foods on TV during children's peak viewing times

8 ADS PER HOUR for unhealthy foods

72% of less healthy breakfast cereals for kids displayed a promotional character appealing to children



9 ads for unhealthy foods per km<sup>2</sup> around schools with more around schools in most deprived areas (10) than least deprived areas (8.3)

## Most deprived schools

10 unhealthy food ads within 500 m

## Least deprived schools

8.3 unhealthy food ads within 500 m

There are 13.7 fast food and takeaway outlets per 10 000 people in the most deprived areas and 3.7 in the least deprived areas

53% of sport and recreation centres sell sugar-sweetened beverages



There are 12.7 convenience stores per 10 000 people in the most deprived areas and 4.5 in the least deprived areas

There are 2.4 convenience stores and takeaway outlets within 500 m of urban schools with more around the most deprived schools (2.4) than the least deprived schools (1.8)

## School food environments

Two-fifths of schools sell sugar sweetened beverages. More of the least deprived schools (44%) sell sugar-sweetened drinks than the most deprived schools (34%).



## 7. Food retail within communities and inside supermarkets

### Communities

The mean density (outlets/10,000 people) of all food outlets was higher in the most deprived communities than the least deprived, including supermarkets and fruit/vegetable shops (3.9 vs 1.3), fast food outlets (13.7 vs 3.7) and convenience stores (12.7 vs 4.5). There were 14% more potential 'food swamps' (high relative density of unhealthy food outlets) in the most deprived areas compared to the least deprived. 47% of urban schools had a convenience store and 38% had a fast food or takeaway outlet within 500m of the school, with higher numbers around the most deprived schools. People living in more deprived communities had food environments which were substantially more obesogenic compared to less deprived communities.

### Supermarkets

Only 27% of supermarkets had at least 20% of checkouts free of 'junk' food placements. In the weekly flyers, 25% of promotions were for 'junk' foods, and 53% of end-cap (end of aisle) promotions were for 'junk' foods. The length of shelf space allocated to sets of unhealthy and healthy indicator foods showed an overall ratio of 0.42 (1m of unhealthy to 0.42m healthy indicator foods). In more deprived areas, the shelf length ratio was more weighted towards unhealthy foods (0.38) than in less deprived areas (0.44). While supermarkets are the major source of healthy food for most people, the in-store placements and promotions still favour the unhealthy food and beverages.

## 8. Cost of healthier versus less healthy foods, meals and diets

### Foods

The prices of healthier and less healthy foods have increased in parallel over 10 years.

### Meals

The dollar price of takeaway meals for a family of four was higher than the equivalent home-cooked (from scratch) or home-assembled (from pre-prepared ingredients) meals by an average of \$8.50 and \$8.20 respectively. Even with the time taken to prepare meals at home accounted for, the takeaway meals remained more expensive on average.

### Diets

The average cost of diets which reflect the current New Zealand diet was somewhat cheaper than healthy diets which meet the dietary guidelines (by about \$13.50 per week for a family of four). However, there was considerable overlap in costs whereby many variations of healthy diets were comparable in costs with the average cost of the current diet. Both current and healthy diets were relatively unaffordable for families on income support or on the minimum wage where food is about half and a third, respectively, of the household budget.

### Overall

Overall, healthy meals and diets can be constructed for a similar cost as takeaways and the current diet, but food in general is relatively unaffordable for those on low incomes.

## 9. How equitable is access to healthy food environments?

Several indicators within the food environments studies were analysed to address this issue.

As already noted above, more deprived communities had a far greater density of all food outlets but especially unhealthy food outlets. In addition, lower decile schools (more deprived) had more unhealthy food outlets and advertisements for unhealthy foods within 500m of the school compared to higher decile (less deprived) schools.

Supermarkets in more deprived areas also devoted more shelf space to unhealthy foods. The cost differentials between current versus healthy diets were similar for Māori and Pacific families as the general population, although with greater variability depending on the amount of gathered and gifted food and the frequency of takeaways included in the analyses. Overall, obesogenic food environments are much worse for those living in more deprived areas or communities.

# Summary

These studies have shown that New Zealand's food environments, especially children's environments, are largely unhealthy, and policy implementation is low. The Government is not at the level of international best practice for most of the recommended food policies, although infrastructure support systems for policy development and implementation were rated reasonably well. Food industry commitments are relatively weak with median scores for all policy domains, except nutrition strategy and food labelling, being below 50%. More than half of the packaged food supply is in the unhealthy or less healthy range and the implementation of the HSR labelling is still low (5% in 2016) and mainly on the more healthy products. Children and young people are exposed to considerable marketing of unhealthy foods through all media channels. Less than half of all schools have nutrition policies, and existing policies are weak and not very comprehensive. Nutrition policies of DHBs are much stronger and more comprehensive. DHBs are displaying some leadership in the provision of healthy food choices. While the yearly rate of change between prices of healthier and less healthy foods was not significantly different, food prices significantly increased over a 10-year period. Healthy diets were on average more expensive than current diets but both diets were unaffordable for those on low incomes. The food retail environment is relatively obesogenic, especially in more deprived areas. Substantial inequalities in access to healthy food environments were evident across multiple indicators.

## Implications

This comprehensive, national assessment of food environments and policies is an international first. It has provided a detailed and coherent picture of New Zealand's greatest determinant of health loss. The implications from this study are several-fold.

- The reasons for New Zealand having very high rates of obesity and having unhealthy diets as the largest contributor to death and disease is obvious from the unhealthy state of the food environments within which people are making their food choices.
- Food environment inequalities, whereby people in the most deprived communities are facing the most obesogenic environments, is an undoubted driver of the well-known health inequalities for diet-related chronic diseases.
- The major players who dictate the nature of food environments, i.e. the government and major food companies, have considerable scope for lifting their efforts to create healthier food environments.
- The prioritised recommendations for government action from the participating experts in the Food-EPI sub-study and the company-specific recommendations to food companies from the BIA-Obesity sub-study are the obvious places to start to improve food environments.
- Ongoing monitoring of food environments is essential to: strengthen accountability mechanisms around the food policies and action of government and food companies; evaluate the impact of policies and actions, and; measure progress towards less obesogenic environments.

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## Publications from this study

Vandevijvere S, Molloy J, Nattrass H, Swinburn B. *Unhealthy food marketing around New Zealand schools: A national study*. Under Review

Vandevijvere S, Kidd B, McCarrroll R, Bennett E, Tawfiq E, Molloy J, Swinburn B. *Nutrition policies and environments in New Zealand hospitals: An assessment in anticipation of the implementation of the National Healthy Food and Drink Policy*. Under review.

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## Abbreviations

**ASA:** Advertising Standards Authority

**BIA-Obesity:** Business Impact Assessment on Obesity and Population Nutrition

**DHB:** District Health Boards

**Food-EPI:** Healthy Food Environment Policy Index

**INFORMAS:** International Network for Food and Obesity/non-communicable diseases (NCDs) Research, Monitoring and Action Support

**FSANZ:** Food Standards Australia New Zealand

**HSR:** Health Star Rating

**NCD:** Non-communicable diseases

**NPSC:** Nutrient Profiling Scoring Criterion

**NZDep2013:** New Zealand Index of Deprivation

**OECD:** Organization for Economic Co-operation and Development

**School-FERST:** School Food Environments Review and Support Tool

**Well-CCAT:** Wellness Child Care Assessment Tool

**Well-SAT:** Wellness School Assessment Tool

**WHO:** World Health Organization

## Glossary

**Convenience store:** Bakery, confectionery store, dairy, service station

**Deprivation:** NZDep2013 combines nine variables from the 2013 census which reflect eight dimensions of deprivation. This provides a deprivation score for each meshblock<sup>1</sup>. NZDep 1-3 are the least deprived and NZDep 9-10 are the most deprived.

**Decile:** Deciles are a measure of the socio-economic position of a school's student community relative to other schools throughout the country. For example, decile 1 schools are the 10% of schools with the highest proportion of students from low socio-economic communities<sup>2</sup>.

**DietCost:** A computer modelling programme that calculates a range of prices for healthy and current household diets.

**Food environments:** The collective physical, economic, policy and sociocultural surroundings, opportunities and conditions that influence people's food and beverage choices and nutritional status

**Geocoding:** Transforms a description of a location to a spatial representation in numerical coordinates.

**Minimally processed foods:** Minimally processed foods have undergone minimal processing and have no added oils, fats, sugar, salt or other substances.

**Nutritrack:** Database comprising information on the nutrition composition of the majority of packaged foods on sale at New Zealand supermarkets.

**Processed foods:** Products manufactured by industry from natural or minimally processed foods with the addition of salt, sugar, oil etc.

**Primary school:** Schools with year 1-8 students, primary schools, full primary, intermediate schools.

**Quick service restaurant:** Chain restaurants with more than one outlet that has minimal table service

**School-FERST:** An online tool enabling schools to self-review the healthiness of foods and beverages they have available and support them in improving their school food environment.

**School zone:** Area 500m road network distance from school boundary.

**Secondary schools:** Schools with year 9-13 students, composite schools (years 1-13 or years 7-13), area schools.

**Takeaway outlet:** Outlet where prepared meals and snacks are available to take away.

**Ultra-processed foods:** Industrial formulations made from substances extracted from foods, food constituents or synthesised from food substrates.

**Urban school:** School within a settlement of at least 1000 people

**Wellness Child Care Assessment Tool:** Quantitative assessment of comprehensiveness and strength of written health-related policies for child care centres.

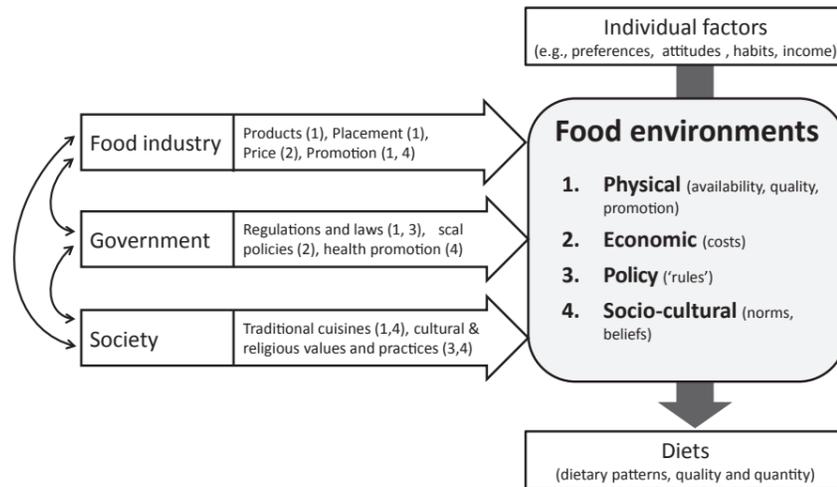
**Wellness School Assessment Tool:** Quantitative assessment of comprehensiveness and strength of written health-related policies for schools.

# Introduction

New Zealand has very high levels of obesity with adults and children having the third highest rate of overweight and obesity within OECD countries<sup>3</sup>. Overall, in 2016/17, 32.2% of adults had obesity, up from 27% in 2007/08<sup>4</sup>. Adult obesity rates are higher for Māori and Pacific adults and for those living in areas of higher deprivation<sup>4</sup>. One in nine children aged 2-14 years has obesity. One-fifth of children living in the most socioeconomically deprived areas has obesity, compared with 6% living in the least deprived areas<sup>4</sup>.

Unhealthy diets and excess energy intake are modifiable factors that contribute to disease and disability in New Zealand. Recent analysis shows that, collectively, dietary risk factors (including high salt intake, high saturated fat intake, low vegetable and fruit intake) and excess energy intake (high body mass index) together account for 18.6% of health loss in New Zealand<sup>5</sup>. This is much greater than other risk factors with tobacco use being the next largest contributor (9.1%).

Figure 1: The determinants of food environments and their effects on diets



One of the main factors contributing to unhealthy diets is unhealthy food environments<sup>6</sup>, defined as the collective physical, economic, policy and sociocultural surroundings, opportunities and conditions that influence people's food and beverage choices and nutritional status<sup>7-9</sup>. Existing global monitoring frameworks<sup>10</sup> do not adequately include upstream indicators related to food policies and environments. These environments are major drivers of unhealthy diets and energy overconsumption and are shaped by governmental, food industry and societal mechanisms (Figure 1)<sup>6,7,11</sup>.

An International Network for Food and Obesity/non-communicable diseases (NCDs) Research, Monitoring and Action Support (INFORMAS) was established in November 2012 to monitor and benchmark food environments globally and support actions to reduce obesity, NCDs and their related inequalities<sup>7</sup>. The INFORMAS framework consists of modules to monitor, benchmark and support public (government) and private (food company) sector actions<sup>7</sup>. There are two 'process' modules that monitor the policies and actions of the public and private sectors, and seven 'impact' modules that monitor the key characteristics of food environments (Figure 2)<sup>7,12-22</sup>. Monitoring frameworks and indicators have been developed for the modules to provide consistent data collection and analysis.

No country has yet undertaken a comprehensive, national food environments and policies survey, making this New Zealand survey the first-ever internationally. The study was conducted between 2014 and 2017 and it consisted of multiple sub-studies for each aspect of food environment policies and food environments. This baseline INFORMAS database will ensure that the impact of future food and nutrition policies and actions can be evaluated. The research is original and innovative due to the 'upstream' approach and the direct policy relevance.

Figure 2: The INFORMAS framework with the modules implemented in New Zealand enclosed in the box

ORGANISATIONS	PROCESSES	Public sector policies and actions		Private sector policies and actions				
		How much progress have (international, national, state and local) governments made towards good practice in improving food environments and implementing obesity/NCDs prevention policies and actions? (University of Auckland)		How are private sector organisations affecting food environments and influencing obesity/NCDs prevention efforts? (Deakin University)				
FOOD ENVIRONMENTS	IMPACTS	Food composition	Food labelling	Food marketing	Food provision	Food retail	Food prices	Food trade & investment
				What is the nutrient composition of foods and non-alcoholic beverages? (The George Institute)	What health-related labelling is present on foods and non-alcoholic beverages? (University of Oxford)	What is the exposure and power of promotion of unhealthy foods and non-alcoholic beverages to different population groups? (University of Wollongong)	What is the nutritional quality of foods and non-alcoholic beverages provided in different settings (eg. schools, hospitals, workplaces)? (University of Toronto)	What is the availability of healthy and unhealthy foods and non-alcoholic beverages in communities and within retail outlets? (University of Auckland)
POPULATIONS	OUTCOMES	Population diet		Physiological & metabolic risk factors		Health outcomes		
		What is the quality of the diet of different population groups? (University of Sao Paulo)		What are the burdens of obesity and other risk factors? (WHO)		What are burdens of NCD morbidity and mortality? (WHO)		

# Objectives

The objectives of the New Zealand food environment study were:

- To undertake comprehensive measurements of the healthiness of New Zealand food environments.
- To benchmark progress towards good practice.
- To develop and apply equity indicators for selected modules.

The report is divided into two components: Food Policies and Food Environments.

The Food Policy component comprises:

1. Policies and actions by the national Government: What is the extent of implementation of recommended policies compared to international best practice?\*
2. Commitments by the food industry: What are the commitments and disclosure of New Zealand's top food companies to improve population nutrition?

The Food Environments component comprises:

1. Food composition: How healthy is the national packaged food supply?
2. Food labelling: How well are foods labelled in relation to health and nutrition?
3. Food marketing: What is the extent and nature of marketing for unhealthy foods and beverages to children through:
  - a. Television
  - b. Magazines
  - c. On websites
  - d. On Facebook
  - e. On food packages
  - f. In children's sport clubs
  - g. Around schools\*
4. Food provision: How healthy is the food provided in
  - a. Schools\*
  - b. District Health Boards
  - c. Other settings
5. Food retail: How healthy is the food retail environment
  - a. Within communities\*
  - b. Within outlets and stores\*
6. Food prices: What is the price differential between
  - a. Healthier and less healthy foods
  - b. Takeaway meals and equivalent home-prepared meals
  - c. Current diets and healthy diets\*

\*Inequality analyses included.

# Methods

The methods for each of the sub-studies are outlined in Appendix One. Ethics approval for the New Zealand Food Environments Study was obtained from the University of Auckland Human Participants Ethics Committee (reference number 12330).

Several INFORMAS indicators of healthiness of food environments have been developed to indicate inequalities in access to healthy food environments using school deciles and the New Zealand Index of Deprivation (NZDep). The school decile indicates the socioeconomic characteristics of the students the school draws upon for its school roll. Decile 1 schools are the 10% of schools with the highest proportion of students from low socioeconomic communities, whereas Decile 10 schools are the 10% of schools with the lowest proportion of such students<sup>2</sup>. Schools were classified into deciles according to socio-economic criteria. Tertiles were used for analyses: low = deciles 1-3, mid=deciles 4-7, high = deciles 8-10. The NZDep2013<sup>1</sup> is a measure of area socioeconomic deprivation, which combines eight dimensions of deprivation: communication, income, employment, qualifications, owned home, support, living space and transport. The NZDep2013 apportioned each mesh block and census area unit into a decile of deprivation, with Decile 1 representing the 10% of areas with the lowest levels of deprivation, while Decile 10 depicts the most deprived 10%. Tertiles were used for analyses: least deprived = 1-3, average deprived = 4-7, most deprived = 8-10.

## Food classification Systems

A range of systems was used to classify foods as healthy and unhealthy or healthier and less healthy. Some modules used more than one system. The choice of the system depended on the indicator, existing national and international food classification systems, the details provided on the food, and the nature of the setting (Table 1).

**Table 1:** Classification systems of the healthiness of foods and non-alcoholic beverages used in the national study

System and uses	Type	Method of classifying
Health Star Ratings <sup>23</sup> (for front-of-pack nutrition labels and nutritional quality of the food supply)	Ordinal scale (½-5 stars)	Baseline points are applied for energy, saturated fat, total sugar and sodium per 100g. Modifying points are applied for dietary fibre, protein and percentage of fruit, vegetables, nuts and legumes. The final score is calculated using an algorithm.
NOVA classification system <sup>24</sup> (for healthiness of the food supply and price differential between foods of different levels of processing)	Category	Nature, level and extent of industrial processing <ol style="list-style-type: none"> <li><b>Natural or minimally processed:</b> Natural foods have not been altered following their removal from nature. Minimally processed foods have undergone minimal processing and have no added oils, fats, sugar, salt or other substances, e.g. frozen vegetables, dried fruit, grains, roasted nuts, meat, poultry, boiled eggs, plain yoghurt, pasteurised milk.</li> <li><b>Processed culinary ingredients:</b> Products extracted from natural foods or from nature. Used to create dishes and meals, e.g. oils, fats, sugar, salt.</li> <li><b>Processed:</b> Products manufactured by industry from natural or minimally processed foods with the addition of salt, sugar, oil etc, e.g. preserved vegetables, canned fruit in syrup, fish, cheeses, breads and canned fish in oil.</li> <li><b>Ultra-processed:</b> Industrial formulations made from substances extracted from foods, food constituents or synthesised from food substrates. Added or introduced substances that substantially change their nature or use, or contain little or no whole foods. Typically energy dense and nutrient-poor, high in saturated fat, trans fats, free sugars or sodium, e.g. soft drinks, takeaways, sugary baked goods, ice-creams, sweetened breakfast cereals, cereal bars, sweetened yoghurts, ready-to-eat meals, confectionery.</li> </ol>
WHO Europe nutrient profile model <sup>25</sup> (for restriction of marketing of unhealthy foods to children)	Category	Food based and nutrient based. Foods are categorised into 1 of 17 food categories. Certain food categories are not permitted to be marketed to children under any circumstances. These include chocolate and confectionery, cakes and sweet biscuits, juices and energy drinks. Conversely, unprocessed meat and fish and fresh/frozen fruit and vegetables can be marketed without restriction. Maximum nutrient level cut points are applied to determine the eligibility of foods in all other categories to be marketed to children. Foods are thus divided into permitted and not permitted to be marketed to children.
Nutrient Profiling Scoring Criterion <sup>26</sup> (for health and nutrition claims on foods)	Numerical	Baseline points are applied for energy, saturated fat, total sugar and sodium per 100g. Modifying points are applied for dietary fibre, protein and percentage of fruit, vegetables, nuts and legumes. The final score is baseline points minus modifying points, and determines whether foods are eligible to carry health claims or not. Healthy <4 (except beverages and cheese products).
Food and Beverage Classification System <sup>27,28</sup> (for provision of food for sale in schools and for restrictions on food marketing to children)	Category	Foods are categorised as <b>everyday</b> , <b>sometimes</b> , <b>occasional</b> depending on alignment with food and nutrition guidelines.  This system was updated in 2016. Earlier studies in this report used the 2007 classification system.
National Healthy Food and Drink Policy (NZ) <sup>29</sup> (for food service in hospitals)	Category	<b>Green</b> foods and drinks are less processed, mostly whole foods and drinks which are low in saturated fat, added sugar and added salt. <b>Amber</b> foods and drinks are not considered part of an everyday diet, but they may have some nutritive value. <b>Red</b> foods and drinks are often highly processed with poor nutritional value and contribute to excess energy consumption.
Junk Food (for quick assessment of food environments around schools and in supermarkets)	Category	Definition developed based on definition of occasional food in Food and Beverage Classification System. <b>Junk food</b> includes confectionery/chocolate; ice cream/ frozen yoghurt/sorbet; sugar-sweetened beverages (soft drinks, fruit and vegetable juices, flavoured milks); artificially sweetened beverages; energy and sports drinks; crisps; snack bars (muesli, granola and fruit); biscuits/cakes/ muffins/pastries; 2-minute noodles/ instant soups; deep fried foods; pies/ sausage rolls; burgers/ pizzas

# 1. Government implementation of healthy food environment policies

**Research question: What is the extent of implementation of recommended food environment policies compared to international best practice?**

Governments have a critical role to play in creating healthier food environments. The Healthy Food Environment Policy Index (Food-EPI) aims to monitor and benchmark food environment policy implementation compared to international best practice to increase the accountability of governments for their actions to create healthier food environments. The Food-EPI was first conducted in New Zealand in 2014 and again in 2017 prior to the respective elections to measure progress over the previous term of government.

The methods are outlined in the appendix and elsewhere<sup>7,16</sup>, but briefly, 47 indicators (42 in 2014) across 7 domains of food environment policies (composition, labelling, promotion, provision, retail, prices, and trade and investment) and 6 domains of infrastructure support for policy development and implementation (leadership, governance, monitoring and intelligence, funding and resources, platforms for interaction, and health-in-all-policies) were assessed. Expert panels of independent and government public health experts rated the extent of implementation of policies on food environments and infrastructure support against international benchmarks. The 2014 panel had 52 independent experts and the 2017 panel had 71 independent and government experts. Their ratings for each of the 47 good practice indicators were informed by documented evidence, validated by government officials and international best practice benchmarks. The level of implementation was categorised as 'high', 'medium', 'low' or 'very little, if any' compared to best practice. The scores for each of the policy indicators were then weighted according to their relative contributions to improve population nutrition developed by a panel of international experts to give a summary score of overall healthy food policy implementation<sup>30</sup>.

## Implementation of food environment policies compared to international best practice

Figure 3 shows the results for 2014 (stars) and 2017 (bars). Some policies were at the level of international best practice, but many large 'implementation gaps' were identified with about 70% of the policy indicators and one third of the infrastructure support indicators rated as 'low' or 'very little, if any' implementation in 2017. The overall weighted food policy implementation scores were medium at 43% in 2014 and 48% in 2017. The Government performed well, at the level of international best practice, in preventing unhealthy foods carrying health claims, providing nutrition information panels on packaged foods, transparency in policy development processes, providing access to information for the public, and monitoring prevalence of NCDs and their risk factors and inequalities. Gaps identified included policies for healthy food in schools, fiscal and food retail policies, and restrictions on unhealthy food marketing to children. Experts recognized progress since 2014 for implementation of the Health Star Ratings (HSR), initiating systems-based approaches with communities (i.e. Healthy Families), developing and implementing the Healthy Food and Drink Policy in the public sector, and improving platforms for interaction between Government and other sectors and across Government.

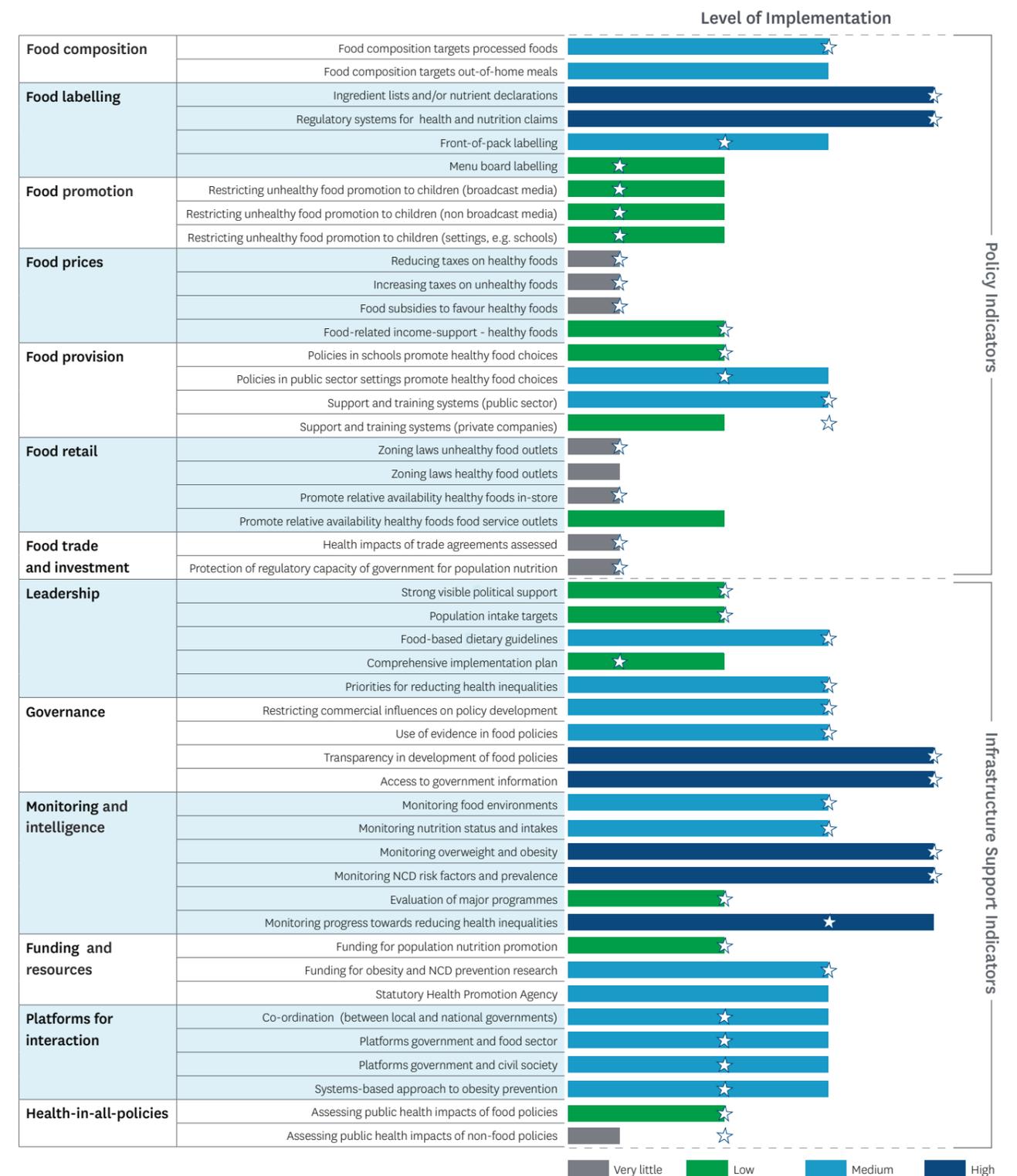
### Recommended actions to improve the healthiness of food environments

The expert panels recommended and prioritized actions to improve the healthiness of food environments. In 2014, 37 actions were recommended with seven prioritised for immediate action. In 2017, 53 actions were recommended with nine prioritised for immediate action. All recommendations are aligned with the World Health Organization's (WHO) Global NCD Action Plan<sup>31</sup>, which was endorsed by the New Zealand Government in May 2013 and again in 2017. The priority actions for improving the healthiness of food environments are outlined in Table 2. Three of the top nine 2017 priorities were the same as in 2014 (sugary drinks tax, healthy school food policies, restriction of unhealthy food marketing to children), while three were new (implement the new Eating and Activity Guidelines, conduct a nutrition survey for children, obesity prevention target) and three were based on 2014 recommendations but updated.

**Table 2:** Priority recommendations for Government action for healthier food environments, 2017

<b>Food composition:</b>	Set targets for nutrients of concern (sodium, saturated fat, sugar)
<b>Food labeling:</b>	Strengthen the Health Star Rating System and make it mandatory
<b>Food marketing:</b>	Regulate unhealthy food marketing to children in all media
<b>Food prices:</b>	Implement a 20% tax on sugary drinks
<b>Food provision:</b>	Ensure healthy foods in schools and early childhood education centres
<b>Leadership:</b>	<ul style="list-style-type: none"> <li>Strengthen the child obesity plan</li> <li>Set a target for reducing child obesity</li> <li>Set targets for intake of nutrients of concern (sodium, saturated fat, sugar)</li> <li>Translate Eating Guidelines in the social, environment and cultural contexts</li> </ul>
<b>Monitoring:</b>	Conduct a new national children's nutrition survey
<b>Funding:</b>	Increase population nutrition promotion funding to at least 10% of health care and productivity costs of overweight and obesity.

**Figure 3:** Level of implementation of food environment policies and infrastructure support by the Government in 2017 against international best practice (\* 2014 ratings)



# 2. Food company commitments and disclosure to improve population nutrition

**Research question: How transparent, specific and comprehensive are the commitments of the top food companies to improve population nutrition?**

In addition to governments, major food companies are the other major actors who need to be included within accountability systems to improve the healthiness of food environments. The Business Impact Assessment on Obesity and Population Nutrition (BIA-Obesity) tool aims to contribute to efforts to improve the healthiness of food environments for NCD prevention by assessing **transparency, comprehensiveness and specificity** of policies and commitments related to obesity prevention and population nutrition by major food companies. **Table 3** shows the domains of the BIA-Obesity tool and the relative weighting applied for the final score. The details of the methods are outlined in the appendix and elsewhere<sup>15,32,33</sup>. Briefly, each of the six domains shown in **Table 3** has a series of indicators with scores related to transparency, comprehensiveness and specificity. Publicly available information was used to populate the tool and then companies were contacted to contribute additional information. The draft scores based on the evidence available were fed back to the companies for comment before the final rankings and recommendations were published<sup>32</sup>. Individualised scorecards and recommendations were sent to individual companies and are available online ([www.informas.org](http://www.informas.org)). This study is **Phase I** of the BIA-Obesity assessment. Phases 2 and 3 will investigate the performance of companies (e.g. extent and nature of food marketing to children, healthiness of overall product portfolio) and compliance with commitments made respectively in the future.

The 25 biggest New Zealand companies with a combined market share of over 50% in each of the four sectors, were selected using the 2016 Euromonitor market share data for New Zealand across the four sectors: food manufacturers (15), non-alcoholic beverage manufacturers (2), supermarkets (2) and quick service restaurants (6). The assessment included commitments until the end of 2017. Supermarkets were assessed both as a retailer as well as a packaged food manufacturer, so the scores are a hybrid assessment.

## Transparency, specificity and comprehensiveness of commitments to improve population nutrition

Companies demonstrated some commitment to addressing obesity and population nutrition issues, but much stronger action is needed across all six BIA-Obesity domains and all four industry sectors (**Figure 4**). The best performing domain was 'corporate nutrition strategy' while the worst performing domain was 'product accessibility'. The overall scores ranged from 0-75% with a median overall score of 38%. About half of the selected companies fully engaged with the research process and provided feedback and comments during several steps in the process.

## Recommended actions to improve commitments

Stronger action is needed across all four sectors to improve population nutrition and food environments:

### Corporate population nutrition strategy

1. Prioritise population nutrition as part of the overall corporate strategy, including relevant objectives, targets, appropriate resourcing and regular reporting against objectives and targets.
2. Link the Key Performance Indicators of senior managers to nutrition targets in the corporate strategy.

### Product formulation

1. Commit to SMART (specific, measurable, achievable, relevant, time-bound) targets on sodium, sugar, and saturated fat reduction across product portfolio.
2. Use the HSR system to guide efforts on product development and reformulation.

### Product labelling

1. Commit to displaying HSR on all processed foods.
2. Support the implementation of regulations by Government on added sugar labelling on foods.
3. Commit to labelling products with nutrition claims only when products are healthy (i.e. meet the Nutrient Profiling Scoring Criterion).

### Product and brand promotion

1. Develop a marketing policy, including advertisement purchasing plans, that applies to children up to the age of 18 years.
2. Eliminate the use of promotion techniques with strong appeal to children (e.g., cartoon characters, interactive games) on unhealthy food products.

### Product accessibility

1. Support evidence-informed, WHO-recommended government policies such as a tax on sugar-sweetened beverages.
2. Commit to increase the proportion of healthy food products in the overall company portfolio.
3. Include other recommended actions for specific sectors such as limiting price promotions on less healthy products, introducing check-outs free of unhealthy food, committing to not provide free refills on caloric soft drinks and committing to not open new stores near schools.

## Relationships with other organisations

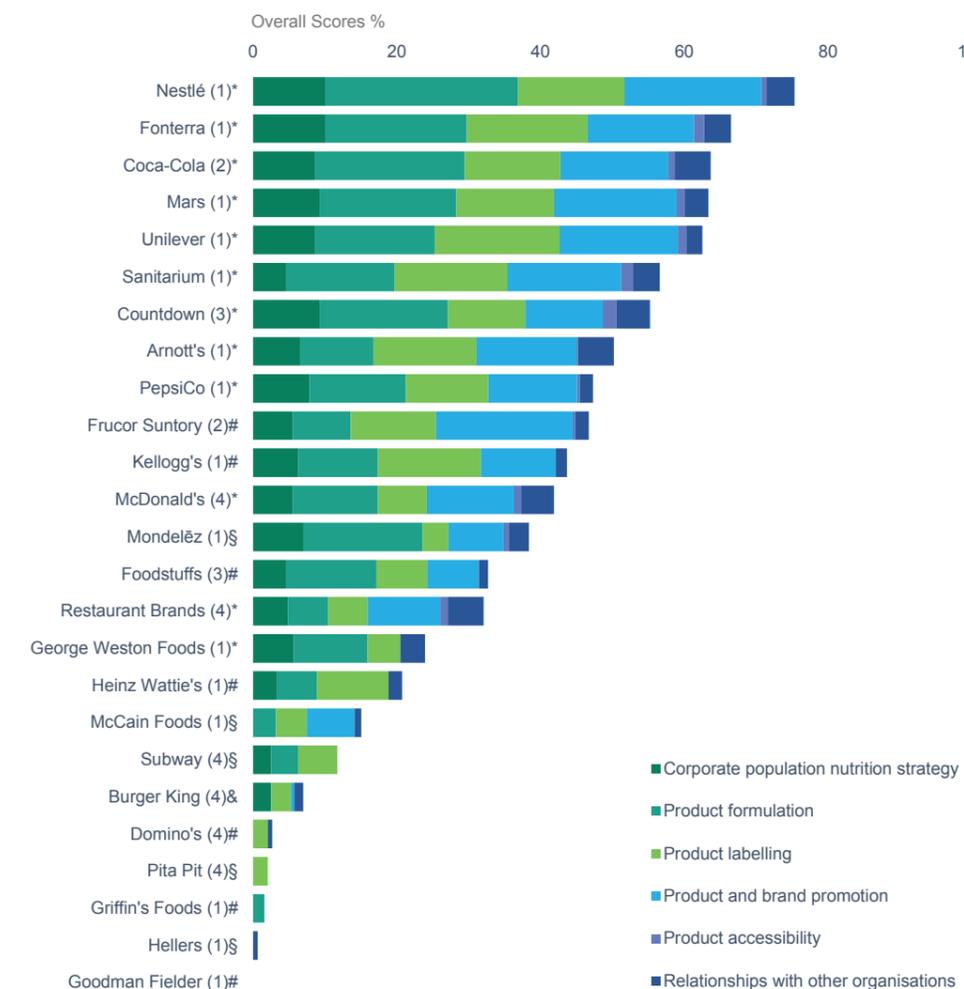
1. Publish all funding relationships for external research on the New Zealand website
2. Disclose all political donations in real time, or commit to not making political donations

While New Zealand food companies have taken some positive steps as part of a societal response to unhealthy diets and obesity, there is a much greater role for them to play. The overall and domain-specific BIA-Obesity scores show that there is a lot of room for food companies across all four sectors to improve comprehensiveness, specificity and transparency of their commitments and policies related to population nutrition. Bolder, more specific and comprehensive commitments by food industry actors are essential to achieving the goals of the WHO action plan on NCDs diseases and the UN Sustainable Development Goals.

**Table 3: BIA-Obesity domains assessed and weightings**

BIA-Obesity Domain	Food & non-alcoholic beverage manufacturers	Quick service restaurants	Supermarkets
Corporate population nutrition strategy	10%	10%	10%
Product formulation	30%	25%	25%
Product labelling	20%	15%	15%
Product and brand promotion	30%	25%	25%
Product accessibility	5%	20%	20%
Relationships with other organisations	5%	5%	5%

**Figure 4: Ranking of the commitments and disclosure of food companies on improving the healthiness of food environments**



\* Full engagement; § Unable to be contacted; & Willing to participate but survey not returned on time; # Declined participation

For §, & and #: Assessment based on publically available information only

(1) Packaged food manufacturers, (2) Non-alcoholic beverage manufacturers, (3) Supermarkets, (4) Quick service restaurants

# 3. Composition of packaged foods

## Research question: How healthy is the national packaged food supply?

The majority of the foods eaten in developed countries are processed or pre-prepared by the food industry<sup>34</sup>. Evidence indicates that higher levels of processing are related to lower healthiness of foods<sup>35</sup> and in New Zealand the nutrient profile of ultra-processed food products is significantly worse using the Nutrient Profiling Scoring Criterion (NPSC) compared to less processed foods<sup>36</sup>. Monitoring of changes to the healthiness of the food supply has the potential to drive positive changes in the nutrient composition of processed foods by highlighting those food groups that are making advances and those that are not<sup>37</sup>.

### Health Star Rating

Out of the 15,358 packaged food products in the Nutritrack database, the Health Star Rating (HSR) was calculated for 13,280 products in 2016. Baby foods, special foods, reconstituted foods, herbs and spices and products with missing information were excluded. At the time of analysis, 5% of products (807) displayed the HSR. **Table 4** shows how the HSR labels are being selectively applied to the healthier foods. Seventy percent of products with the HSR had  $\geq 3.5$  stars while for all products (labelled or not), only 41% qualify for  $\geq 3.5$  stars. Foods that displayed the HSR on the front of the pack had a higher median rating (4 stars) compared to those that did not display the HSR (2.5 stars).

**Table 4:** Health Star Ratings (HSR) of packaged food supply April 2016

Indicator	Result
N products carrying the HSR (% of total eligible)	807 (5%)
% of packaged foods which qualify for a HSR $\geq 3.5$ stars	41%
% of packaged foods with HSR labels which have $\geq 3.5$ stars	70%
Median HSR of packaged foods with a HSR on label (n=807)	4 stars
Median HSR of packaged foods with no HSR on label (n=12,741)	2.5 stars

### Level of processing

A novel approach to classifying foods (NOVA classification) is by the degree of processing where foods are classified as unprocessed or minimally processed, processed culinary ingredients, processed and ultra-processed<sup>35</sup>. Using the 2013 Nutritrack data (n=13,406 products), 82.7% of products were classified as processed or ultra-processed, 8.1% were processed culinary ingredients, while 9.2% were unprocessed or minimally processed. The NPSC is correlated with the degree of processing indicating that that less processed foods are healthier<sup>36</sup>.

greater proportion of products carrying claims than any other category (n=1503 claims on 564 products), one-third of which were displayed on 'less-healthy' products (n=508). Almost all (96%) breakfast cereal products displayed a claim with an average of four claims per product.

A new Food Standard (1.2.7) was implemented in January 2016 to address claims on food labels and advertising. The Ministry for Primary Industries recently conducted a survey of nutrition content claims and health claims of 600 products from across 15 product categories from the Nutritrack database in 2014/15 and 2016/17<sup>41</sup>. The number of products

with nutrition content claims increased from 42% at baseline to 56% in 2016/17. The number of claims meeting the requirements of the Food Standards Code increased from 57% to 86%. There was a similar number of general level health claims for both Ministry of Primary Industry surveys. At baseline, none of these claims met the requirements but by 2016/17 over half did. There were no high-level health claims in the survey.

**Table 5:** The number of products with nutrition claims and health claims

Food categories		Total N of products (%)	N of products with claims (%)	Products with nutrition claims			Products with health claims				
				Total N (%)	Health-related ingredient claims N (%)	Nutrient content claims N (%)	Nutrient comparative claims N (%)	Total N (%)	General health claims N (%)	Nutrient and other function claims N (%)	Reduction of disease risk claims N (%)
<b>All packaged foods</b>	<b>Total</b>	<b>7526 (100.0)</b>	<b>2972 (39.5)</b>	<b>2644 (35.1)</b>	840 (31.8)	1913 (72.4)	586 (22.2)	<b>1094 (14.5)</b>	872 (79.7)	45 (4.1)	303 (27.7)
<b>Healthy foods</b>	<b>Total</b>	<b>3557 (47.3)</b>	<b>1845 (51.9)</b>	<b>1596 (44.9)</b>	530 (33.2)	1250 (78.3)	312 (19.5)	<b>807 (22.7)</b>	601 (74.5)	37 (4.6)	286 (35.4)
<b>Less healthy foods</b>	<b>Total</b>	<b>3969 (52.7)</b>	<b>1127 (28.4)</b>	<b>1048 (26.4)</b>	310 (29.6)	663 (63.3)	274 (26.1)	<b>287 (7.2)</b>	271 (94.4)	8 (2.8)	17 (5.9)
<b>Bakery products</b>	<b>Total</b>	<b>1565 (100)</b>	<b>450 (28.8)</b>	<b>392 (25.0)</b>	<b>116 (29.6)</b>	<b>249 (63.5)</b>	<b>121 (30.9)</b>	<b>125 (8.0)</b>	<b>113 (90.4)</b>	<b>6 (4.8)</b>	<b>8 (6.4)</b>
	Healthy	445 (28.4)	208 (46.7)	<b>178 (40.0)</b>	71 (39.9)	135 (75.8)	11 (6.18)	<b>74 (16.6)</b>	62 (83.8)	6 (8.1)	8 (10.8)
	Less healthy	1120 (71.6)	242 (21.6)	<b>214 (19.1)</b>	45 (21.0)	114 (53.3)	110 (51.4)	<b>51 (4.6)</b>	51 (100)	0 (0.0)	0 (0.0)
<b>Cereals</b>	<b>Total</b>	<b>564 (100)</b>	<b>458 (81.2)</b>	<b>410 (72.7)</b>	<b>218 (53.2)</b>	<b>333 (81.2)</b>	<b>35 (8.5)</b>	<b>248 (44.0)</b>	<b>196 (79.0)</b>	<b>13 (5.2)</b>	<b>83 (33.5)</b>
	Healthy	291 (51.6)	259 (89.0)	<b>232 (79.7)</b>	140 (60.3)	192 (82.8)	24 (10.3)	<b>166 (57.0)</b>	121 (72.9)	11 (6.6)	75 (45.2)
	Less healthy	273 (48.3)	199 (72.9)	<b>178 (65.2)</b>	78 (43.8)	141 (79.2)	11 (6.2)	<b>82 (30.0)</b>	75 (91.5)	2 (2.4)	8 (9.8)
<b>Confectionery</b>	<b>Total</b>	<b>784 (100)</b>	<b>231 (29.5)</b>	<b>229 (29.2)</b>	<b>77 (33.6)</b>	<b>153 (66.8)</b>	<b>28 (12.2)</b>	<b>37 (4.7)</b>	<b>37 (100)</b>	<b>0 (0.0)</b>	<b>0 (0.0)</b>
	Healthy	100 (12.8)	70 (70.0)	<b>69 (69.0)</b>	3 (4.3)	68 (98.6)	13 (18.8)	<b>24 (24.0)</b>	24 (100)	0 (0.0)	0 (0.0)
	Less healthy	684 (87.2)	161 (23.5)	<b>160 (23.4)</b>	74 (46.3)	85 (53.1)	15 (9.4)	<b>13 (1.9)</b>	13 (100)	0 (0.0)	0 (0.0)
<b>Convenience foods</b>	<b>Total</b>	<b>378 (100)</b>	<b>121 (32.0)</b>	<b>93 (24.6)</b>	<b>42 (45.2)</b>	<b>67 (72.0)</b>	<b>6 (6.5)</b>	<b>74 (19.6)</b>	<b>58 (78.4)</b>	<b>0 (0.0)</b>	<b>23 (31.1)</b>
	Healthy	252 (66.7)	96 (38.1)	<b>75 (29.8)</b>	32 (42.7)	57 (76)	5 (6.7)	<b>60 (23.8)</b>	47 (78.3)	0 (0.0)	19 (31.7)
	Less healthy	126 (33.3)	25 (19.8)	<b>18 (14.3)</b>	10 (55.6)	10 (55.6)	1 (5.6)	<b>14 (11.1)</b>	11 (78.6)	0 (0.0)	4 (28.6)
<b>Dairy products</b>	<b>Total</b>	<b>1677 (100)</b>	<b>638 (38.0)</b>	<b>594 (35.4)</b>	<b>190 (32.0)</b>	<b>400 (67.3)</b>	<b>241 (40.6)</b>	<b>241 (14.4)</b>	<b>150 (62.2)</b>	<b>7 (2.9)</b>	<b>104 (43.2)</b>
	Healthy	1027 (61.2)	509 (49.6)	<b>459 (44.7)</b>	145 (31.6)	337 (73.4)	183 (39.9)	<b>208 (20.3)</b>	121 (58.2)	7 (3.4)	99 (47.6)
	Less healthy	650 (38.8)	129 (19.8)	<b>135 (20.8)</b>	45 (33.3)	63 (46.7)	58 (43.0)	<b>33 (5.1)</b>	29 (87.9)	0 (0.0)	5 (15.2)
<b>Fruit and vegetable products</b>	<b>Total</b>	<b>1155 (100)</b>	<b>433 (37.5)</b>	<b>339 (29.4)</b>	<b>94 (27.7)</b>	<b>263 (77.6)</b>	<b>34 (10.0)</b>	<b>199 (17.2)</b>	<b>152 (76.4)</b>	<b>3 (1.5)</b>	<b>81 (40.7)</b>
	Healthy	926 (80.2)	390 (42.1)	<b>302 (32.6)</b>	81 (26.8)	236 (78.1)	32 (10.6)	<b>180 (19.4)</b>	134 (74.4)	2 (1.1)	81 (45)
	Less healthy	229 (19.8)	43 (18.8)	<b>37 (16.2)</b>	13 (35.1)	27 (73.0)	2 (5.4)	<b>19 (8.3)</b>	18 (94.7)	1 (5.3)	0 (0.0)
<b>Non-alcoholic beverages</b>	<b>Total</b>	<b>1040 (100)</b>	<b>520 (50.0)</b>	<b>472 (45.4)</b>	<b>68 (14.4)</b>	<b>394 (83.5)</b>	<b>62 (13.1)</b>	<b>133 (12.8)</b>	<b>129 (97.0)</b>	<b>16 (12.0)</b>	<b>4 (3.0)</b>
	Healthy	491 (47.2)	297 (60.5)	<b>268 (54.6)</b>	53 (19.8)	217 (81.0)	40 (14.9)	<b>87 (17.7)</b>	84 (96.6)	11 (12.6)	4 (4.6)
	Less healthy	549 (52.8)	223 (40.6)	<b>204 (37.2)</b>	15 (7.4)	177 (86.8)	22 (10.8)	<b>46 (8.4)</b>	45 (97.8)	5 (10.9)	0 (0)
<b>Snack foods</b>	<b>Total</b>	<b>363 (100)</b>	<b>121 (33.3)</b>	<b>115 (31.6)</b>	<b>35 (30.4)</b>	<b>54 (47.0)</b>	<b>59 (51.3)</b>	<b>37 (10.2)</b>	<b>37 (100)</b>	<b>0 (0.0)</b>	<b>0 (0.0)</b>
	Healthy	25 (6.9)	16 (64.0)	<b>13 (52.0)</b>	5 (38.5)	8 (61.5)	4 (30.8)	<b>8 (32.0)</b>	8 (100)	0 (0.0)	0 (0.0)
	Less healthy	338 (93.1)	105 (31.1)	<b>102 (30.2)</b>	30 (29.4)	46 (45.1)	55 (53.9)	<b>29 (8.6)</b>	29 (100)	0 (0.0)	0 (0.0)

# 4. Labelling of packaged foods

## Research question: How well are foods labelled in relation to nutrition and health?

Health-related labelling on food packaging has the potential to have both positive and negative effects on diets<sup>12</sup>. Food labels are an important source of useful information for consumers aiming to improve their health depending on the labelling content, its format and context. Food labels, as well as being a source of information, are also a source of marketing claims by food producers. Such claims have the potential to inform consumers but can also mislead consumers in their food choices by, for example, highlighting positive product attributes while ignoring other, less desirable characteristics.

### Health Star Rating

The HSR system is a trans-Tasman voluntary front-of-pack labelling scheme<sup>38</sup>. The rating is independent with the number of stars based on their nutrients, ingredients and energy. The overall nutritional profile of packaged food and beverage products is rated from 0.5 to 5 stars. The system was introduced in June 2014 and by April 2016, of the 5% of products in the Nutritrack database (n=807) displaying the HSR, the highest rates of uptake were for cereals, convenience foods, packaged fruit and vegetables, sauces and spreads and 'other' products (mostly breakfast beverages)<sup>39</sup>.

### Nutrition and health claims on food packages

INFORMAS developed a new taxonomy of health-related food labelling, classifying nutrition information into: nutrient declarations, supplementary nutrition information (e.g. % guideline daily amounts), ingredient list, and other information (e.g. origin)<sup>12</sup>. Claims are classified into: 1) nutrition claims: health-related ingredient claims, nutrient content claims, nutrient comparative claims, and 2) health claims: general health claims, nutrient and other function claims, reduction of disease risk claims.

In 2014, data from 7526 products across eight categories from the Nutritrack database were used to classify food packages according to the INFORMAS taxonomy<sup>40</sup>. The eight categories were: fruit and vegetable products; convenience foods; dairy products; cereals; non-alcoholic beverages; bakery products; confectionery; snack foods. Overall, more than one-third (35%) of all food products (2644) featured at least one nutrition claim, whereas 15% featured at least one health claim (**Table 5**). Almost half (n=1596; 45%) of all 'healthy' products displayed nutrition claims and almost one-quarter (n=807; 23%) displayed health claims, whereas 26% (n=1048) of 'less-healthy' food products carried nutrition claims and 7% (n=287) carried health claims. The cereals category had a substantially

# 5. Unhealthy food marketing to children

## Research question: What is the extent and nature of marketing for unhealthy foods and beverages to children?

Several systematic and narrative reviews have shown that exposure to food promotions influences children's brand recognition, food preference, and consumption patterns, and health status<sup>42-45</sup>. The healthiness of children's food marketing environments in New Zealand was measured in a number of ways over the period 2014-2016 as there are different types of media that children are exposed to.

Currently in New Zealand, advertising is self-regulated by the industry-led Advertising Standards Authority (ASA). A new Children and Young People's Advertising Code<sup>46</sup> was effective from October 2017 and implies that

brands and companies cannot target any 'occasional food' advertisements to children aged less than 14 years old and that companies have to apply a 'special duty of care' (vaguely specified) to young people 14-18 years old<sup>46</sup>. However, research has consistently shown that self-regulation doesn't significantly reduce children's exposure to unhealthy food and beverage marketing<sup>47,48</sup> and a critical review of the Children and Young People's Advertising Code by 77 New Zealand health professors expressed concern about the likely lack of impact of this Code on reducing exposure of children to unhealthy food marketing<sup>49</sup>.

## A. Television

Four weekday and four weekend days were randomly selected between June and August 2015<sup>50</sup>. Programming was recorded from 6am to midnight for a total of 432 hours. Audience ratings from A.C. Nielsen were used to identify children's peak viewing times. Unhealthy food advertisements are defined as containing either 'occasional foods' according to the Ministry of Health's Food and Beverage Classification System (MOH) or food not permitted to be marketed to children by WHO-Europe criteria (WHO).

The majority of foods advertised were unhealthy with over two-thirds of food advertisements showing at least one food not permitted to be marketed to children according to the WHO definitions (or over half using MOH definitions). The mean hourly rate of unhealthy food advertising was 9.1 (WHO definitions) or 6.7

(MOH definitions). Since the highest number of children watching TV is in the evening, the 'impacts' (i.e. number of ads x the number of children watching) is much greater during these peak viewing hours (Figure 5 and Figure 6). About 88% of unhealthy food advertisements were shown during children's peak viewing times. About one-third of all ads for unhealthy food contained premium offers and about one-third contained promotional offers.

Figure 5: Unhealthy food television advertising impacts (ads x views) for children 5-13 years during week days.

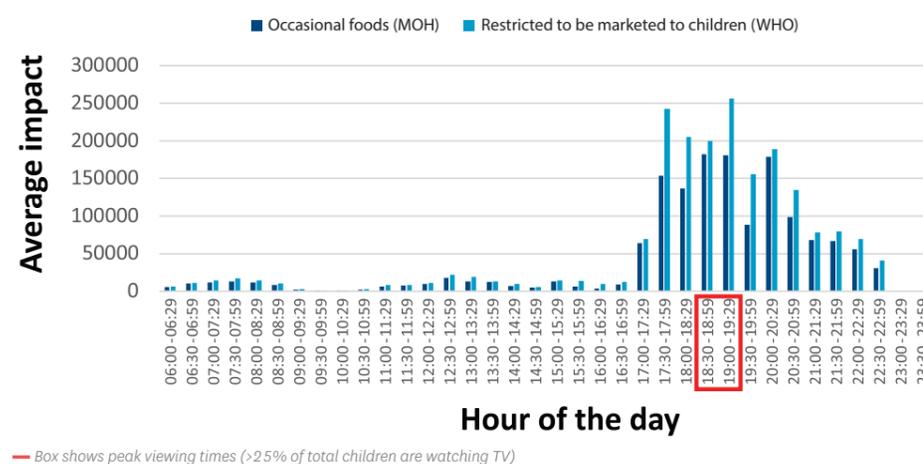
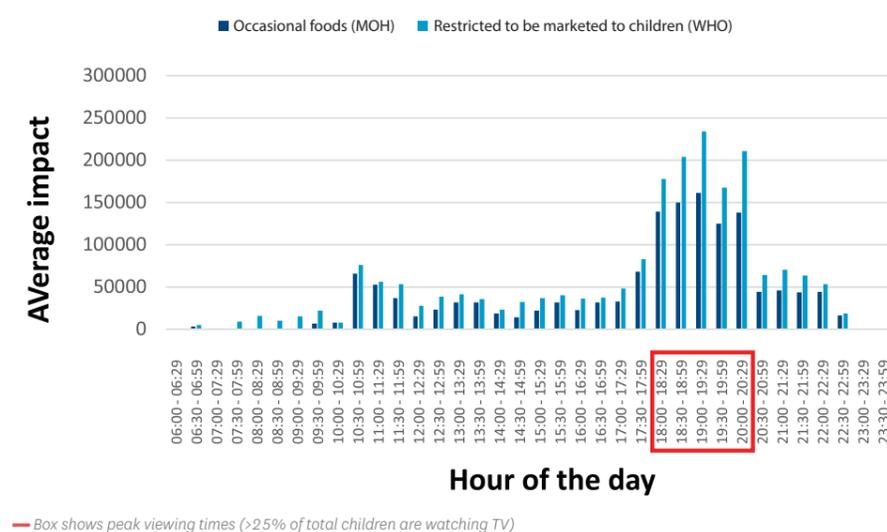


Figure 6: Unhealthy food advertising impact (ads x views) for children 5-13 years during weekend days



The current ASA guidelines define 'targeted at children' when children are >25% of the viewing audience which means that children's peak viewing hours where the maximum number of children are watching does not meet this definition because the large number of adult viewers is counted in the denominator. If unhealthy food advertisements were more logically to be restricted during times when >25% of children are in the viewing audience (as shown in figures 5 and 6), this would reduce the average unhealthy food advertising impact (i.e. unhealthy food ads multiplied by number of children watching) by 24% during weekdays and 50% during weekend days. Current self-regulation rules are ineffective in protecting children from exposure to unhealthy food advertising on television.

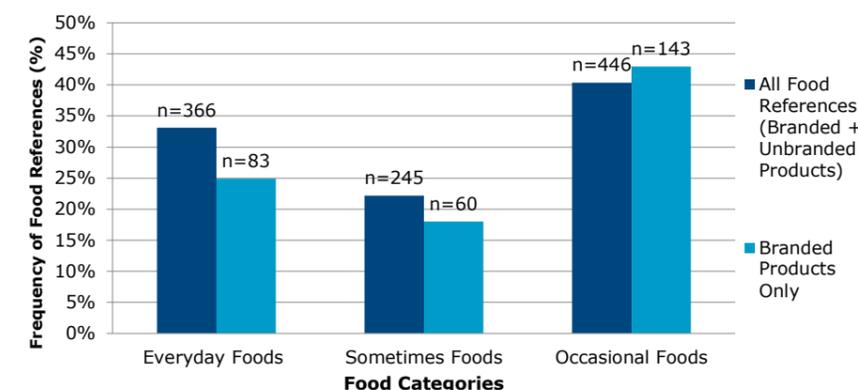
The ASA Children and Young People's Advertising Code contains inappropriate criteria for determining whether children are likely to be exposed to unhealthy food advertisements on television because children's peak viewing hours in the evening are not covered. Clear recommendations for better criteria have been made by a group of 77 health professors<sup>49</sup>.

## B. Magazines

A content analysis was conducted of all food references (branded and non-branded) found in the six magazines either popular with, or targeted to 10-17 year-olds in New Zealand for all issues over one year (2013)<sup>51</sup>. Branded food references (30% of total) were more frequent for unhealthy (43%) compared to healthy (25%) foods (Figure 7). Magazines specifically targeted to children and adolescents contained a significantly higher proportion of unhealthy branded food references (72%) compared to magazines which were targeted to women but were popular among children and adolescents (42%). The most frequently marketed items were 'snack items' (36%) such as chocolate and ice creams, while 'vegetables and fruits' were the least frequently marketed (3%).

Magazines specifically targeting adolescents have a significantly higher proportion of unhealthy food advertisements than magazines which are targeted to women but are popular with adolescents. Adolescent magazines now need to conform to the ASA Children and Young People's Advertising Code.

Figure 7: Proportion of branded and non-branded references for everyday ('healthy'), sometimes and occasional ('unhealthy') foods in magazines popular among children and adolescents 10-17 years



## C. Company websites

Internet traffic data for January 2014 was purchased from A.C. Nielsen to identify the most popular websites of the food and beverage brands most frequently marketed through television, sport sponsorship, magazines and Facebook to New Zealand children and adolescents aged 6-17 years (n=70)<sup>52</sup>. A coding tool captured marketing techniques and features on those websites.

Most food marketing techniques appeared more frequently on websites specifically targeting children and adolescents, than on other websites (Table 6). The Internet allows food marketers to use more engaging techniques to target children and directly interact with them. Regulations to restrict marketing techniques targeted to children through food company websites could be an effective measure to reduce childhood obesity. Of the websites targeting children, 25% had specific children's areas, 67% used promotional characters, 25% had advergames (advertising in games) and 92% had advercation (advertising in education).

Since companies are in control of their own websites, they can readily design them not to target children. This should form part of company commitments towards healthier food environments for children.

Table 6: Marketing techniques used on food and beverage brand and company websites

Marketing techniques	All websites (n=70)	Websites targeting children and adolescents (n=24)	Websites targeting general population (n=46)
	Websites, N (%)	Websites, N (%)	Websites, N (%)
Brand identifiers	70 (100%)	24 (100%)	46 (100%)
Designated children's section	13 (18.6%)	6 (25.0%)	7 (15.2%)
Advergaming	9 (12.9%)	6 (25.0%)	3 (6.5%)
General gaming	3 (4.3%)	3 (12.5%)	0 (0.0%)
Promotional characters	27 (38.6%)	16 (66.7%)	11 (23.9%)
Premium offers	11 (15.7%)	4 (16.7%)	7 (15.2%)
Promotions	49 (70%)	16 (66.7%)	33 (71.7%)
Opportunities to extend website experience	67 (95.7%)	23 (95.8%)	44 (95.7%)
Marketing partnership and tie-ins	34 (48.6%)	14 (58.3%)	20 (43.5%)
Nutrition labels	53 (75.7%)	20 (83.3%)	33 (71.7%)
Claims	39 (55.7%)	14 (58.3%)	25 (54.3%)
Registration and accounts	13 (18.6%)	12 (50.0%)	1 (2.2%)
Protection for children	59 (84.3%)	24 (100%)	35 (76.1%)
Educational material (advercation)	61 (87.1%)	22 (91.6%)	39 (84.7%)

## D. Company Facebook pages

The WHO<sup>53</sup> recognizes that digital marketing amplifies marketing in traditional media, achieving greater ad attention and recall, greater brand awareness and more positive brand attitudes, and greater intent to purchase. There are countless platforms that companies can use to target children, such as social media sites like Facebook<sup>54,55</sup> which allow marketers to engage more deeply with their audiences than traditional marketing<sup>54</sup>.

The extent, nature and potential impact of marketing by food brands popular in New Zealand on Facebook were analysed<sup>56</sup>. Popular brands in New Zealand were selected from Socialbakers<sup>57</sup>. Posts on Facebook pages of 45 packaged food, beverage and fast food companies over 2 months (October to November 2016) were analysed for healthiness using the Ministry of Health Food and Beverage Classification System (FBCS) (updated in 2016)<sup>28</sup> and use of activities, promotional strategies and premium offers. Unhealthy food advertising by popular food and beverage brands on Facebook is substantial in New Zealand, with food and beverage brands posting on average every three days, but some brands more than once a day. The study of posts on company Facebook pages is only a minority of total Facebook marketing for food and beverage brands since the majority is likely to be purchased ads to the Facebook pages of people in its targeted demographic.

The food and beverage products advertised by brands were nearly all classified as 'occasional' using the FBCS (**Table 7**). Social media advertisements use marketing techniques extensively. Nearly every brand asked followers to like, comment, tag friends and share their posts, ensuring that their product was seen not only by their followers but also by the followers Facebook 'friends'. Famous sportspersons and teams, such as the All Blacks, were most frequently used to promote products. By using these techniques, brands attract the consumer's attention, increase their brand loyalty and make them more likely to go and buy their product.

As with websites, companies are in control of their Facebook posts and should commit to not target children and young people with them.

**Table 7:** Facebook posts from popular packaged food, beverage and fast food brands (October-November 2016)

	Packaged food brands (15 brands)	Fast food brands (15 brands)	Beverage brands (15 brands)	Total (45 brands)
<b>Volume and type of posts</b>				
Total number of posts on all pages (n)	225	345	192	762
Average number of posts per page (n)	15	23	13	17
Average number of posts per day per page (n)	0.2	0.4	0.2	0.3
Posts that were videos (n (%))	45 (20)	76 (22)	94 (49)	215 (28)
<b>Level of consumer interaction with posts<sup>1</sup></b>				
Likes per post (mean ± SD)	830 ± 1,408	1,916 ± 9,503	8,526 ± 26,791	3,261 ± 15,228
Shares per post (mean ± SD)	71 ± 222	481 ± 3,463	989 ± 2,729	488 ± 2,727
Comments per post (mean ± SD)	294 ± 680	268 ± 796	294 ± 832	282 ± 773
Views per video (mean ± SD)	79,021 ± 75,152	437,088 ± 988,319	782,817 ± 2,053,039	514,908 ± 1,509,284
<b>Healthiness of food and/or beverage products in posts</b>				
Posts containing a food and/or beverage product (n (%))	187 (83)	231 (67)	71 (37)	489 (64)
Food and/or beverage products classified as occasional <sup>2</sup> (n (%))	205 (91)	208 (90)	71 (100)	484 (99)
Facebook pages with 100% of products classified as occasional (n (%))	11 (73)	8 (53)	13 (87)	32 (71)
<b>Use of marketing techniques in posts</b>				
Posts with an activity for consumers (n (%))	128 (57)	105 (30)	44 (23)	276 (36)
Posts with a promotional strategy (n (%))	52 (23)	121 (35)	136 (71)	309 (41)
Posts with a premium offer (n (%))	81 (36)	145 (42)	35 (18)	261 (34)

1. The number of likes, comments, shares and views on each post may include non-New Zealanders who have also liked the brands Facebook page

2. Classified according to the Ministry of Health Food and Beverage Classification System

SD: Standard deviation

## E. Sponsorship of children's sport clubs

An analysis of the web pages of sports clubs for five major sports popular among children was conducted to identify any listed sponsors from December 2014 to February 2015. A website survey of 268 local children's clubs and national/regional associations across five popular sports in three regions of New Zealand (Auckland, Hawkes Bay, and Otago) was undertaken. As only those sponsors that were promoted on the website were included, the analysis may be an underestimation. Sponsors were categorised as non-food, food or beverage related.

All the national bodies, most of the regional organisations and over half (54%) of the local sports clubs received sponsorship (**Table 8**). Four of the five national bodies had food-related sponsors (including non-alcoholic beverages). Half of the regional organisations and one-quarter (27%) of the local clubs had food-related sponsors. Football and rugby had the highest proportion of organisations at all levels with food-related sponsors with 43% and 38% of organisations respectively, netball had 29% and basketball had 23% while swimming had the fewest food-related sponsors at 9%.

The percentage of sponsors that were food and beverage related ranged from 2.9% for swimming to 13.1% for rugby. Supermarkets featured amongst the top food-related sponsors with grocery stores (New World, Pak'n'Save, Four Square) having 15% of the food and beverage sponsorship, fast food chains selling burgers and pizza had 14% of the sponsorship and non-alcoholic beverages had 7%.

This study showed significant food-related sponsorship of children's sports. Sponsorship is not included within the ASA Code on marketing to children, but it clearly needs to be.

**Table 8:** Sponsorship of children's sport clubs

Sport	Number of clubs in survey*	Number of food and beverage sponsors	Total all sponsors	% of clubs with food sponsorship*
Football	77	58	640	National: 100% Regional: 0% Local: 44% Total: 43%
Basketball	22	7	118	National: 100% Regional: 43% Local: 7% Total: 23%
Netball	51	39	337	National: 100% Regional: 67% Local: 6% Total: 29%
Rugby	73	79	624	National: 100% Regional: 83% Local: 33% Total: 38%
Swimming	45	5	199	National: 0% Regional: 0% Local: 10% Total: 9%
<b>Total</b>	<b>268</b>	<b>188</b>	<b>1811</b>	<b>National: 80% Regional: 51% Local: 27% Total: 32%</b>

\*National, regional, local

## F. Food packages

Packaged foods and non-alcoholic beverages in the Nutritrack database were classified using WHO and MOH nutrient profiling systems<sup>58</sup>. The percentage of items not permitted to be marketed to children was 71% using WHO Europe criteria and 61% under the Ministry of Health's criteria (FBCS).

The use of promotional characters on breakfast cereals was investigated using pictures of the nutrition information panel and front-of-pack label for all breakfast cereals (n=247) on sale at two major supermarkets in 2013<sup>59</sup>. Products were classified using the FSANZ Health Claims Nutrient Profiling Scoring Criterion<sup>26</sup>. Of the 52 products displaying promotional characters, 48% were for 'cereals for kids', and of those, 72% featured on 'less healthy' cereals. The most common type of promotional character was cartoon or company owned characters. Other types of promotional characters used were an amateur sportsperson or premium offers. No licenced characters or celebrities or famous sports persons were found on breakfast cereals.

Food packages need to be included within restrictions on marketing to children since unhealthy foods are being promoted to children using promotion strategies such as the cartoon characters.

## G. Outdoor advertising around schools

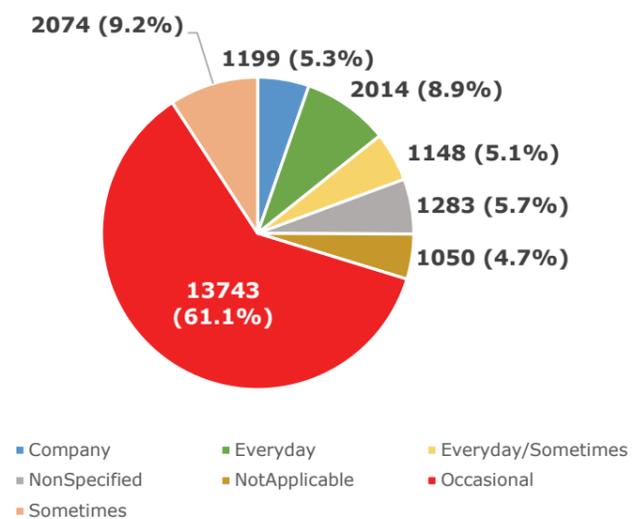
It is unclear whether 'school zones' are considered a children's setting in the Children and Young People's Advertising Code<sup>46</sup>, and if so, how the zones are defined. A sample of 950 schools (37.5% of total) was assessed in 2016. 500m network buffers were created from school boundaries. For comparative purposes, the numbers of ads was adjusted to per km<sup>2</sup>, because schools with larger grounds had larger school zones. However, since the average school zone area was about 1km<sup>2</sup>, the absolute and adjusted numbers were similar. All outdoor food and beverage advertisements in the area were identified and for 535 schools, pictures were taken of all food advertisements. These included billboards, posters, free standing signs, bus shelter signs and store signs with a food or beverage logo. Foods advertised were classified according to the Ministry of Health Food and Beverage Classification System (2016 version).

About 60% of foods were classified as not permitted to be marketed to children and young people under the new Children and Young People's Advertising Code<sup>46</sup> (Figure 8).

There was a median of 8.9 unhealthy food advertisements per km<sup>2</sup> with a median of 10 around the most deprived schools and 8.3 around the least deprived schools. The proportion of 'junk' food advertisements was significantly higher around schools with the highest (50.7%) compared to the lowest (37.4%) number of socioeconomically deprived children ( $p < 0.001$ ). Sugar-sweetened beverages (N=4584, 20.4%) and fast food (N=4329, 19.2%) were most frequently marketed.

School zones need to be explicitly recognized as a children's setting in the Advertising Standards Authority self-regulatory Code, which restricts occasional food advertising in children's settings.

Figure 8: Foods and food brands/companies identified in advertisements around schools



## 6. Food provision in settings

Research question: How healthy is the food provided in key settings (schools, hospitals, other settings)?

### A. In schools

There is strong evidence linking health and wellbeing with educational outcomes, especially among children<sup>60,61</sup>, and healthy school environments with higher student education achievements<sup>62-64</sup>. School policy has an indirect effect on student learning, in that the policy impacts on the actions and the environments that have a positive effect on learning, behaviour and overall health and wellbeing<sup>65,66</sup>. A whole school approach is required rather than simply focusing on the food-service<sup>64</sup>. Policies improve the health and wellbeing of students through facilitating an environment that is conducive to learning healthy behaviours, encouraging students to refrain from making unhealthy dietary choices, overcoming barriers and improving the coherence between school food systems and school curriculum on healthy food choices<sup>67</sup>.

In 2008 a clause in the National Administration Guideline was introduced requiring schools to make only healthy options available where food and beverages are sold on school premises. This was removed in 2009<sup>68</sup>. In March 2016, the Ministry of Health and Ministry of Education recommended to schools that they become a 'milk and water only school'<sup>69</sup>. The Ministry of Health has a classification system for the provision of foods in schools: Food and Beverage Classification System<sup>28</sup>. Foods are categorised as 'everyday', 'sometimes' or 'occasional' depending on alignment with food and nutrition guidelines, particularly added fat, salt and sugar.

In 2016, all schools, except special schools, alternate education schools, correspondence schools and teen parent units, were invited to participate in the School-FERST (School Food Environments Review and Support Tool) Study. There were 819 participating schools (response rate = 33%): 618 full and contributing primary, 29 intermediates, 135 secondary, 37 composite schools. The sample was representative of New Zealand schools by school type, decile and area (urban, rural). Food policies were received and assessed from 145 schools.

### Nutrition policies in New Zealand schools

Strength and comprehensiveness of school food/nutrition policies were assessed using an adapted version of the Well-SAT (Wellness School Assessment Tool) to score the comprehensiveness and strength of written health-related policies<sup>70</sup>. The Well-SAT was adapted to the New Zealand context by focusing on nutrition only and aligning with the Food and Beverage Classification System and the Food and Nutrition Guidelines for Healthy Children and Young People<sup>71</sup>. The tool has 40 indicators within 4 domains: 'Nutrition education' (5 indicators), 'nutrition standards for foods provided and sold' (13 indicators), 'promotion of a healthy school food environment' (14 indicators) and 'communication and evaluation of the nutrition policy' (8 indicators).

### Scoring of indicators was as follows:

**0:** the policy did not address the particular good practice indicator,

**1:** the policy addressed the particular indicator, but the statements in the policy were vague or unclear,

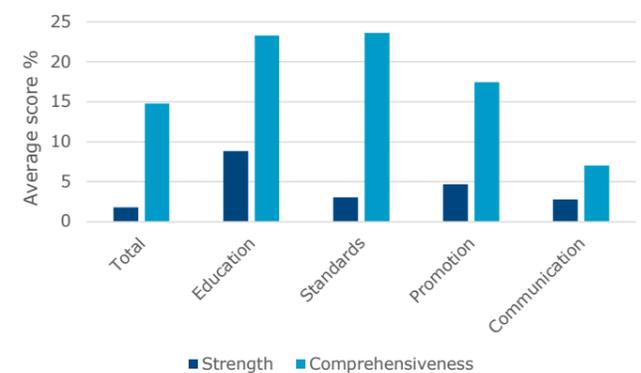
**2:** statements in the policy were specific and directive language was used.

The frequency of 1 and 2 scores determined the total comprehensiveness score while the frequency of 2 scores determined the total score for strength.

Of the 819 participating schools, 38.5% of primary and 44.8% of secondary schools reported having a written school food and nutrition policy. Policies received from 145 schools were analysed. Overall scores for the strength (mean 3%) and comprehensiveness (mean 16%) of the policies were extremely low across all school types (Figure 9).

The scores for strength and comprehensive were 5.3 and 20.3 respectively for schools in the most deprived areas and 4.1 and 16.8 respectively in the least deprived areas. Policy statements were suggestive only, lacked authority and were more guidelines rather than mandates.

Figure 9: Strength and comprehensiveness of school nutrition policies (n=145)



### The most common aspects included in school food and nutrition policies were:

- Recommendations that all foods provided and sold in schools should be based on the Ministry of Health Food and Nutrition Guidelines and/or the Food and Beverage Classification System.
- Encouraging nutrition education in the curriculum and teachers to be good role models for students.

### Few policies addressed the following:

- Students leaving school grounds during lunch.
- Standards for foods and beverages brought from home.
- Steps to promote healthy food choices in the canteen, e.g. price interventions.

### Virtually no policies addressed:

- Monitoring and evaluation of the policy implementation.
- Timely reviewing and updating of the policy.
- Assessing the level of compliance with the policy.

Strengthening healthy school food policies, with regular monitoring systems is key to aligning school food to government and school outcomes. Parents and caregivers support schools limiting access to less healthy foods and drinks<sup>72</sup>.

## Foods provided in schools

Provision of foods and beverages in schools is optional for schools with many schools providing a lunch order-in system or a school canteen, which may be a profit-making business. Therefore, it is important to monitor the school food environment to ensure that its operation is in the best interests of student health and wellbeing. The School-FERST self-completed questionnaire contained mainly closed-ended questions (Table 9). In addition, canteen menus were retrieved and analysed using the national Food and Beverage Classification System for New Zealand schools.

**Table 9:** Outline of School-FERST questionnaire

<b>Part A</b>	Existing programmes, guidelines and policies implemented related to healthy food environments in schools  Development and updating of policies/procedures and processes/implementation
<b>Part B</b>	Sources, type and ways foods and beverages are available to students, including provision, sales and fundraising
<b>Part C</b>	Sponsorship, commercial advertising, school gardens, nutrition education, examples of positive stories of improving the healthiness of school food environments

A larger proportion of secondary and composite schools (83.1%) sold food and/or beverages to students during the school day in comparison to primary and intermediate schools (67.1%). For primary schools (56.7%), the lunch order-in system was the most popular source through which foods and beverages were sold to students. For secondary schools, the school canteen, either run by the school (46.2%) or outsourced to private contractors (45.5%) was the most popular.

## Milk and water only schools

In March 2016, the Ministry of Health and Ministry of Education recommended to schools that they become a 'Milk and Water Only School', that is, offering only milk and water for sale to students during the school day<sup>69</sup>. A lot more primary and intermediate schools (67.5%) self-reported to be 'Milk and Water Only' in comparison to secondary and composite schools (23.3%). Forty-two percent of schools sold sugar-sweetened beverages.

## Healthiness of food and beverages sold to students during the school day

Foods were sold in 434 primary schools and 143 secondary schools. The proportion of 'everyday', 'sometimes' and 'occasional' items offered on menus was evaluated for the 423 primary and 122 secondary schools who provided their menu for analysis. Similar proportions of 'everyday' and 'occasional' items were offered by both primary and secondary schools as part of the daily school food service (Table 10). There were no statistical differences by decile tertile for primary and secondary schools.

**Table 10:** Healthiness of foods for sale at schools

	Primary Schools (n=423)	Secondary Schools (n=122)
Proportion of food groups offered for sale that were 'everyday' Mean (SD)	26.2% (19.5)	26.8% (11.2)
Proportion of food groups offered for sale that were 'occasional' Mean (SD)	58.2% (25.3)	57.4% (13.6)
Number (%) of schools that did not offer any 'occasional' food groups for sale	18 (4.3%)	0 (0%)
Number (%) of schools that did not offer any 'everyday' food groups for sale	93 (22.0%)	6 (4.9%)
Number (%) of schools that only offered 'occasional' food groups for sale	63 (14.9%)	3 (2.5%)

SD = standard deviation

A validation study compared the self-reported information on the food and beverages sold in school via the School-FERST survey with fieldworker observations in 53 schools. There was a strong, positive correlation ( $r_s = 0.60$ ,  $p < .001$ ) between the self-reported and the observed data for the proportion of 'everyday' (healthy) items offered for sale, giving confidence in the validity of the short list of foods included in the School-FERST questionnaire.

## Fundraising activities using foods and beverages

Fundraising is an integral part of school life and provides a vital source of supplemental income for school infrastructure, resources, and student activities. Many primary (81.8%) and secondary schools (80.2%) conduct fundraising activities using foods and beverages. Primary schools were more likely to conduct fundraising activities 'once a term' whereas secondary schools conducted them 'several times a term'. The majority of food and beverage items used most often for fundraising activities were 'occasional' items with few 'everyday' items used (Table 11). Schools that reported not using food and beverages for fundraising raised funds through various activities and initiatives that enhance health and wellbeing for their students and the wider school community, for example walk-a-thons, car washes, book fairs, students' art auctions, Zumba classes, and toothbrushes. Some school regulations limited the number of food-related fundraising activities.

**Table 11:** Food and beverages used for fundraising activities in schools

	Primary Schools	Secondary Schools
Schools using food and beverages for fundraising, N (%)	530 (81.8%)	138 (80.2%)
Schools that use food and beverages for fundraising that submitted the list of fundraising items, N (%)	491 (92.6%)	129 (93.5%)
Mean proportion of items used for fundraising in schools that are 'everyday' food and beverage items	17.4%	16.5%
Mean proportion of items used for fundraising that are 'occasional' food and beverage items	74.7%	78.7%
Number (%) of schools using 'occasional' foods in fundraising	473 (96.3%)	125 (96.9%)
Number (%) of schools using ONLY 'occasional' foods in fundraising	213 (43.4%)	67 (51.9%)

## Food and nutrition programmes

Primary schools were more likely to participate in both food (62% of schools) and nutrition (57% of schools) programmes in comparison to secondary schools (42% food programmes, 34% nutrition programmes). Of the schools that participated in programmes, the participation in specific programmes is outlined in Table 12.

**Table 12:** Participation of schools in food and nutrition programmes

Activity	Primary schools	Secondary schools
<b>Food programmes</b>		
Fonterra Milk in Schools	92.3%	39.7%
Fruit in Schools	40.3%	N/A
Kids Can Food for Schools	36.5%	28.8%
Kick Start Breakfast	50.0%	84.9%
<b>Nutrition programmes</b>		
Enviroschools	36.7%	29.3%
Health Promoting Schools	53.1%	53.5%
Heart Schools	14.6%	12.1%
Life Education Trust	34.8%	NA

NA: Programmes only in primary schools

## School gardens, nutrition education, sponsorship and commercial advertising

A healthy school environment is associated with healthy eating embedded as a whole school approach<sup>55,66</sup>. Schools were asked about additional activities related to foods. A large proportion of primary schools (85%) and 62% of secondary schools reported that they have an actively-used school garden. For secondary schools, school gardens were primarily used in teaching curriculum (85.1%), for example food technology or hospitality subjects, while for primary schools, students and staff were able to take produce for themselves and their families (71.6%). Almost all schools reported that nutrition education was included in the curriculum.

Only a very small proportion of schools (1.7% primary, 0.6% secondary) reported to have commercial promotion/advertising on school grounds. The most common were healthier fast food (for example Pita Pit, Subway), ice creams/ice blocks/jellies, and sausage sizzles. A small number of schools (2.4% primary, 3.2% secondary) reported to receive sponsorship from food and beverage companies. Most of the sponsorship supported sports teams, school prizes/awards, financial aid for students as well as infrastructure and resources such as publishing the newspaper or school magazine.

## Barriers in implementing a healthier school food environment

Almost one-third of primary schools and half of secondary schools reported that they faced barriers when trying to implement a healthier school food environment. The most common barriers faced by primary schools were resistance from parents (20.4%), convenience and ease of preparing processed/ready-to-eat items (13.6%), and resistance from students (8.7%). For secondary schools, the main barriers were resistance from students (30.2%), loss of profits from the lack of sale of healthy foods and beverages (23.8%), and the convenience and ease of preparing processed/ready-to-eat items (20.9%).

## Inequalities in access to healthy foods in schools

There were significant differences between most deprived schools (deciles 1-3) and least deprived schools (deciles 8-10) for the following indicators:

- Most deprived schools were more likely to participate in food or nutrition programmes than least deprived schools.
- For fundraising, most deprived primary schools were more likely to use more 'everyday' items for fundraising than least deprived primary schools, whereas the mid-decile schools (deciles 4-7) were more likely to use more 'occasional' items than schools of other deciles.
- For primary schools, most deprived schools were more likely to face barriers (46% of schools) when trying to implement a healthier school food environment than least deprived schools (20% of schools).

There were no significant differences between most deprived and least deprived schools for the following indicators:

- Similar proportions of 'everyday' and 'occasional' items were offered by both primary and secondary schools as part of the daily school food service across deciles.

In terms of food and beverage items for sale, the most deprived schools were less likely to sell sugar-sweetened beverages, but otherwise there were no differences compared with least deprived schools (Table 13). Nevertheless, the proportions of schools selling sugar-sweetened beverages and 'occasional' foods were very high across the board.

**Table 13:** Key indicators of food provision in schools by decile

Indicator	Most deprived*	Least deprived*
% of schools selling sugar-sweetened beverages	<b>33.9</b>	<b>44.3</b>
Proportion (%) of foods offered for sale that are 'everyday' items (primary)	29.8	29.8
Proportion (%) of foods offered for sale that are 'occasional' items (primary)	54.8	56.6
Proportion (%) of foods offered for sale that are 'everyday' items (secondary)	27.2	28.3
Proportion (%) of foods offered for sale that are 'occasional' items (secondary)	59.5	53.6

Statistically significant results in bold

\* Most deprived schools (decile 1-3), least deprived schools (decile 8-10)

Overall, the healthiness of school food environments is poor. If schools have policies, they are typically very weak and not comprehensive. There is still considerable unhealthy food and drinks sold at schools or used in fundraising. The most deprived schools did have a higher proportion of nutrition-related programs, but what was clearly missing across the board was a strong policy environment which was ensuring healthy food environments to match the teachings of healthy eating in the curriculum.

## B. In District Health Boards (DHBs) and hospitals

The public health care system can show real leadership by providing healthier food environments, starting with DHB nutrition policies<sup>29</sup>. All DHBs made a commitment to remove sugar-sweetened beverages from their premises by January 2016. Subsequently, a National Healthy Food and Drink Policy<sup>29</sup> has been developed by the DHB Healthy Food and Drink Environments Network – a group of nutrition, dietetic, food service, and/or public health representatives from all DHBs, along with the Ministry of Health. Individual DHBs are encouraged to adopt it or review their current policy to ensure it aligns with the National Policy. Where DHBs have adopted the policy, it is expected to be implemented over a two-year period (by 2019). The policy relates only to areas of the hospital that are freely accessible to the public such as open cafes and vending machines, not private areas of the hospital such as an internal staff cafeteria or patient

food. The policy includes a classification system to categorize the foods for sale according to their healthiness, to support work with food retailers to improve the foods and drinks on offer. Foods are classified as 'green', 'amber' or 'red'<sup>29</sup>.

### Assessing DHB nutrition policies

The strength and comprehensiveness of the national policy and each of the DHB nutrition policies were assessed in 2017 using an adapted version of the Well-CCAT assessment tool<sup>73</sup> (Wellness Child Care Assessment Tool) to quantitatively assess the comprehensiveness and strength of written health-related policies. The tool has 29 indicators within 3 domains: 'Nutrition standards' (13 indicators), 'promotion of a healthy food and drink environment' (10 indicators), and 'communication and evaluation of the nutrition policy' (6 indicators), scored as follows:

- 0:** the policy did not address the particular good practice indicator,
- 1:** the policy addressed the particular indicator, but the statements in the policy were vague or unclear,
- 2:** statements in the policy were specific and directive language was used.

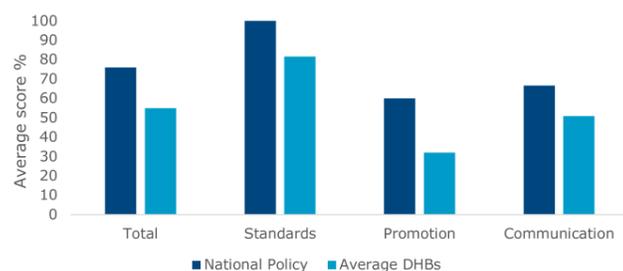
The frequency of 1 and 2 scores determined the total comprehensiveness score while the frequency of 2 scores determined the total score for strength.

Some DHBs had adopted the National Policy, some were working towards adoption while others were continuing with their own existing policies.

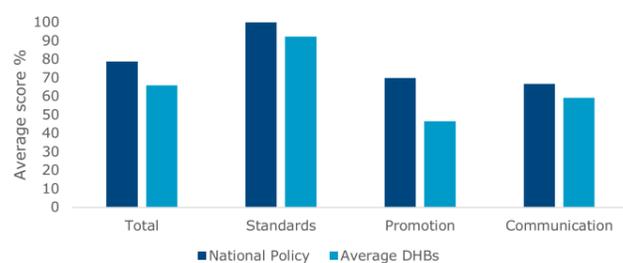
The average strength of DHB nutrition policies was 55/100, while the average comprehensiveness was 66/100. The scores of each domain are displayed in **Figure 10** and **Figure 11**.

The maximum score of 100 was obtained by five DHBs for strength of their nutrition standards and by 15 for comprehensiveness of their nutrition standard. None of the DHBs obtained the maximum score for the other two domains. For both strength and comprehensiveness, the best performing DHBs were Waitemata, Waikato, Auckland, Bay of Plenty and Hawkes Bay.

**Figure 10:** Strength of DHB nutrition policies (average score)



**Figure 11:** Comprehensiveness of DHB nutrition policies (average score)



In 2017, DHBs were performing best (≥90% of DHBs with a score of "2") for the following indicators:

#### Standards:

- Implementation of nutrition standards complying with existing New Zealand guidelines.
- Availability of wholegrain food options.
- Availability of fruits and vegetables.
- Implementation of nutrition standards for meetings and events.
- Implementation of nutrition standards for stores, canteens, outlets and vending machines.

#### Communication

- Assignment of staff for implementation of the policy.
- Specification of time frame for revision of the policy.

The DHBs were performing worst (<20% of DHBs with a score of "2") for the following indicators:

#### Promotion

- Provision of technical support for food vendors.
- Availability of menu labelling system.
- Availability of front-of-pack labelling system.

#### Communication

- Specification of course of action when policy is breached.
- Guidelines on how to deal with complaints and concerns.

The National Healthy Food and Drink Policy includes a classification system to categorize the foods for sale according to their healthiness, to support work with food retailers to improve the foods and drinks on offer. Foods are classified as 'green', 'amber' or 'red'<sup>29</sup>.

In four DHBs (Auckland, Counties Manukau, Waitemata, Northland), photos were taken of all individual foods offered in publicly accessible spaces inside hospitals (8 hospitals or clinical/surgery centres with a total of 34 outlets and 54 vending machines) in the first half of 2017. The data collected related only to areas of the hospital that are freely accessible to the public such as open cafes and vending machines, not private areas of the hospital such as an internal staff cafeteria.

On average, 54% of all foods offered were 'red' foods and 13% were 'green' foods. The most common foods offered on hospital grounds were packaged snack foods (18%), cold drinks (17%), bakery items (12%) and mixed or ready-to-eat meals (12%). Fruit (2.6%) and vegetables (0.9%) were much less frequently offered. The most common 'red' foods offered were packaged snacks, cold drinks and bakery items. The most common 'green' foods offered were fruit, mixed meals, cold drinks and nuts and seeds. Generally, the proportion of 'red' foods was higher in vending machines (76%) than in canteens and other stores on hospital grounds (47%). Cold drinks classified as 'red' still represented 10.5% of all foods and drinks available on hospital grounds, despite DHBs making a commitment to remove sugar-sweetened beverages from their premises by January 2016.

DHBs are on an improvement journey in relation to their food and drink policies and are at different stages on that journey. They have differing contractual arrangements for the provision of food and drink on their premises, which impact on the implementation of healthy food and drink policies. The size of the staff and visiting population impact the volume of product sold, which can result in limitations to the availability of fresh produce. However, hospital food environments are largely unhealthy offering mainly 'red' foods. The implementation of the national policy will need to be thoroughly evaluated to ensure better policies translate into healthier environments.

## 7. Food retail

### A. In communities

**Research question: How healthy is the food retail environment within communities?**

#### Food swamps

Food retail food environments can influence food purchases, dietary behaviours and associated health outcomes<sup>21,74-76</sup>. This sub-study assessed the density of healthy and unhealthy food outlets in communities to identify food 'swamps'<sup>77</sup>, census areas with a higher relative density of unhealthy outlets than other census areas. Addresses from all food outlets were retrieved from 66 City and District Councils in 2014. They were geocoded and a sample was spatially validated<sup>78</sup>. Outlets classified as healthy were supermarkets and fruit and vegetables stores. Outlets classified as unhealthy were fast food, takeaway and convenience (bakery, confectionery store, dairy, service station) outlets. The average density of outlets was calculated per 10 000 people in each census area.

The most deprived areas were associated with higher food retail outlet availability for all outlet types<sup>77</sup> (**Table 14**). However, the relative density of unhealthy food outlets was significantly higher in most compared to least deprived areas. Areas in the most deprived quintile had 73% higher availability of fast food and takeaway outlets, 64% higher availability for convenience stores and 66% higher availability of supermarkets and fruit and vegetable stores compared to areas in the least deprived quintile. There were 14% more potential food swamps in the most deprived areas compared to the least deprived areas.

**Table 14:** Inequalities in access to healthy food retail environments

Indicator	Most deprived*	Least deprived*
Average density of convenience stores per 10,000 people in census areas	<b>12.7</b>	<b>4.5</b>
Average density of fast food and takeaway outlets per 10,000 people in census areas	<b>13.7</b>	<b>3.7</b>
Average density of supermarkets and fruit and vegetable stores per 10,000 people in census areas	<b>3.9</b>	<b>1.3</b>

Results in bold are statistically significant.

\* Areas with highest/lowest NZ Deprivation Index

### School zones

Convenience, fast food and takeaway outlets were mapped in school zones defined as 500 metres road network distance from school boundaries and stratified by urban/rural area and quintile of school socioeconomic deprivation<sup>78</sup>. Access to unhealthy foods within walking distance was considerable with 47% of urban schools having a convenience store within 500m road network distance from the main school entrance and 38% having a fast food or takeaway outlet. There were significantly more convenience stores, fast food and takeaway outlets per km<sup>2</sup> within 500m around the most deprived urban schools (average 2.4 stores and outlets) than the least deprived schools (1.8). There was a median of 8.9 unhealthy food advertisements with a median of 10 around the most deprived schools and 8.3 around the least deprived schools.

There are substantial inequalities in access to healthy community food environments, with more unhealthy food outlets in more deprived communities compared to less deprived communities.

### B. Within outlets and stores

**Research question: How healthy is the food retail environment within outlets and stores?**

#### Sports and recreation centres

Seventy council sport and recreation centres around New Zealand were sampled. Over half (53%) sell sugar-sweetened beverages.

#### Takeaway outlets

A survey of 1500 takeaway outlets was undertaken. Large fast-food chains were not included. Almost all outlets (98%) sold sugar-sweetened beverages with one-quarter of outlets having less than half the drink options as sugar-sweetened.

A sample of 592 takeaways in the Auckland District Health Board area were visited. The promotions of foods and meals, not including menus, inside the outlets were identified and categorised according to the Ministry of Health Food and Beverage Classification System<sup>27</sup>. Those classified as 'occasional' were considered unhealthy. On average, there were eight unhealthy foods and meals promoted inside a fast food or takeaway outlet. Two-thirds of promoted foods and meals were unhealthy.

The takeaway outlets that sold deep-fried battered fish and hot chips were asked about fat and salt. There were 61 outlets selling fish and chips in the sample of takeaway outlets in central Auckland. Of the 51 that reported the type of fat used, 39 outlets deep fried using oil with most using canola oil. No outlets reported using lard, tallow or shortening. Twelve reported using 'other' which was mostly vegetable oil. Almost half (45%) of fish and chip shops gave customers the option of adding salt to hot chips on request.

#### Supermarkets

New Zealanders buy the majority of their food in supermarkets: 87% of households buy food and drinks from supermarkets weekly or more often<sup>79</sup>. A small number of companies hold a 90% share of the retail food market: Foodstuffs (Pak 'N Save, New World, Four Square) and Progressive Enterprises (Countdown, Freshchoice, Supervalu)<sup>80</sup>. This means that small changes to the in-store food environment by one or two retailers have the potential to substantially change the diet of the entire New Zealand population.

A set of indicators to measure the healthiness of supermarket food environments were developed. These were assessed in a large, representative sample of supermarkets across New Zealand<sup>81</sup>. Over

half (204 out of 375) of large supermarkets (Pak 'N Save, New World, Countdown) were selected. Data was collected between August and November 2016. Flyers from supermarket chains were collected and analyzed over fifteen weeks. Junk food was defined based on the definition of occasional food in the Ministry of Health Food and Beverage Classification system (updated in March 2016)<sup>27,28</sup>. The results are reported in **Table 15**.

**Table 15:** Indicators of the healthiness of supermarket food environments

Indicator	Result	Description of indicator
<b>Availability</b>		
Cumulative linear shelf length	On average, for every 1m of shelf length for indicator unhealthy foods, there was about 42cm of shelf length for indicator healthy foods.	Indicator unhealthy foods: represented by soft drinks and energy drinks, crisps and snacks, sweet biscuits and confectionery Indicator healthy foods: represented by fresh and frozen fruits and vegetables
<b>Prominence</b>		
Check-outs and end-of aisle endcaps free of Junk food	27% of all supermarkets had at least 20% of check-outs free of junk food. On average, 15% of check outs (including self-check outs) were free of junk food. On average, 53% of end of aisle endcaps (back and front) were for junk food	Junk food includes confectionery/chocolate; ice cream/ frozen yoghurt/sorbet; sugar-sweetened beverages (soft drinks, fruit and vegetable juices, flavoured milks); artificially sweetened beverages; energy and sports drinks; crisps; snack bars (muesli, granola and fruit); biscuits/cakes/muffins/pastries; 2-minute noodles/ instant soups; deep fried foods; pies/sausage rolls; and burgers/pizzas
<b>Promotions</b>		
At entrance or on store windows	One-third of food promotions were for junk food	
Flyers	One-quarter of food promotions were for junk food. There were on average 2.5 junk food promotions for every promotion of fresh fruits and vegetables on the cover pages	

### Inequalities in access to healthy retail food environments

There was no significant difference between supermarkets in more, medium and less deprived areas for the number of junk food free check-outs, proportion of junk food free end caps, or proportion of junk food free promotions in flyers, at the entrance or outside the supermarket (**Table 16**). The ratio of cumulative linear shelf length for healthy versus unhealthy indicator foods was significantly lower in the most deprived areas (ratio 0.38) compared to the least (ratio 0.44) and medium deprived areas (ratio 0.48). This indicates that there was less availability of healthy foods compared to unhealthy foods in supermarkets in more deprived areas.

There is substantial potential for retail environments to be much healthier than they currently are. Local government could be given the powers to reduce the number of food swamps in more deprived neighbourhoods through zoning regulations, particularly around schools. Councils and communities need more regulatory tools to create healthier food environments for those most affected by obesity and NCDs.

Retailers are also an important part of the community, especially in providing competitively priced healthy foods for local consumers. However, they have considerable capacity to create retail environments that do more to promote healthier choices. Supermarkets are already working hard to promote their fresh produce and meat/fish sections, however there are other strategies they can employ to reduce the promotion of unhealthy foods through their choices on product placement in shelves, end of aisle promotions, food in checkouts, and weekly specials choices.

**Table 16:** Indicators of the healthiness of supermarket food environments by area deprivation level

Indicator	Most deprived*	Least deprived*
Average ratio of linear cumulative shelf length for healthy versus unhealthy foods in supermarkets	<b>0.38</b>	<b>0.44</b>
Average % of junk food free checkouts	12.4	16.2
Average % of aisle junk food free endcaps	48.1	43.0
Average % junk food free promotions	62.5	74.6

Results in **bold** are statistically significant.

\* Areas with highest/lowest NZ Deprivation Index

## 8. Food prices

### Research question: What is the relative price and affordability between healthier versus less healthy foods, meals and diets?

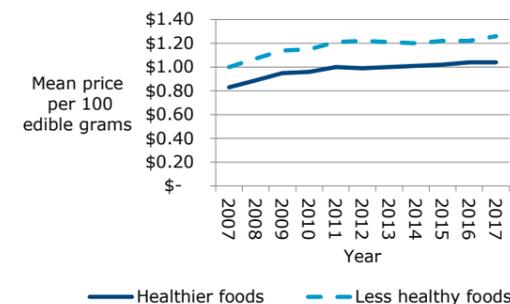
Cost and convenience are major influences on the selection of foods, meals and diets<sup>82,83</sup>. There is a perception that healthier foods, meals and diets are more expensive than their less healthy counterparts<sup>84-86</sup>. Monitoring the price differential provides data to enable advocacy for fiscal policies to make healthy food more affordable and provides nutrition educators and health promoter's valuable information when encouraging people to choose healthier foods.

Commonly consumed foods and takeaway meals by New Zealanders were identified from the Household Expenditure Survey<sup>87</sup> and national Adult Nutrition Survey<sup>88</sup>. The prices of the foods were collected from supermarkets, fresh produce stores and other outlets in selected areas of New Zealand. As the prices were collected by different organisations and research groups, the collection took place at different times of year, so the price collection reflected the seasonal fruits and vegetables at the time. The price of foods in the Food Price Index became available in February 2017 for the previous 10 years, so the change in price of foods was analysed over this time<sup>89,90</sup>. The three approaches of the INFORMAS food prices module<sup>20</sup> were implemented.

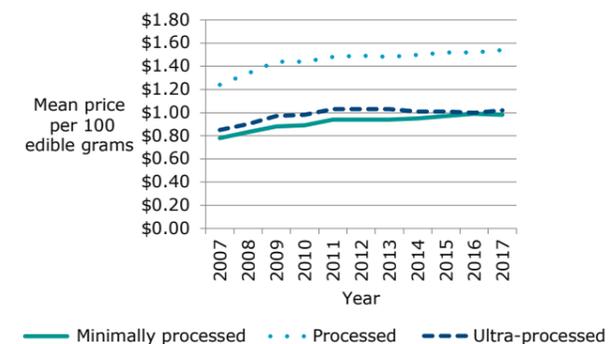
### Price differential between healthier versus less healthy foods

Foods were categorised as healthier and less healthy according to the WHO Europe nutrient profile model, and by degree of processing<sup>90</sup>. Food prices rose during the 10-year period by 20%. Food prices increased at a similar rate for healthier and less healthy foods, and for foods categorised as minimally processed, processed and ultra-processed (**Figure 12, Figure 13**).

**Figure 12:** Change in price over ten years of healthier and less healthy foods



**Figure 13:** Change in price over ten years by degree of processing

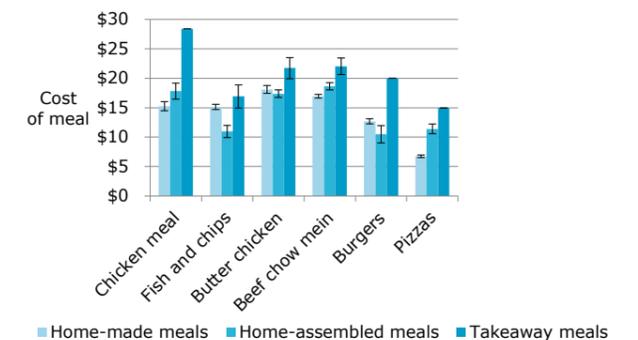


### Price differential between takeaway meals versus home-made equivalents

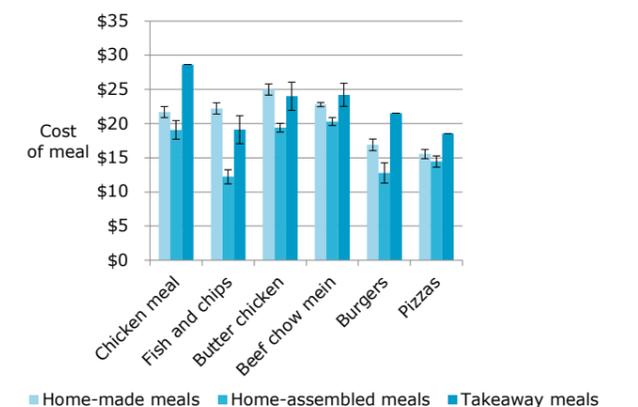
Six popular takeaway meals were identified. For each meal, recipes for a similar but healthier home-made meal (prepared 'from scratch'), and components of home-assembled meals using pre-prepared items (e.g., frozen potato fries, frozen fish fillets, frozen mix vegetables) were selected. Prices of takeaways and foods were collected from takeaway outlets and supermarkets in areas of lower and higher deprivation in Auckland. The takeaway meals were priced at one outlet for the meals from the multinational fast food chains, and from 14 outlets for each of the meals from independent takeaways. As time is a major barrier to preparing home-made meals, the cost of preparation and waiting time of the meals was added to the meal cost in a separate analysis.

The home-cooked meals were cheaper than their takeaway counterparts (except fish and chips) when time was not included (**Figure 14**)<sup>91</sup>. When the cost of preparation time or waiting time (takeaways) was added, costed at the minimum wage, the home-assembled meals were the cheapest options, with three of the home-made meals remaining significantly cheaper than the takeaway meals (**Figure 15**). The home-cooked meals had considerably less saturated fat and sodium and considerably more vegetables than their takeaway counterparts. The home-assembled meals were higher in sodium than the home-made meals but still low in saturated fat.

**Figure 14:** Cost of popular takeaway and home-made meals without time (mean, standard deviation)



**Figure 15:** Cost of popular takeaway and home-made meals with preparation or waiting time (mean, standard deviation)



Preparation and waiting time costed at the minimum wage

## Price differential between healthy versus current diets

A healthy and a current diet were developed using commonly consumed foods for a household of four (2 adults, 14-year boy, 7-year old girl). The healthy diet met the New Zealand Eating and Activity Guidelines<sup>92</sup> and the Nutrient Reference Values<sup>93</sup>. The current diet met the serves consumed of food groups and the nutrient intakes for the household members from the New Zealand adult and children nutrition surveys<sup>94,95</sup>. The current diet met the energy requirement to maintain the current BMI at the current physical activity level (PAL), while the healthy diet met the energy requirement for the ideal BMI (23) and an active PAL (1.7). The affordability of the diets was compared to median household income, income support or minimum wage (1 adult working 40 hours, 1 adult working 20 hours).

Separate healthy and current diets for Māori and Pacific households were developed under the guidance of a Māori and a Pacific expert group co-ordinated by Toi Tangata and Pacific Heartbeat respectively<sup>96</sup>. A scenario for the Māori diets included foods commonly gathered and gifted at no price such as mussels, fresh fish, watercress, puha and mandarins.

### Standard diet

- Alcohol and takeaways only in current diet
- Cheapest price (generics and discounts)
- Fresh fruit and vegetables priced at supermarket

### The prices of the foods in the diets were collected in several different collections.

- Nelson: February 2015, diets for general population to test scenarios of price and diet
- Auckland: November 2016, diets for general population
- Auckland: September 2016, diets for Pacific
- Hamilton, Waikato, July 2017, diets for Māori

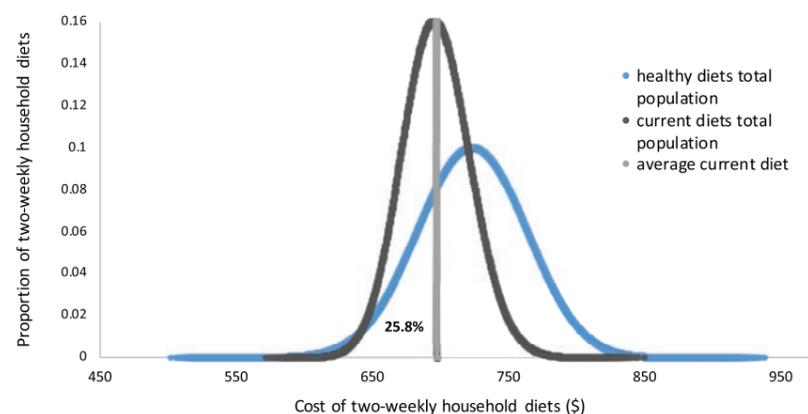
When only one healthy and current diet was developed there was little difference in the price of the healthy and current diet. However, if both diets included alcohol and takeaways, with the healthy diet having moderate alcohol and healthier takeaways, the healthy diet became considerably more expensive than the current diet (Table 17). Considerable savings can be made when including generic products with the cost of the healthy diet (13% cheaper), and the current diet (19% cheaper). Savings can be made when purchasing fresh fruit and vegetables at fresh produce stores, with the cost of the healthy diet 4.8% cheaper, and the current diet 2.2% cheaper.

**Table 17:** Scenarios for general population using prices collected in Nelson in 2015

Diet	Price difference % + current cheaper - healthy cheaper
Standard diet 1 cost for each diet	-0.6%
Takeaways and alcohol in current and healthy diets	+ 18.6%
No takeaways or alcohol in current and healthy diets	+12.7%
No GST fresh fruit and vegetables	-2.0%

A novel computer modelling programme, DietCost<sup>97</sup>, was developed by the University of Auckland to provide a range of prices for healthy and current diets rather than just one of each, allowing for statistical significance to be tested. The average cost of healthy household diets for two weeks was \$27 more expensive than the average cost of current diets, but one-quarter of the healthy diets were cheaper than the average cost of current diets (Figure 16).

**Figure 16:** Percentage of healthy household diets cheaper than the average current diet



### Affordability

Though affordability was similar for both the healthy diet and the current diet, both diets require a considerable proportion of income, particularly if the income was based on the minimum wage or receiving income support (Table 18).

**Table 18:** Percentage of income required to purchase diet

Diet	Price collection	% of income required to purchase diet		
		Median income*	Minimum wage**	Income support***
Healthy diet - all	Auckland Nov 2016	18.7%	32.8%	51.0%
Current diet - all	Auckland Nov 2016	19.4%	33.9%	52.8%
Healthy diet - Māori	Hamilton July 2017	16.1%	28.2%	43.9%
Current diet - Māori	Hamilton July 2017	16.2%	28.3%	44.2%
Healthy diet - Māori	Waikato rural, gifted and gathered foods included, July 2017	16.1%	28.2%	44.0%
Current diet - Māori	Waikato rural, gifted and gathered foods included, July 2017	16.7%	29.2%	45.4%
Healthy diet - Pacific	Auckland Sept 2016	15.2%	26.6%	41.4%
Current diet - Pacific	Auckland Sept 2016	15.9%	27.8%	43.3%

\*Median household disposable income (<http://stats.oecd.org/Index.aspx?DataSetCode=IDD>)

\*\*Minimum wage + Family tax credit. Minimum wage on April 2016 was \$15.25

<https://www.employment.govt.nz/hours-and-wages/pay/minimum-wage/>

<http://www.ird.govt.nz/calculators/keyword/wff-tax-credits/calculator-wfftc-estimate-2016.html>

\*\*\*Income Support: Jobseeker support and Accommodation Supplement (<https://www.workandincome.govt.nz/products/index.html>)

# 9. Inequalities in access to healthy food environments

An important part of this study of food environments was to assess differences by locality because inequalities in access to healthy food environments could explain a substantial part of the inequalities in obesity and diet-related NCDs. The findings from these studies show substantial food environment inequalities. Compared to the least deprived areas, the most deprived areas:

- Have higher food retail outlet availability for all outlet types, 73% more fast food and takeaway outlets, 64% more convenience stores, and 66% more supermarkets and fruit and vegetable stores.
- Are 14% more likely to be considered a 'food swamp' (areas with higher relative density of unhealthy outlets)
- Have a higher proportion of shelf space in supermarkets allocated for unhealthy than healthy foods, but have similar proportions of check-outs free of unhealthy foods, unhealthy food promotions on end cap displays at the end of aisles, and poster promotions at the entrance or outside the supermarket.
- Have 33% more convenience, fast food and takeaway outlets in school zones (within 500 metres) around urban schools.

One positive sign amongst these negative findings of less healthy food environments in more deprived areas was that lower decile (more deprived) primary and secondary schools were more likely to participate in food or nutrition programs than higher decile schools. For primary schools only, the schools with the most disadvantage (deciles 1-3) were more likely to use more 'everyday' items in their school menus than higher decile schools, whereas deciles 4-7 were more likely to use more 'occasional' items than schools of other deciles in fundraising activities. For primary schools, low decile (1-3) schools (46% of schools) were more likely to face barriers when trying to implement a healthier school food environment than less deprived, high decile (8-10) schools.

In general, many food environments were significantly less healthy in areas of greater deprivation but the targeted food nutrition programs for schools may be helping to offset this with food and nutrition programs being preferentially targeted at low decile schools. Unhealthy food environments within more deprived areas is a likely strong contributor to creating and exacerbating social and health inequalities.

## Discussion, recommendations and future plans

This study presents an overview of the healthiness of New Zealand food environments for measuring progress on creating healthy food environments. This research is highly original and policy relevant due to the very 'upstream' approach of examining policies and environments. Most research on obesity and NCDs has been at the individual level (e.g. behavioural, metabolic, genetic) or more 'downstream' at the population level (e.g. prevalence of risk factors and diseases). In addition, this research is 'solution-oriented' with all sub-studies relating specifically to policy actions.

New Zealand's food environment profile is largely unhealthy. Implementation of actions by central and local Governments, the food industry and schools are low, but nutrition policies by DHBs are more comprehensive. More than 50% of the packaged food supply is unhealthy according to several nutrient profiling systems; healthy diets are on average more expensive than current diets and food marketing to children through a range of media is pervasive and predominantly for unhealthy foods. In addition, there are substantial inequalities in access to healthy food environments, with significantly more

unhealthy food outlets around more deprived schools and communities compared to less deprived schools and communities.

These food environments largely determine the population's dietary patterns and levels of obesity which are the largest cause of ill-health in New Zealand. Far more emphasis needs to be placed on reducing this preventable health burden which is responsible for about one fifth of preventable health loss. The responsibility for creating healthier food environments largely sits with the government and the food industry. The two INFORMAS modules that rated government progress on food policies and infrastructure support (Food-EPI) (<http://www.informas.org/food-epi/>) and food company commitments (BIA-Obesity) (<http://www.informas.org/bia-obesity/#BIAObesity|2>) provide guidance on the future priorities for action.

### Priority actions for government

The process of benchmarking the New Zealand Government compared to international best practice by 71 public health experts found that the Government is at the level of international best practice for very few of the healthy food policy domains, with fiscal policies and regulations on food marketing to children being particularly weak<sup>98</sup>. The Government performed better with infrastructure support, particularly governance, monitoring and intelligence and platforms for interaction. The top priorities for action, along with the current situation and challenges are outlined in **Table 19**.

An overarching priority action to improve the healthiness of food environments was to strengthen the childhood obesity plan. The previous Government's plan to reduce New Zealand's very high rate of childhood obesity bore little resemblance to the recommendations from WHO's Commission on Ending Childhood Obesity, co-chaired by New Zealand Prime Minister's Chief Scientific Advisor, Sir Peter Gluckman. A revised plan to reduce childhood obesity in New Zealand should include the major policies recommended by the Commission. The biggest challenge for the current Government to achieve this is to withstand the powerful opposition of the processed food industry which lobbies against the 'hard' but effective policies based around taxes, regulations and targets.

A target for reducing childhood overweight and obesity to one in four children by 2025 (currently one in three) with reduced disparities has been proposed<sup>101</sup>. This target is about the current level of childhood overweight and obesity in Australia. International best practice for improving the nutrient composition of the food supply is Public Health England's structured reformulation approach<sup>102</sup> which New Zealand could emulate for salt and sugar.

Funding for the promotion of healthy eating and improving food environments is very low given the very high contribution that unhealthy diets make to health loss and the preventable nature of this burden. Income from a tax on sugar-sweetened beverages drinks could help to fund a boost in nutrition promotion.

New Zealand children are surrounded by unhealthy food marketing. The voluntary ASA Children and Young People's Advertising Code does not cover certain types of advertising such as sponsorship and marketing on packages which target children. Its ability to limit other types of marketing to children which are included in the Code is also highly questionable<sup>49</sup>. School zones need to be explicitly recognized as a children's setting which restricts unhealthy food advertising. Converting the voluntary code into regulations and broadening the coverage of media will be needed to give teeth to this code.

Less than half of New Zealand schools have nutrition policies and those

policies are almost uniformly very weak and not comprehensive. This is an area in need of greater strengthening. A stronger childhood obesity plan would ensure that healthy foods are provided in schools and in early childhood education services. Nutrition policies of DHBs are much stronger and more comprehensive and have been supported by the National Healthy Food and Drink Policy, with experts recognising the progress made with public sector policies to promote healthy food choices since 2014. Both schools and DHBs have the potential to promote healthy food choices through many of the domains such as influencing food composition of suppliers, menu board labelling, food pricing and promotion to favour healthier foods.

The government initiative to encourage schools to become a 'milk and water only school' is a start and is reportedly achieved by two-thirds of primary schools but less than one-quarter of secondary schools. Many schools, particularly secondary schools, sell food and beverages during the school day. Of these schools, 15% of primary schools offered only 'occasional', unhealthy foods, and all secondary schools offered 'occasional' foods. The Government's approach of not providing schools with policy directions on food service is perpetuating the unhealthy food environments in schools. Government policies will be required to ensure healthy food is widely available and that the unhealthy 'occasional' foods are removed from school menus and fund-raising activities. Access to unhealthy foods within walking distance from urban schools is substantial, and greater for the most deprived schools compared to the least deprived schools.

Local governments cannot currently use zoning laws to limit the density of unhealthy outlets, especially around schools, so the ability for them to do so needs to be included within their zoning laws. Sports centres are a key place to promote healthy lifestyles alongside physical activity and a simple first step would be to remove sugar-sweetened beverages. A stronger childhood obesity plan could include policies on availability and promotion of foods and beverages, particularly for council-owned centres that sell food and beverages.

Compared to other obesity prevention actions, a tax or health levy on sugar-sweetened beverages has considerable empirical and modelled evidence of effectiveness<sup>103</sup>. It has been implemented in over 30 jurisdictions<sup>104</sup> and has the strong backing of the 71 health experts in the Food-EPI study<sup>98</sup> as well as the New Zealand Medical Association<sup>105</sup>, New Zealand Dental Association<sup>106</sup>, and the Royal Australasian College of Physicians<sup>107</sup>. The processed food industry has been a central force in lobbying successive governments against a sugar-sweetened beverages levy. This pattern of industry lobbying being more powerful than the strong recommendations of WHO and multiple medical and public health organisations on government policy on sugar-sweetened beverages levies has been seen repeatedly overseas. However, a significant number of politicians in many countries have now shown the fortitude to place children's health as a high enough priority to withstand the industry lobbying by implementing the levy.

The HSR labelling is one of the few food environment policies in place in New Zealand, yet it is at risk of being undermined by very low implementation by industry, problems with the algorithms giving sugary products high star ratings, no evidence yet of effects on consumer purchasing or on industry reformulation, and much stronger front of pack labelling systems emerging from other countries. In particular, the warning label approach taken by Chile mandates a warning be placed on processed foods that are above certain levels for sugar, salt, saturated fat and energy density<sup>104</sup>. Brazil, Canada and other countries are developing such systems which will probably overtake New Zealand's HSR system in terms of coverage and effectiveness.

There is universal agreement that there is a lot of nutrition information in the public arena from numerous sources which is confusing for the public and there is a lack of authoritative information and education on nutrition from the government. Dietary guidelines are regularly developed but rarely widely disseminated such that they can help the public navigate the complexities of the food environments and the cacophony of conflicting nutrition information. West Australia and Victoria have led the way with social marketing approaches to nutrition through the Live Lighter campaign<sup>108</sup>. This approach has been very successful in providing

consistent, authoritative messages with sufficient cut-through to influence reported behaviours<sup>109</sup>. Investing in such approaches is an essential strategy for improving the diets of New Zealanders.

Obesity, dental caries and mental health problems are all related to diet and are all high among New Zealand children. Yet, the most recent information we have on children's diet is 16 years old from New Zealand's only child nutrition survey conducted in 2002. A repeat survey is a high priority and ideally nutrition surveys for children and adults should be created as annual rolling surveys with allocated funding, rather than having to find major funding every 5-10 years for periodic surveys.

While the yearly rate of price change is not significantly different between healthier and less healthy foods, food prices significantly increased over a 10-year period, and healthy diets are, on average, more expensive than current diets for the total population. The latter is not the case for Māori and Pacific populations due to the current diet consumed being much higher in energy than the recommended healthy diet. Healthier home-cooked meals are cheaper than most of their equivalent takeaway meals (e.g. fried chicken meal), even when the cost of preparation time is accounted for. Both a healthy and the current diet is unaffordable for households on low incomes. A priority is therefore to reduce poverty and lift incomes for those households in the lowest income brackets. Inequalities in income lead to inequalities in health. Major actions to reduce the marked inequalities in food environments would also help to prevent the income inequalities translating into health inequalities. Such actions include giving local government the authority to reduce 'food swamps' in disadvantaged areas, including in 'school zones' within 500m of schools. There were more food and nutrition programs within low decile schools showing that programmatic targeting is appropriate. What have not been implemented to reduce inequalities, are population-wide approaches recommended by WHO and expert groups. Population-wide policies, such as regulations on reducing unhealthy food marketing to children, are likely to have a disproportionately greater effect on more disadvantaged children, thus reducing inequalities.

### Priority actions for food companies

The BIA obesity study revealed that food industry commitments are relatively poor with median scores for all policy domains, except nutrition strategy, below 50%. There was also a wide range of scores (0-75%) indicating enormous scope for many food companies to catch up the leaders in the field. The major areas for improvement are in: product formulation to reduce sugar, sodium and saturated fat; reducing marketing which targets children and young people; and applying HSR labelling to all their products. The current government is in discussions with the food industry about some of these measures.

More than half of the packaged foods available for sale are unhealthy and while New Zealand has high implementation for regulatory systems for health and nutrition claims, one-quarter of unhealthy packaged foods have nutrition claims, and 7% have health claims. Having government targets to reduce the mean population intakes of sodium, sugar and saturated fat and targets to reduce these nutrients in certain food groups would provide the direction needed for industry to act in a more concerted way than the current voluntary reformulation approaches provide.

The level of implementation of front-of-pack labelling has improved since 2014 with the introduction of the Health Star Rating in 2014, with 807 foods displaying the HSR in 2016, and 2700 by March 2017 although the HSR is more likely to be on healthier products. By 2017 however, this is still a small minority of products available and implementation remains slow. A priority for action is to strengthen the HSR system to address anomalies in the design algorithm (especially sugar) and to consider mandatory implementation.

The food industry can contribute substantially to the voluntary ASA Children and Young People's Advertising Code by having its own policies on ethical marketing. With the explosion of targeted marketing at the individual level through social media, companies are being forced to specify very tightly their target markets. Their media purchasing strategies can be very effective in ensuring that children under 18 are not targeted and this will greatly reduce the exposure of children to marketing for unhealthy

**Table 19:** Priority actions for improving food environments in New Zealand

Priority Action	Current situation	Implementation challenges
1. Strengthen Childhood Obesity Plan	The food environments in places where children gather (schools, sport clubs, school zones etc) remains largely unhealthy, despite two decades of publicity about rising rates of childhood obesity and the soft education and awareness strategies in the current plan of action.	Implementation of the most effective and cost-effective strategies recommended by WHO has been hampered by food industry opposition and a lack of government willingness to use 'hard' policy tools such as taxes and regulations. Nevertheless in certain areas (i.e. taxes on sugar-sweetened beverages) there has been accelerated action internationally in recent years <sup>99</sup> .
2. Set targets for: <ul style="list-style-type: none"> <li>Reducing childhood obesity</li> <li>Population intakes of salt, sugar, saturated fat</li> <li>Voluntary reformulation of packaged foods (salt, sugar, saturated fat)</li> </ul>	Over half the packaged food supply is unhealthy. There are no targets for childhood obesity, healthy diets or healthier foods that New Zealand is working towards.	Setting targets may not be favoured because this increases the accountability for the organisations (e.g. government agencies, food companies, schools) who have the ability to make a difference. Nevertheless other countries are going down this track. The UK recently announced a target to reduce childhood obesity by half by 2030 <sup>100</sup>
3. Increase funding for population nutrition promotion	Current funding for promoting healthy diets, although increased from 2014 to 2017, is lower than a decade ago and is equivalent to only about 5% of the current direct costs of overweight and obesity.	Achieving increases in funding for prevention is traditionally difficult when there is high pressure on healthcare services. Significant funding is needed for priorities #5, #8 and #9 but will be offset by income from #6.
4. Regulate unhealthy food marketing to children	High exposure of children and young people to marketing of unhealthy foods in school zones, TV, magazines, product packaging, Facebook and other social media.	The ASA Code is voluntary, does not include children's peak TV viewing times, does not include all non-broadcast media and children's settings, sponsorship and packaging and there is no evaluation of effectiveness of the Code.
5. Ensure healthy food in schools	Lack of nutrition policies in schools, existing policies are weak and not as comprehensive, occasional foods are readily available. Milk and water policies in some schools.	There is no overarching commitment for mandatory policies on healthy food in schools. Changing food culture in schools will take time and more support systems are needed for schools to change.
6. Introduce a tax on sugar-sweetened beverages	High consumption and availability of sugar-sweetened beverages.	Strong opposition from the processed food sector. Traditional political fear of implementing new taxes.
7. Strengthen the Health Star Rating	Very slow uptake of HSR. HSR mainly on healthier products. Concerns about validity of the algorithms. No evidence yet that HSR will encourage healthier food choices and product reformulation. Lack of funding for HSR promotion.	Little evidence yet to point to success or failure of HSR, making strengthening or abandoning decisions harder to make. Voluntary approaches appear easier to establish than mandatory approaches, but they are always weaker.
8. Implement the new Eating and Activity Guidelines	Very little public promotion or education on healthy eating and activity recommendations	Effective promotion needs significant funding.
9. Conduct a new national nutrition survey for children	Latest nutrition survey conducted in 2002 reflecting a lack of information on children's eating habits and nutrient intake.	Dietary surveys are expensive and have not been incorporated into rolling monitoring systems with ongoing funding (like the New Zealand Health Survey).

foods. While almost half the companies in the BIA-Obesity study committed to comply with the Code, none of the companies had extended Code restrictions on marketing to children up to 18 years of age. Quick-service chain restaurants performed poorly on the BIA-Obesity with regards to restrictions on marketing to children.

Supermarkets have great potential to create food retail environments which are more conducive to healthy food choices by reducing unhealthy foods in their weekly specials, end of aisle promotions and check-out counters. Adjusting shelf space towards more healthy and less unhealthy products will also send healthier signals to customers about their food purchases.

**Future developments**

INFORMAS will become a critical data resource for analysing the determinants of changes in obesity and NCDs over time and also the impacts of national policies which are difficult to measure otherwise. It will tie in closely with, and contribute to, WHO monitoring efforts. INFORMAS

is a global initiative so in the future the healthiness of food environments in different countries can be compared. From this study, a country profile of the state of food policies and environments will be created to benchmark countries and will be particularly useful in the context of the United Nations Decade of Action on Nutrition (2016-2025)<sup>110</sup> which aims to increase accountability of the main actors to improve and increase their commitments to end malnutrition in all its forms.

**FoodBack**

FoodBack is a systems-based approach to empower citizens and change agents to create healthier food environments<sup>111</sup>. The FoodBack App offers a potential monitoring tool to continue to collect data on the New Zealand food environments by a range of people alongside academic researchers. FoodBack was developed with input from citizens and change agents in six diverse New Zealand communities and reviewed by public health experts. A food environments feedback system uses crowdsourcing to gather key

indicators of the healthiness of diverse community food places (schools, hospitals, supermarkets, fast food outlets, sports centres) and outdoor spaces (e.g. around schools). Comments and pictures on the barriers and facilitators to healthy eating are collected along with exemplar stories. All the information collected is centrally processed and translated into 'short' (immediate) and 'long' (after analyses) feedback loops to stimulate actions to create healthier food places. A medal-like system (bronze, silver, gold) and positive stories highlight positive action.

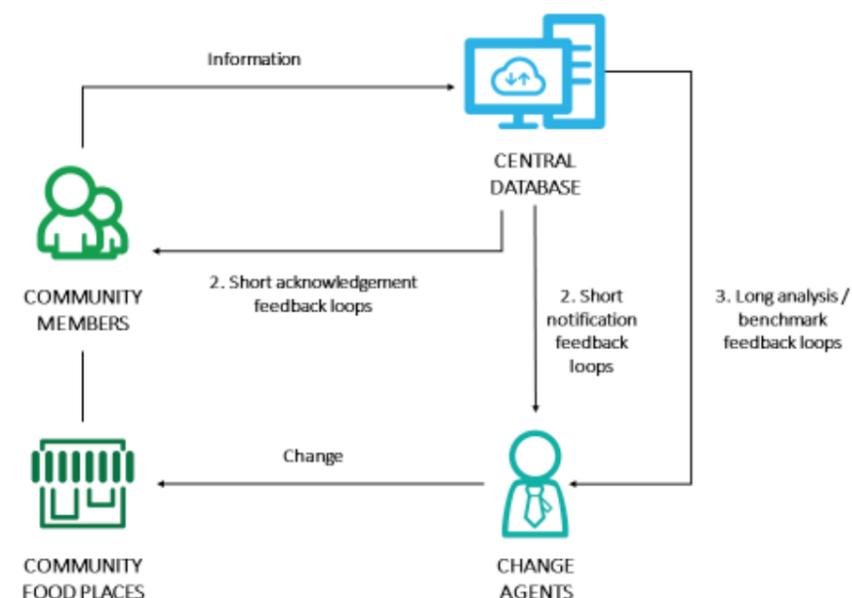
The 'short' immediate feedback loops for citizens acknowledge their contribution and the feedback loops for local change agents notify them of the healthiness of their setting. The crowdsourced information can be used to generate 'long' feedback loops through formal analysis and benchmarking of food places to populate reports for policymakers.

The FoodBack App is available at no charge through the Google Play and Apple iOS stores alongside an interactive website ([www.foodback.org.nz/](http://www.foodback.org.nz/)). FoodBack engages citizens in data collection on their food environments. FoodBack provides a way to recognise positive efforts to create healthier food places, find outlets providing healthier options, apply pressure for action to create healthier food places, and to provide a fine-grained database of food environments for real-time food policy research. FoodBack provides constructive feedback and benchmarking to give local change agents goals to work towards.

**Conclusion**

This research and monitoring fills a gap in the information available regarding food environments and policies in New Zealand. There is considerable scope for the government, food companies and local settings such as schools to make major changes towards healthier, more equitable food environments and healthier New Zealanders.

**Figure 17:** FoodBack food environments feedback system



# Appendix 1: Methodology of the first New Zealand national food environment and policy survey

Setting	Sample	Year	Methods and tools	Food classification system(s)	Indicators	Equity indicators	References
<b>Nutrition policies and commitments</b>							
<b>National Government</b>	56 independent public health experts in 2014 and 71 independent public health (n=48) and government (n=23) experts in 2017	2014 & 2017	<b>The Healthy Food Environment Policy Index</b> (Food-EPI): Evidence documentation on policy implementation for 23 policy and 24 infrastructure support indicators; government officials validate document; independent performance rating workshops (online rating in 2017); action identification and prioritization according to importance and achievability criteria; feedback of results to government. See <b>Appendix figure 1</b>	NA	Level of implementation ('very little if any', 'low', 'medium' and 'high') compared to international best practice of 47 good practice indicators across 13 domains: 7 'Policy' domains (food composition, labelling, marketing, prices, retail, provision and trade) and 6 'Infrastructure Support' domains (e.g. leadership, governance, funding, monitoring); Food-EPI composite score; Top priorities for creating healthier food environments	Two out of 47 indicators: 1. Reducing health inequalities is a government priority 2. The Government regularly monitors progress towards reducing inequalities	16,98, 112-115
<b>Food companies</b>	The 25 largest NZ companies by market share across food and non-alcoholic beverage manufacturers, quick service restaurants and supermarkets.	2017	<b>Business Impact Assessment-Obesity and Population Nutrition (BIA-Obesity)</b> : document <sup>32</sup> and website (www.informas.org/bia-obesity/) analysis on publicly available commitments, interviews of food companies; feedback results to companies (see <b>Appendix figure 2</b> ); methods based on Access to Nutrition Index <sup>116</sup>	NA but nutrient profiling system used by companies within their commitments is evaluated as part of the BIA	About 70 indicators across 6 action areas tailored by sector (food and non-alcoholic beverage manufacturers, supermarkets and quick service restaurants): corporate population nutrition strategy, relationships with other organizations, positions in relation to government policy, product formulation, product labelling, product and brand promotion, product accessibility	NA	15,116
<b>Healthiness of food environments</b>							
<b>Food composition</b>	All packaged foods across the 4 biggest NZ supermarket chains	2014 & 2016	Pictures of all sides of food packages in supermarkets, entering nutrition information panels and ingredient lists in the <i>Nutritrack</i> database of composition of packaged food products	Health Star Ratings, NOVA classification system, WHO Europe nutrient profile model	% of packaged foods with a Health Star Rating < 3.5 stars; Median Health Star Rating of packaged foods with and without a Health Star Rating on the front-of-pack; % of packaged foods that are ultra-processed; % of packaged foods not permitted to be marketed to children according to the WHO Europe	NA	14
<b>Food labelling</b>	Selection of 8 healthier and less healthy packaged food groups <sup>40</sup> , all products in those food groups	2014	<i>Nutritrack</i> photos of food packages analysed using a standardized taxonomy <sup>12</sup> for health-related labelling on food products; packaged food products with and without HSR on the front-of-pack	FSANZ Nutrient Profiling Scoring Criterion (NPSC), Health Star Ratings	% of healthy and less healthy packaged foods with health claims on the front-of-pack, % of healthy and less healthy packaged foods with nutrition claims on the front-of-pack; % of packaged foods with a Health Star Rating on the front-of-pack	NA	12,40,59
<b>Food promotion**</b>	<ol style="list-style-type: none"> <li><b>Television:</b> 3 channels, 4 week and 4 weekend days, 18 hours/day</li> <li><b>Internet:</b> 110 popular websites among children and 70 food brand websites</li> <li><b>Facebook:</b> Pages of 45 popular packaged food, beverage and fast food companies</li> <li><b>Magazines:</b> Total of six magazines, five with highest readership among adolescents, 3 specifically targeted to adolescents (aged 10-17)</li> <li><b>Outdoor:</b> Around 950 schools</li> <li><b>Children- settings:</b> in 819 schools</li> <li><b>Sport sponsorship:</b> 268 websites of children's sport clubs for the 5 most popular sports</li> <li><b>Food packages:</b> Breakfast cereals most appealing to children</li> </ol>	2014-2017	<p>Extent and nature of marketing, analysis of the power of food advertisements (premium offers, promotional characters).</p> <p><b>Television:</b> recordings and coding ads</p> <p><b>Internet and Facebook:</b> visiting and coding pages</p> <p><b>Magazines:</b> reading and coding</p> <p><b>Outdoor:</b> taking pictures and coding ads in a zone of 500m around the school boundaries</p> <p><b>Children's settings:</b> Through school survey filled out by school representative</p> <p><b>Sport sponsorship:</b> Through visiting websites from children's sport clubs and national/regional sport associations</p> <p><b>Food packages:</b> <i>Nutritrack</i> photos of food packages analysed using a standardized taxonomy for promotional characters and premium offers</p>	WHO Europe nutrient profile model, Food and Beverage Classification System; Nutrient Profiling Scoring Criterion (NPSC)	<ul style="list-style-type: none"> <li>Average number of unhealthy TV food ads per hour during child peak viewing times; % of food company websites with a designated children's section; % of ads on Facebook pages of popular food and beverage brands using promotional characters and premium offers.</li> <li>Average number of unhealthy food ads per magazine for magazines popular among adolescents and magazines targeted at adolescents.</li> <li>Average number of unhealthy food advertisements per km<sup>2</sup> in a zone of 500m around urban schools; % of schools with unhealthy food advertising or sponsorship.</li> <li>Average number of food and beverage sponsors for children's sport clubs; % of less healthy foods with promotions appealing to children on the front-of-pack.</li> </ul>	Indicators by tertile of level of school socioeconomic deprivation (using school decile 1-10*)	13,51,56 52

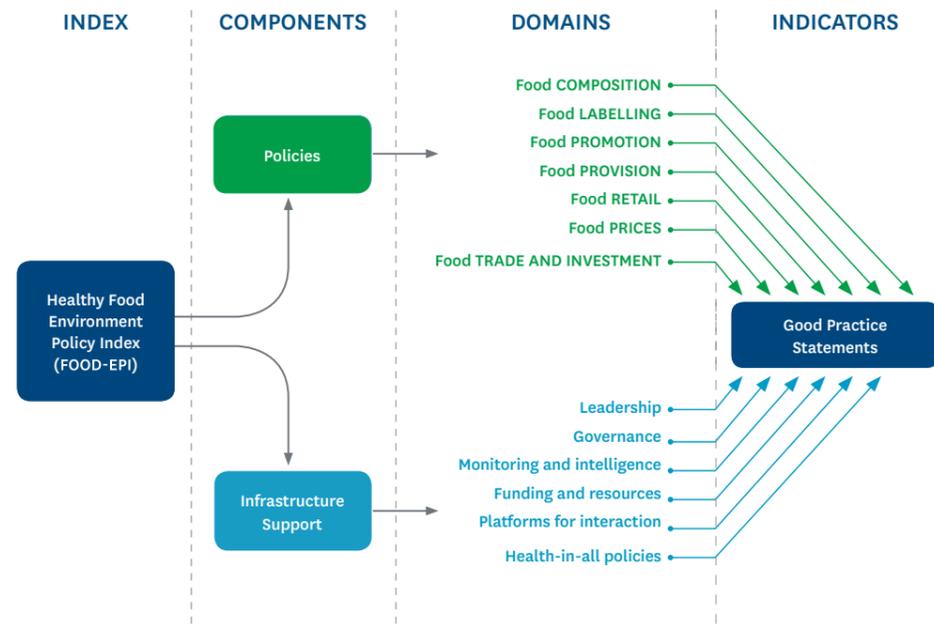
Setting	Sample	Year	Methods and tools	Food classification system(s)	Indicators	Equity indicators	References
Food provision	819 schools (1/3 of schools in New Zealand) including 647 primary and 172 secondary schools	2016	Food environment review and support tool (School-FERST), questionnaire filled in by school representatives; menus analyses versus standards/guidelines  Policy check list (including the domains 'nutrition education', 'standards', 'promotion' and 'communication', developed based on the WELL-SAT tool <sup>70</sup> )	Food and beverage classification system	% of schools with a written nutrition policy; strength (out of 100%) and comprehensiveness (out of 100%) of current school nutrition policies  % of schools selling sugar-sweetened beverages; Proportions of foods sold meeting Food and Beverage Classification System Number of schools using occasional foods in fundraising Involvement in food and nutrition programmes	Indicators by tertile of level of school socioeconomic deprivation (school decile 1-10*)	In preparation
	All hospitals across 4 Auckland District Health Boards (DHBs)	2016 & 2017	Taking pictures of all foods available in the hospitals and analyse them according to the Health Food and Drink Policy for the public sector	Amber/green/red as per the national Healthy food and drink policy	% of red, amber and green foods by hospital and for vending machines and canteens/outlets separately	NA	In preparation
	All DHBs (n=20) across the country	2015 & 2017	Policy check list (including the domains 'standards', 'promotion' and 'communication', developed based on the WELL-CCAT tool <sup>73</sup> )	NA	% of DHBs with a written nutrition policy; strength (out of 100%) and comprehensiveness (out of 100%) of current DHB nutrition policies	NA	In preparation
Food retail	Community: all school zones in NZ; all food outlets from Council lists	2014-2015	Geocoding and spatial validation of location of different food outlets types. Three different definitions of school food zones (radial buffers, network buffers and polygon buffers); Ground truthing food outlets in about 500 school zones	NA	Average density of convenience stores per 10,000 people in census areas; Average density of fast food and takeaway stores per 10,000 people in census areas; Average number of convenience, fast food and takeaway outlets per km <sup>2</sup> within 500m around urban schools	Indicators by tertile or quintile of level of area socioeconomic deprivation (using NZDep 1-10)	21,78
	In-store: 204 supermarkets, 1500 takeaways, 70 sport and recreation centres.	2016	Validation study for indicator of cumulative shelf length for healthy versus unhealthy foods <sup>118</sup> ; Measuring cumulative linear shelf length for healthy versus unhealthy foods; counting total number and number of check-outs and end-of-aisle endcaps with junk food; analysing supermarket flyers ; identifying if sport and recreation centres selling sugar sweetened beverages	Defined based on validation study <sup>118</sup>	<b>Supermarkets:</b> Indicators related to food availability (ratio of cumulative linear shelf length for healthy versus unhealthy foods), prominence (proportion of 'junk food free' check-outs and end-of-aisle endcaps) and promotion (proportion of 'junk food free' promotions in flyers and in-store)  <b>Fast food and takeaway outlets:</b> % of fish and chips outlets using deep frying oil with less than 28% of saturated fat; % of outlets for which sugar-sweetened beverages represent less than 50% of drink options on the menu; Average number of promotions inside fast food and takeaway outlets and sport and recreation centres for unhealthy foods; % of centres selling sugar sweetened beverages.  <b>Sport and recreation centres:</b> % of centres selling sugar sweetened beverages	Indicators by tertile of level of area socioeconomic deprivation (using NZDep 1-10)	118
Food prices	Foods in the food price index, popular NZ takeaway and home-cooked meals, population current and healthy diets	2015-2017	Modelling of a) dietary guidelines and b) current intakes converted to family menus and shopping basket price surveys.	WHO Europe NP model, NOVA classification system by degree of processing	Cost differential between healthy and current less healthy diets for different population groups, affordability of healthy diets; yearly rate of change of price of healthier versus less healthy foods	Cost differential between healthy and current diets for different ethnic groups	90,91,96,97

NA: Not applicable; FSANZ: Food Standards Australia New Zealand; HSR: Health Star Rating, NZDep: New Zealand Deprivation Index 2013; NPSC: Nutrient Profiling Scoring Criterion

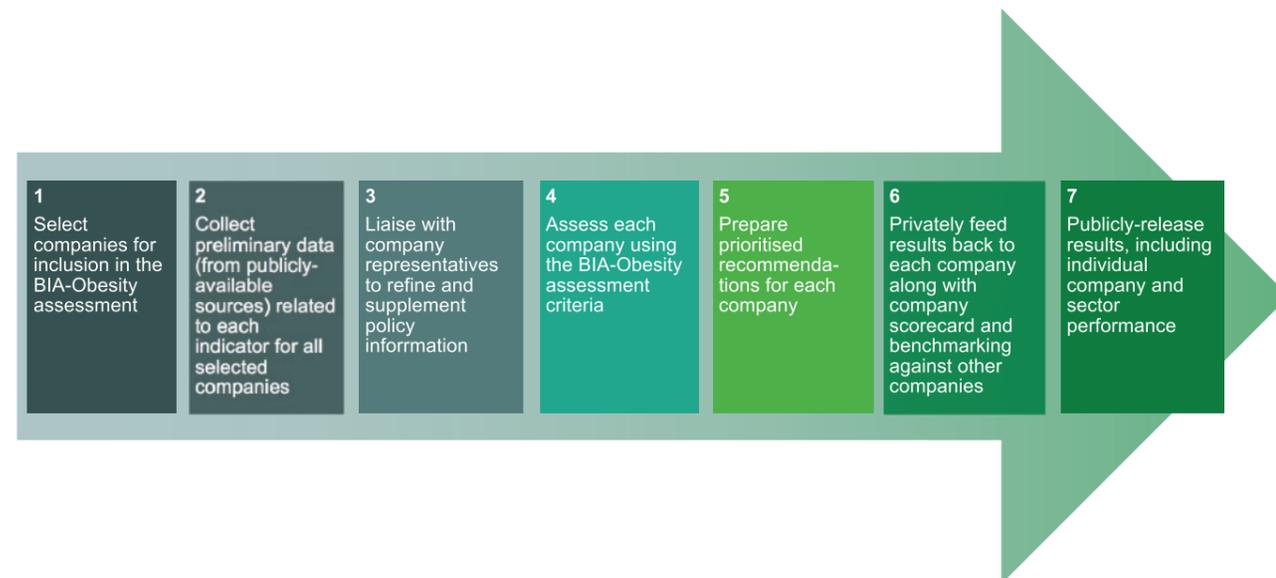
\* Decile 1 schools are the 10% of schools with the highest proportion of students from low socioeconomic communities while Decile 10 schools are the 10% of schools with the lowest proportion of students from low socioeconomic communities

\*\* Food promotion in retail settings (supermarkets, fast food and takeaway outlets) is captured as part of the Food Retail setting but could fit under food promotion too, although not focused on children such as the other media included

Appendix Figure 1: Food-EPI Tool



Appendix figure 2: BIA-Obesity process



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