How healthy are New Zealand food environments?

A comprehensive assessment 2014-2017

Report
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Contents

Executive Summary 4
Publications from this study 10
Acknowledgements 11
Abbreviations 11
Glossary 11
Introduction 12
Objectives 13
Methods 14
Food classification systems 14
1. Government implementation of healthy food environment policies 16
   Implementation of food environment policies compared to international best practice 16
   Recommended actions to improve the healthiness of food environments 18
2. Food company commitments and disclosure to improve population nutrition 18
   Transparency, specificity and comprehensiveness of commitments to improve population nutrition 18
   Recommended actions to improve commitments 18
3. Composition of packaged foods 20
   Health star Rating 20
   Level of processing 20
4. Labelling of packaged foods 20
   Health star Rating 20
   Nutrition and health claims on food packages 20
5. Unhealthy food marketing to children 22
   Television 22
   Magazines 23
   Company websites 23
   Company Facebook pages 24
   Sponsorship of children’s sport clubs 25
   Food packages 25
   Outdoor advertising around schools 26
6. Food Provision in Settings 27
   A. In schools 27
   B. In District Health Boards (DHBs) and hospitals 29
7. Food Retail 31
   A. In communities 31
   B. Within outlets and stores 31
8. Food Prices 33
   Price differential of healthier versus less healthy foods 33
   Price differential of takeaway meals versus home-made equivalents 33
   Price differential of healthy versus current diets 34
9. Inequalities in access to healthy food environments 36
   Discussion, Recommendations and Future Plans 38
   Priority actions for government 38
   Priority actions for food companies 37
   Future developments 38
   Conclusion 39
   Appendix 1: Methodology of the first New Zealand national food environment and policy survey 40
   References 45

List of tables
Table 1: Classification systems of the healthiness of foods and non-alcoholic beverages used in the national study 15
Table 2: The number of products with nutrition claims and health claims 21
Table 3: Health star Ratings (HSR) of packaged food supply March 2016 20
Table 4: The level of implementation of food environment policies and infrastructure support by the Government in 2017 against international best practice (* 2014 ratings) 17
Table 5: Ranking of the commitments and disclosure of food companies on improving the healthiness of food environments 19
Table 6: Priority actions for government 36
Table 7: Priority actions for food companies 37
Table 8: Priority actions for improving food environments in New Zealand 38

List of figures
Figure 1: The determinants of food environments and their effects on diets 12
Figure 2: The INFORMAS framework with the modules implemented in New Zealand enclosed in the box 13
Figure 3: Level of implementation of food environment policies and infrastructure support by the Government in 2017 against international best practice (* 2014 ratings) 17
Figure 4: Ranking of the commitments and disclosure of food companies on improving the healthiness of food environments 19
Figure 5: Unhealthy food television advertising impacts (ads x views) for children 5-13 years during week days 22
Figure 6: Unhealthy food advertising impact (ads x views) for children 5-13 years during weekend days 22
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 23
Figure 8: Foods and food brands/companies identified in advertisements around schools 24
Figure 9: Strength and comprehensiveness of school nutrition policies (n=145) 27
Figure 10: Strength of DBH nutrition policies (average score) 30
Figure 11: Comprehensiveness of DHB nutrition policies (average score) 30
Figure 12: Change in price over ten years of healthier and less healthy foods 33
Figure 13: Change in price over ten years by degree of processing 33
Figure 14: Cost of popular takeaway and home-made meals meal with and without time (mean, standard deviation) 33
Figure 15: Cost of popular takeaway and home-made meals meal with preparation or waiting time (mean, standard deviation) 33
Figure 16: Percentage of healthy household diets cheaper than the average current diet 34
Figure 17: FoodBack feedback system 39

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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 to 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 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 provider (819 schools, 28 hospitals, 70 sport centres); food retail (3674 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 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 provider (819 schools, 28 hospitals, 70 sport centres); food retail (3674 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.

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 03 policy and 34 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 Labelling: Strength 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 sugar drinks
- Food Provision: Ensure healthy foods in schools and early childhood education centres

2. Food company commitments to improving population nutrition

The comprehensiveness and transparency of commitments of the 35 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 Uniliver. The bottom five were Goodman Fielder, McCain, Griffith’s Foods, Bita H’ and Domino’s. Insufficient commitments on food information 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), 7% were classified as not suitable for marketing to children using WHO-Europe nutrient criteria, and 5.9% 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 (33%) of all products carried nutrition claims (45% on healthier foods, 31% on less healthy foods) and 15% carried a health claim (33% on healthier foods and 7% on less healthy foods). Almost all (94%) 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 premiums offer (24% 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 km² around schools.

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 93% of secondary schools reported being water/milk only schools; 46.5% of schools used unhealthy foods for fundraising, 58% of schools participated in food provision programs (e.g. fruit in schools) and 53% 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. Offsetting contractual arrangement 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.
Health claims regulations
Government transparency
Monitoring Systems for obesity & NCDs
Fiscal policies
Local zoning laws
Nutrition impact of trade policies

95% of District Health Boards have a written nutrition policy
40% of schools reported they have a written nutrition policy
34% is the median score for food company commitments to healthy reformulation of products

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

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

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 list of variation of costs

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

Food labelling

Cost of diets

Food prices

Food marketing to children

Most deprived schools
10 unhealthy food ads within 500 m
Least deprived schools
4.3 unhealthy food ads within 500 m

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 (13.7 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 39% had a fast food outlet within 500m or 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 37% of supermarkets had at least 20% of promotions were for ‘junk’ foods. The length of weekly flyers, 25% of promotions were for unhealthy foods and advertisements for unhealthy foods within 500m of the school, with higher numbers around the most deprived schools. In addition, lower decile schools (more deprived) had more unhealthy food outlets (3.9 vs 1.3), fast food outlets (13.7 per 1000 people) in the most deprived compared to less deprived, 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.

Dinners
The average cost of dinners 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.

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 living in more deprived areas or communities.

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

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 analysis. Overall, obesogenic food environments are much worse for those living in more deprived areas or communities.

Summary
This study has 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 ORs are much stronger and more comprehensive. ORs 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.

Full report available at: www.informas.org
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, McCarroll A, Bennett E, Tawh 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


Mahesh R, Vandevijvere S, Dominick C, Swinburn B. Relative contributions of recommended food environment policies to improve population nutrition: results from a Delphi study with international food policy experts. Pub Health Nutr. 2018; May 1-7


Vandevijvere S, Adkin C, Swinburn B. Volume, nature and potential impact of advertisements on Facebook and YouTube by food brands popular in New Zealand. NZ Med J. 2018; Apr.13;131(1473):1-4


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The authors would like to thank the Health Research Council and the National Heart Foundation for funding the food environments study.

INFORMAS is the International Network for Food and Obesity/non-communicable diseases (NCDs) Research, Monitoring and Action Support. The authors wish to thank all funding members of the network for their contributions to the development of the INFORMAS modules.


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
NZANZ: Food Standards Australia New Zealand
NSHR: 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

Depensation: NZDep2013 combines nine variables from the 2013 census which reflect eight dimensions of deprivation. This provides a deprivation score for each meshblock. NZDep 2-3 are the least deprived and NZDep 9-10 are the most deprived.

Decile: Decile 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 the schools with the highest proportion of students from low socio-economic communities.

DietCost: A computer modeling 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

Gecoding: 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.

NutTrak: Database comprising information on the nutrient 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 1-8 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.
New Zealand has very high levels of obesity with adults and children having the third highest rate of overweight and obesity within OECD countries. Overall, in 2016/17, 32.2% of adults had obesity, up from 27% in 2007/08. Adult obesity rates are higher for Māori and Pacific adults and for those living in areas of higher deprivation. 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.

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. This is much greater than other risk factors with tobacco use being the next largest contributor (9.1%).

The determinants of food environments and their effects on diets

Food environments

1. Physical (availability, quality, location)
2. Economic (costs)
3. Policy (rules)
4. Socio-cultural (norms, beliefs)

Food environments determine where and what people eat. They are influenced by many factors, including 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 2).

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. The INFORMAS framework consists of modules to monitor, benchmark and support public (government) and private (food company) sector actions.

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

Introduction

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 disclosures 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 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 data 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 13335). 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 students2. Schools were classified into deciles according to socioeconomic criteria. Tertiles were used for analyses: low = deciles 1–3, mid = deciles 4–7, high = deciles 8–10. The NZDep2013 is a measure of New Zealand socioeconomic deprivation, which combines eight dimensions of deprivation: communication, income, employment, qualifications, owned home, support, living space and transport. The NZDep2013 apportions 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

<table>
<thead>
<tr>
<th>System and uses</th>
<th>Type</th>
<th>Method of classifying</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health star ratings</td>
<td>Ordinal scale</td>
<td>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.</td>
</tr>
<tr>
<td>NOVA classification system</td>
<td>Category</td>
<td>Nature, level and extent of industrial processing</td>
</tr>
<tr>
<td>Food classification System</td>
<td>Category</td>
<td>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.</td>
</tr>
<tr>
<td>Nutrient Profiling Scoring Criterion</td>
<td>Numerical</td>
<td>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 &lt;4 (except beverages and cheese products).</td>
</tr>
<tr>
<td>Food and Beverage Classification System</td>
<td>Category</td>
<td>Foods are categorised as everyday, sometimes, occasional depending on alignment with food and nutrition guidelines. This system was updated in 2016. Earlier studies in this report used the 2007 classification system.</td>
</tr>
<tr>
<td>National Healthy Food and Drink Policy</td>
<td>Category</td>
<td>Green foods and drinks are less processed, mostly whole foods and drinks which are low in saturated fat, added sugar and added salt. Amber foods and drinks are not considered part of an everyday diet, but may have some nutritious value. Red Foods and drinks are often highly processed with poor nutritional value and contribute to excess energy consumption.</td>
</tr>
<tr>
<td>Junk Food</td>
<td>Category</td>
<td>Definition developed based on definition of occasional food in Food and Beverage Classification System. Junk food includes confectionery/chocolate, ice cream, frozen yoghurt/ice-cream, sugar-sweetened beverages (soft drinks, fruit and vegetable juices, flavoured milks), artificially sweetened beverages, energy and sports drinks, crisps, snack bars (musels, granola and fruit), biscuits/cakes/muffins/pastries, 2-minute noodles, instant soups, deep fried foods, pies/sausage rolls, burgers, pizza.</td>
</tr>
</tbody>
</table>
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 elsewhere14, but briefly, 47 indicators (42 in 2014) across 7 domains of food environment policies (composition, labeling, 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 59 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 improving population nutrition developed by a panel of international experts to give a summary score of overall healthy food policy implementation15.

Implementation of food environment policies compared to international best practice

Figure 3 shows the results for 2014 (stains) 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 their risks and factor indices. Gaps identified included policies for healthy foods in schools, fiscal and food retail policies, and restrictions on unhealthy food marketing to children. Experts recommend stronger progress since 2014 for implementation of the Healthy Star Rating (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 Plan16, 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 2014 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, 2011.

<table>
<thead>
<tr>
<th>Policy Indicator</th>
<th>Level of Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food composition</td>
<td>High</td>
</tr>
<tr>
<td>Food labeling</td>
<td>Medium</td>
</tr>
<tr>
<td>Food marketing</td>
<td>Medium</td>
</tr>
<tr>
<td>Food prices</td>
<td>Low</td>
</tr>
<tr>
<td>Leadership</td>
<td>Very little, if any</td>
</tr>
<tr>
<td>Governance</td>
<td>Low</td>
</tr>
<tr>
<td>Monitoring and intelligence</td>
<td>Low</td>
</tr>
<tr>
<td>Funding and resources</td>
<td>Low</td>
</tr>
<tr>
<td>Platforms for interaction</td>
<td>Low</td>
</tr>
<tr>
<td>Health-in-all-policies</td>
<td>Very little, if any</td>
</tr>
</tbody>
</table>

| Food composition | Set targets for nutrients of concern (sodium, saturated fat, sugar) |
| Food labeling    | Strengthen the health star rating system 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 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 |

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

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.

Table 3: 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.

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 calories soft drinks and committing to not open new stores near schools.

Researchers and companies fully engaged with the research process and provided feedback and comments during several steps in the process.
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. Evidence indicates that higher levels of processing are related to lower healthiness of foods and in New Zealand the nutrient profiles of ultra-processed food products is significantly worse using the Nutrient Profiling Scoring Criterion (NPSC) compared to less processed foods. Monitoring of changes to the healthiness of the food supply has the potential to drive positive changes at the nutrient composition of processed foods by highlighting those food groups that are making advances and those that are not.

Health Star Rating
Out of the 15,358 packaged food products in the Nutritrack database, the Health Star Rating (HSR) was calculated for 13,380 in 2014. Baby foods, special foods, reconstituted foods, herbs and spices and products with missing information were excluded. At the time of analysis, 5% of products (647) 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 ≤3.5 stars while for all products labeled or not, only 41% qualify for ≥3.5 stars. Foods that displayed the HSR on the label shows how the HSR rating is independent with the number of stars based on the nutrient profile of ultra-processed food products is significantly worse using the Nutrient Profiling Scoring Criterion (NPSC) compared to less processed foods. Almost all (96%) breakfast cereal products displayed a claim with an average of four stars 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 6,100 products from across 1,5 product categories from the Nutritrack database in 2014/15 and 2016/17. The number of products with nutrition content claims increased from 49% at baseline to 56% in 2016/17. The number of claims meeting the requirements of the Food Standards Code increased from 57% to 88%. There was a similar number of general level health claims for both Ministry of Primary Industry survey 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.

Level of processing

A novel approach to classifying foods (NPOC classification) is by the degree of processing where foods are classified as minimally processed, partially processed or industrially processed. Using the 2013 Nutritrack data (n=13,406 products), 67% of products were classified as processed or ultra-processed. 81% of minimally processed foods, while 9% were unprocessed or minimally processed. The HSR is correlated with the degree of processing indicating that less processed foods are healthier.

4. Labelling of packaged foods

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

Health-related labeling on food packaging has the potential to have both positive and negative effects on dietary patterns. 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 that they 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. The rating is independent with the number of stars based on their nutrient, 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, 5% of the products in the Nutritrack database (n=807) displaying the HSR, the highest rating of uptake were for cereals, convenience foods, packaged fruit and vegetables, sauces and spreads and 'other' products (mostly breakfast beverages).

Nutrition and health claims on food packages

INFORMS 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). Claims are classified into: 1) nutrition claims: health-related ingredient claims, nutrient content claims, nutrient comparative claims, and 0) health claims: general health claims, nutrient and other function claims, reduction of disease risk claims. In 2014, data from 756 products across eight categories from the Nutritrack database were used to classify food products according to the INFORMS taxonomy. 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 1.5% 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=187) carried health claims. The cereals category had a substantially greater proportion of products carrying claims than any other category (n=1503 on 64 products), one-third of which were displayed on ‘less-health’ products (n=508). Almost all (96%) breakfast cereal products displayed a claim with an average of four stars per product.
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[50]. 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[46] 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[46]. However, research has consistently shown that self-regulation doesn’t significantly reduce children’s exposure to unhealthy food and beverage marketing[51] 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.[49].

A. Television

Four weekly and four weekend days were randomly selected between June and August 2015[52]. Programming was recorded from 6am to midnight for a total of 450 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 listed as permitted to be marketed to children by WHO’s Europe criteria (WHOD). 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 (WHOD 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 81% 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.

B. Magazines

A content analysis was conducted of all food references (branded and unbranded) for everyday (“healthy”), sometimes and occasional (“unhealthy”) foods in magazines popular among children and adolescents 10-17 years old[52]. Magazines specifically targeted adolescents have 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 cream, while ‘vegetables and fruits’ were the least frequently marketed (3%).

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 in New Zealand children and adolescents aged 6-17 years (n=70)44. 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 advertising (advergaming in games) and 92% had advertising (advercation) in education.

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

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.
D. Company Facebook pages

The WHO recognizes that digital marketing, amplified 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, which allow marketers to engage more deeply with their audiences than traditional marketing.

The extent, nature and potential impact of marketing by food brands popular in New Zealand on Facebook were analyzed. Popular brands in New Zealand were selected from Socialbakers. Posts on Facebook pages of 45 packaged food, beverage and fast food companies over 2 months (October to November 2016) were analyzed for healthiness using the Ministry of Health Food and Beverage Classification System (FBCS) (updated in 2016) 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 demographics. 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 follower’s Facebook “friends.” Famous sportspersons and their product was seen not only by their followers but also by their Facebook “friends.” Famous sportspersons and their product was seen not only by their followers but also by their Facebook “friends.”

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

<table>
<thead>
<tr>
<th>Volume and type of posts</th>
<th>Packaged food brands (15 brands)</th>
<th>Fast food brands (15 brands)</th>
<th>Beverage brands (15 brands)</th>
<th>Total (45 brands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of posts</td>
<td>1215</td>
<td>345</td>
<td>192</td>
<td>760</td>
</tr>
<tr>
<td>Average number of posts per page</td>
<td>15</td>
<td>3</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>Average number of posts per day</td>
<td>0.3</td>
<td>0.4</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Posts that were videos (in %)</td>
<td>45 (20)</td>
<td>76 (20)</td>
<td>44 (40)</td>
<td>215 (28)</td>
</tr>
</tbody>
</table>

Level of consumer interaction with posts

| Likes per post (mean ± SD) | 830 ± 3,406 | 1,960 ± 5,505 | 6,528 ± 35,701 | 7,961 ± 20,936 |
| Shares per post (mean ± SD) | 71.3 ± 227 | 491 ± 3,420 | 489 ± 719 | 488 ± 3,727 |
| Comments per post (mean ± SD) | 294 ± 656 | 368 ± 736 | 394 ± 832 | 382 ± 773 |
| Views per video (mean ± SD) | 79,231 ± 437,088 | 870,917 ± 3,503,012 | 1,645,908 ± 8,526,918 |

Healthiness of food and/or beverage products in posts

| Posts containing a food and/or beverage product (in %) | 187 (83) | 231 (87) | 71 (17) | 469 (64) |
| Food and/or beverage products classified as occasional (in %) | 205 (91) | 108 (60) | 71 (100) | 404 (40) |
| Facebook pages with 100% of products classified as occasional (in %) | 11 (73) | 8 (53) | 13 (87) | 30 (71) |

Use of marketing techniques in posts

| Posts with an activity for consumers (in %) | 109 (57) | 105 (50) | 44 (23) | 276 (38) |
| Posts with a promotional strategy (in %) | 59 (33) | 123 (53) | 136 (71) | 310 (43) |
| Posts with a premium offer (in %) | 81 (46) | 145 (43) | 35 (18) | 261 (34) |

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 318 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.

Table 8: Sponsorship of children’s sport clubs

<table>
<thead>
<tr>
<th>Sport</th>
<th>Number of clubs in survey</th>
<th>Number of food and beverage sponsors</th>
<th>Total all sponsors</th>
<th>% of clubs with food sponsorship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Football</td>
<td>77</td>
<td>58</td>
<td>640</td>
<td>National: 100% Regional: 0% Local: 44% Total: 43%</td>
</tr>
<tr>
<td>Basketball</td>
<td>22</td>
<td>7</td>
<td>118</td>
<td>National: 100% Regional: 43% Local: 7% Total: 23%</td>
</tr>
<tr>
<td>Netball</td>
<td>51</td>
<td>39</td>
<td>337</td>
<td>National: 90% Regional: 51% Local: 5% Total: 20%</td>
</tr>
<tr>
<td>Rugby</td>
<td>73</td>
<td>79</td>
<td>624</td>
<td>National: 100% Regional: 83% Local: 33% Total: 38%</td>
</tr>
<tr>
<td>Swimming</td>
<td>45</td>
<td>5</td>
<td>109</td>
<td>National: 0% Regional: 10% Local: 0% Total: 9%</td>
</tr>
<tr>
<td>Total</td>
<td>228</td>
<td>188</td>
<td>1811</td>
<td>National: 80% Regional: 51% Local: 27% Total: 33%</td>
</tr>
</tbody>
</table>

F. Food packages

Packaged foods and non-alcoholic beverages in the NutriTag database were classified using WHO and MDR nutritional profiling systems. The percentage of items not permitted to be marketed to children was 71% using WHO Europe criteria and 62% under the Ministry of Health 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. Products were classified using the FSANZ Health Claims Nutrient Profiling Scoring Criterion. Of the 25 products displaying promotional characters, 48% were for ‘cereals for kids’, and of these, 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 licensed 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 child’s setting in the Children and Young People's Advertising Code46, and so, how the zones are defined. A sample of 950 schools (37.5% of total) was assessed in 2018. 500m network buffers were created from school boundaries. For comparative purposes, the numbers of ads was adjusted to per km², because schools with larger grounds had larger school zones. However, since the average school zone area was about 1km², 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 Code46 (Figure 8): Foods and food brands/companies identified in advertisements around schools

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

<table>
<thead>
<tr>
<th></th>
<th>2074 (9.2%)</th>
<th>1199 (5.3%)</th>
<th>2014 (8.9%)</th>
<th>1148 (5.1%)</th>
<th>1283 (5.7%)</th>
<th>1050 (4.7%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
<td>13743 (61.1%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NonSpecified</td>
<td></td>
<td>1199 (5.3%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td></td>
<td></td>
<td>1148 (5.1%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Everyday</td>
<td></td>
<td></td>
<td></td>
<td>1283 (5.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Everyday/Sometimes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1050 (4.7%)</td>
<td></td>
</tr>
<tr>
<td>NotApplicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2074 (9.2%)</td>
</tr>
</tbody>
</table>

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 children63-65, and healthy school environments with higher student education achievement64-66. 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 wellbeing67-68. A whole school approach is required rather than simply focusing on the food-service69. 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 choices48.

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 20098. In March 2016, the Ministry of Health and Ministry of Education recommended to schools that they become a ‘milk and water only’ school10. The Ministry of health has a classification system for the provision of foods in schools: Food and Beverage Classification System70. 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 train 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, 30 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 reviewed 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 Wall-SAT (Wellness School Assessment Tool) to score the comprehensiveness and strength of written health related policies71. The Wall-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 People72. 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 0-2 scores determined the total score for strength.

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.

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 3.3%) and comprehensiveness (mean 16%) of the policies were extremely low across all school types (Figure 9).

The scores for strength and comprehensiveness were 5.3 and 50.3 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)
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 day44. A lot more primary and intermediate schools (97.5%) self-reported to be ‘Milk and Water Only’ in comparison to secondary and composite schools (3.3%). 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’ (healthy) items offered for sale was ‘occasional’ (healthy) items (89.8%). For secondary schools, the main barriers were resistance from parents (26.8%), convenience and ease of preparing processed/ready-to-eat items (23.6%), and resistance from students (8.7%). For secondary schools, the main barriers were resistance from parents (30.1%), loss of profits from the lack of sale of healthy foods and beverages (23.6%), and the convenience and ease of preparing processed/prepared-to-eat items (20.9%).

Food provision 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 a closed-ended questions (Table 9). In addition, census menus were retrieved and analysed using the national Food and Beverage Classification System for New Zealand schools.

| Table 9: Outline of School-FERST questionnaire |
| Part A: Existing guidelines, policies and procedures implemented related to healthy food environments in schools |
| Development and updating of policies/procedures and processes/implementation |
| Part B: Sources, type and ways foods and beverages are available to students, rules and pricing for food and beverage items |
| Part C: Sponsorship, commercial advertising, school gardens, nutrition education, examples of positive stories of improving the healthiness of school food environments |

School gardens, nutrition education, sponsorship and commercial advertising

A health-promoting school environment is associated with healthy eating embedded as a whole school approach53,54. Schools were asked about additional activities related to foods. A large proportion of primary schools (61.6%) and 62% of secondary schools reported that they have an actively-used school garden. For secondary schools, school gardens were primarily used for fundraising that submitted the list for fundraising that submitted the list for fundraising. The most deprived schools did have a higher proportion of schools participating in food or nutrition programmes than least deprived schools (107 of 108). There were no significant differences between most deprived and least deprived schools for the following indicators: Schools in the least deprived category were more likely to face barriers (44% of schools) when trying to implement a healthier school food environment than least deprived schools (10%) of schools. Overall, the healthiness of school food environments is poor if schools have policies that are typically very weak and not comprehensive. There is still considerable unhealthy food and drinks sold or used in schools 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 policies15,16. All DHBs have committed to remove sugar-sweetened beverages from their premises by January 2016. Subsequently, a National Healthy Food and Drink Policy29 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, 13% of DHBs have been 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 categorise 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’.

### 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 strength and comprehensiveness of the national policy and each of the ‘amber’ or ‘red’.29 to improve the foods and drinks on offer. Foods are classified as ‘green’, ‘amber’, or ‘red’29 to quantitatively assess the comprehensiveness and strength of written health-related policies. The tool had 59 indicators within 3 domains: ‘nutrition standards’ (13 indicators), ‘promotion of a healthy food and drink environment’ (11 indicators), and ‘communication and evaluation of the nutrition policy’ (3 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 46/100. 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 Hawke’s Bay.

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 stores, cafes, outlets and vending machines.

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

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

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

- **Standards**:
  - 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 categorise 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’.

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 (9%) and vegetables (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 cafes 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 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 environments can influence food purchases, dietary behaviours and associated health outcomes.13-15,16,17 This sub-study assessed the density of healthy and unhealthy food outlets in communities to identify to food swamps,17 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.18 Outlets classified as healthy were supermarkets and fruit and vegetable stores. Outlets classified as unhealthy were fast food, takeaway and convenience (bakery, confectionary 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.18 (Table 14). However, the relative density of unhealthy outlet availability was significantly higher in more deprived areas. Areas in the most deprived quintile had 73% higher availability of fast food than takeaway outlets, 64% higher availability for convenience stores and 68% higher availability of supermarkets and fruit and vegetable stores compared to areas in the least deprived quintile. There were 14 times more potential food swamps in the most deprived areas compared to the least deprived areas.

#### 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.77 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. Its outlets reported using salt, tallow or shortening. Twenty 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.39 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 km2 within 500m around the most deprived urban schools (average 4.4 stores and outlets) than the least deprived schools (2.8). There was a median of 8.8 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.
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 endcaps, or proportion of junk food free promotions in flyers, at the entrance or outside the supermarket (Table 18). The ratio of cumulative linear shelf length for healthier 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.

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 diets11,12. There is a perception that healthier foods, meals and diets are more expensive than their less healthy counterparts10-14. Monitoring the price differential provides data to enable advocacy for fiscal policies to make healthy food more affordable and provides nutrition educators and health promoters’ valuable information when encouraging people to choose healthier foods.

Commonly consumed foods and takeaway meals by New Zealanders were identified from the Household Expenditure Survey15 and national Adult Nutrition Survey16. 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 12 years, so the change in price of foods was analysed over this time17-19. The three approaches of the INFORMAS food price modules17,18 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 processing20. Food prices rose during the 10 year period by 10%. 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).

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 takeaway foods 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 1-4 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)20. When the cost of preparation time or waiting time (takeaway) was added, costing 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 lower in saturated fat.
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 and the Nutrient Reference Values. 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. The current 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).

A novel computer modelling programme, DietCost, 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 $77 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).

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

<table>
<thead>
<tr>
<th>Diet</th>
<th>Price difference % - current cheaper - healthy cheaper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard diet – all</td>
<td>0.6%</td>
</tr>
<tr>
<td>Takeaways and alcohol in current and healthy diets</td>
<td>+18.6%</td>
</tr>
<tr>
<td>No takeaways or alcohol in current and healthy diets</td>
<td>+10.7%</td>
</tr>
<tr>
<td>No GFO fresh fruit and vegetables</td>
<td>+0.0%</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Diet</th>
<th>Median income**</th>
<th>Minimum wage**</th>
<th>Income support***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy diet – all</td>
<td>Auckland Nov 2016</td>
<td>18.7%</td>
<td>33.8%</td>
</tr>
<tr>
<td>Current diet – all</td>
<td>Auckland Nov 2016</td>
<td>19.4%</td>
<td>33.9%</td>
</tr>
<tr>
<td>Healthy diet – Māori</td>
<td>Hamilton July 2017</td>
<td>16.1%</td>
<td>28.9%</td>
</tr>
<tr>
<td>Current diet – Māori</td>
<td>Hamilton July 2017</td>
<td>16.0%</td>
<td>28.3%</td>
</tr>
<tr>
<td>Healthy diet – Māori</td>
<td>Waikato rural, gifted and gathered foods included, July 2017</td>
<td>16.1%</td>
<td>28.9%</td>
</tr>
<tr>
<td>Current diet – Māori</td>
<td>Waikato rural, gifted and gathered foods included, July 2017</td>
<td>16.7%</td>
<td>29.0%</td>
</tr>
<tr>
<td>Healthy diet – Pacific</td>
<td>Auckland Sept 2016</td>
<td>15.2%</td>
<td>26.6%</td>
</tr>
<tr>
<td>Current diet – Pacific</td>
<td>Auckland Sept 2016</td>
<td>15.9%</td>
<td>27.8%</td>
</tr>
</tbody>
</table>

**Minimum wage + Family tax credit. Minimum wage on April 2016 was $15.25
http://www.employment.govt.nz/hours-and-wages/minimum-wage/
9. Inequalities in access to healthy food environments

An important part of this study of food environments was to assess differences by locality and overcome the inequalities in access to healthy food environments which 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
- Have less supermarkets and more ‘downstream’ at the population level (e.g. prevalence of risk factors and diseases). In addition, this research is ‘solution-oriented’ with all policies targeted at the most deprived areas.
- Are 34% more likely to be included in a ‘food swap’ (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 of unhealthy foods, unhealthy food promotions on end caps, display 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 (eating particularly well in‘downstream’ at the population level (e.g. prevalence of risk factors and diseases). In addition, this research is ‘solution-oriented’ with all policies targeted at the most deprived areas.

In general, many food environments were significantly less healthy in areas where children and young people are more likely to be exposed to unhealthy foods, including areas with higher relative density of unhealthy outlets.

One positive sign amongst these negative findings of less healthy food environments in more deprived areas was that lower (more deprived) primary and secondary schools were more likely to participate in food or nutrition projects than higher decile schools. For primary schools only the most deprived (deciles 1-3) were more likely to include ‘everyday’ items in their school menus than higher decile schools, whereas deciles 4-7 were less likely to do so. This ‘occasional’ items than other schools in deciles 8-10.

For primary schools, low decile (1-3) schools (44% of schools) were more likely to face barriers when trying to implement a healthier school food environment than lower decile schools. Higher decile (9-10) 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 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 ‘health’ but effective policies based around taxes, regulations and targets.

A first step would be to remove sugar-sweetened beverages. A stronger childhood obesity 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.

Priority actions for government

The process of benchmarking the New Zealand Government compared to international best practice by Y1, 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 outlets and products performing particularly well.49 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.

A key 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 ‘health’ but effective policies based around taxes, regulations and targets.

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Priority actions for food companies

The New Zealand Food Industry Association and the New Zealand Dental Association through their INFORMAS modules that rated government progress on food policies and regulations on food outlets and products.

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

<table>
<thead>
<tr>
<th>Priority Action</th>
<th>Current situation</th>
<th>Implementation challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Strengthen Childhood Obesity Plan</td>
<td>The food environments in places where children gather (schools, sport clubs, school zones etc) remain 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.</td>
<td>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.</td>
</tr>
<tr>
<td>2. Set targets for</td>
<td>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.</td>
<td>Setting targets may not be favored 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 2010.</td>
</tr>
<tr>
<td>- Reducing childhood obesity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Population intakes of salt, sugar, saturated fat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Voluntary reformulation of packaged foods (salt, sugar, saturated fat)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Increase funding for population nutrition promotion</td>
<td>Current funding for promoting healthy diets, although increased from 2014 to 2017, is lower than a decade ago and is equivalent to only about 3% of the current direct costs of overweight and obesity.</td>
<td>Achieving increases in funding for promotion 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.</td>
</tr>
<tr>
<td>4. Regulate unhealthy food marketing to children</td>
<td>High exposure of children and young people to marketing of unhealthy foods in school zones, TV, magazines, product packaging, Facebook and other social media.</td>
<td>This ASA Code is voluntary, does not include children’s pre 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.</td>
</tr>
<tr>
<td>5. Ensure healthy food in schools</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>6. Introduce a tax on sugar sweetened beverages</td>
<td>High consumption and availability of sugar-sweetened beverages.</td>
<td>Strong opposition from the processed food sector. Traditional political fear of implementing new taxes.</td>
</tr>
<tr>
<td>7. Strengthen the Health Star Rating</td>
<td>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.</td>
<td>Little evidence yet to point to success or failure of 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.</td>
</tr>
<tr>
<td>8. Implement the new Eating and Activity Guidelines</td>
<td>Very little public promotion or education on healthy eating and activity recommendations.</td>
<td>Effective promotion needs significant funding.</td>
</tr>
<tr>
<td>9. Conduct a new national nutrition survey for children</td>
<td>Latest nutrition survey conducted in 2002, reflecting a lack of information on children’s eating habits and nutrient intake.</td>
<td>Dietary surveys are expensive and have not been incorporated into rolling monitoring systems with ongoing funding (like the New Zealand Health Survey).</td>
</tr>
</tbody>
</table>

...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.nz/). FoodBack engages citizens in data collection on their food environments. FoodBack provides a way to recognize 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.

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

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

<table>
<thead>
<tr>
<th>Setting</th>
<th>Sample</th>
<th>Year</th>
<th>Methods and tools</th>
<th>Food classification system(s)</th>
<th>Indicators</th>
<th>Equity indicators</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Government</td>
<td>58 independent public health experts in 2014 and 71 independent public health (n=48) and government (n=23) experts in 2017</td>
<td>2014 &amp; 2017</td>
<td>The Healthy Food Environment Policy Index (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 Appendix Figure 2</td>
<td>NA</td>
<td>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</td>
<td>Two out of 47 indicators: 1. Reducing health inequalities is a government priority 2. The Government regularly monitors progress towards reducing inequalities</td>
<td>16,98, 31D-115</td>
</tr>
<tr>
<td>Food companies</td>
<td>The 55 largest NZ companies by market share across food and non-alcoholic beverage manufacturers, quick service restaurants and supermarkets.</td>
<td>2017</td>
<td>Business Impact Assessment-Obesity and Population Nutrition (BIA-Obesity)-document12 and website (<a href="http://www.informas.org/bia-obiety/">www.informas.org/bia-obiety/</a>) analysis on publicly available commitments; interviews of food companies; feedback results to companies (see Appendix Figure 2); methods based on Access to Nutrition Index11</td>
<td>NA but nutrient profiling system used by companies within their commitments is evaluated as part of the BIA</td>
<td>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</td>
<td>NA</td>
<td>15,116</td>
</tr>
</tbody>
</table>

Healthiness of food environments

<p>| Food composition | All packaged foods across the 4 biggest NZ supermarket chains | 2014 &amp; 2016 | Pictures of all sides of food packages in supermarkets, entering nutrition information panels and ingredient lists in the Nutritrack database of composition of packaged food products | Health Star Ratings, NDVA 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 |
| Food labelling | Selection of 8 healthier and less healthy packaged food groups16, all products in those food groups | 2014 | Nutrinook photos of food packages analysed using a standardized taxonomy17 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 |
| Food promotion** | 1. Television: 3 channels, 4 week and 4 weekend days, 18 hours/day 2. Internet: 110 popular websites among children and 70 food brand websites 3. Facebook: Pages of 45 popular packaged food, beverage and fast food companies 4. Magazines: Total of six magazines, five with highest readership among adolescents, 3 specifically targeted to adolescents (aged 10-17) 5. Outdoor: Around 950 schools 6. Children’s settings: In 819 schools 7. Sport sponsorship: 268 websites of children’s sport clubs for the 5 most popular sports 8. Food packages: Breakfast cereals most appealing to children | 2014-2017 | Extent and nature of marketing, analysis of the power of food advertisements (premium offerings, promotional characters) Television: recordings and coding ads Internet and Facebook: visiting and coding pages Magazines: reading and coding Outdoor: taking pictures and coding ads in a zone of 500m around the school boundaries Children’s settings: Through school survey filled out by school representative Sport sponsorship: Through visiting websites from children’s sport clubs and national/regional sport associations Food packages: Nutrinook photos of food packages analysed using a standardized taxonomy for promotional characters and premium offers | WHO Europe nutrient profile model, Food and Beverage Classification System, Nutrient Profiling Scoring Criterion (NPSC) | - 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 - Average number of unhealthy food ads per magazine for magazines popular among adolescents and magazines targeted at adolescents - Average number of unhealthy food advertisements per km2 in a zone of 500m around urban schools; % of schools with unhealthy food advertising or sponsorship - 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 | Indicators by tertile of level of school socioeconomic deprivation (using school decile 1-10*) | 13,51,56,59 |</p>
<table>
<thead>
<tr>
<th>Setting</th>
<th>Sample</th>
<th>Year</th>
<th>Methods and tools</th>
<th>Food classification system(s)</th>
<th>Indicators</th>
<th>Equity indicators</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food provision</strong></td>
<td>819 schools (1/3 of schools in New Zealand) (including 647 primary and 172 secondary schools)</td>
<td>2016</td>
<td>Food environment review and support tool (School-FERST), questionnaires 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)</td>
<td>Food and beverage classification system</td>
<td>% of schools with a written nutrition policy; strength (out of 100%) and comprehensiveness (out of 100%) of current school nutrition policies</td>
<td>Indicators by tertile of level of school socioeconomic deprivation (school decile 1-10)</td>
<td>In preparation</td>
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<td></td>
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<td></td>
<td>% 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</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>All hospitals across 4 Auckland District Health boards (DHBs)</td>
<td>2016 &amp; 2017</td>
<td>Taking pictures of all foods available in the hospitals and analyse them according to the Health Food and Drink Policy for the public sector</td>
<td>Amber/green (red as per the national Healthy food and drink policy)</td>
<td>% of DHBs with a written nutrition policy; strength (out of 100%) and comprehensiveness (out of 100%) of current DHB nutrition policies</td>
<td>NA</td>
<td>In preparation</td>
</tr>
<tr>
<td></td>
<td>All DHBs (n=20) across the country</td>
<td>2015 &amp; 2017</td>
<td>Gecocoding 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</td>
<td>NA</td>
<td></td>
<td>NA</td>
<td>In preparation</td>
</tr>
<tr>
<td><strong>Food retail</strong></td>
<td>Community: all school zones in NZ; all food outlets from Council lists</td>
<td>2014-2015</td>
<td>Validation study for indicator of cumulative shelf length for healthy versus unhealthy foods: 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</td>
<td>Defined based on validation study</td>
<td></td>
<td>Indicators by tertile of level of area socioeconomic deprivation (using NZDep 1-10)</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td>In-store: 304 supermarkets, 1500 takeaways, 70 sport and recreation centres</td>
<td>2016</td>
<td>Validation study for indicator of cumulative shelf length for healthy versus unhealthy foods: 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</td>
<td>Defined based on validation study</td>
<td></td>
<td>Indicators by tertile of level of area socioeconomic deprivation (using NZDep 1-10)</td>
<td>118</td>
</tr>
<tr>
<td><strong>Food prices</strong></td>
<td>Foods in the food price index, popular NZ takeaway and home-cooked meals, population current and healthy diets</td>
<td>2015-2017</td>
<td>Modelling of a) dietary guidelines and b) current intakes converted to family menus and shopping basket price surveys.</td>
<td>WHO Europe NP model, NOVA classification system by degree of processing</td>
<td>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</td>
<td>Cost differential between healthy and current diets for different ethnic groups</td>
<td>90,91,96.97</td>
</tr>
</tbody>
</table>

NA: Not applicable; FSANZ: Food Standards Australia New Zealand; HSR: Health Star Rating; NZDep: New Zealand Deprivation Index 2013; NPSC: Nutrient Profiling Staging Criterion  
* Decile 2 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 EPYI Tool

INDEX

COMPONENTS

DOMAINS

INDICATORS

Policies

Food COMPOSITION

Food LABELLING

Leadship, Governance

Good Practice Statements

Food COMPOSITION

Food LABELLING

Leadership, Governance

Monitoring and intelligence

Funding and resources

Healthy Food Environment Policy Index (Food-EPYI)

Food TRADE AND INVESTMENT

Food PROMOTION

Platforms for interaction

Food composition

Food provision

Governance

Healthy-food and unhealthy-food and non-alcoholic-beverages availability in community and consumer retail food environments globally.


xxi. Luiten CM, Steenhuis IH, Eyles H, Ni Mhurchu C, Waterlander WE. Ultra-processed foods have the worst nutrient profile, yet they are the most available packaged products in a sample of New Zealand supermarkets. Public Health Nutr 2015; 1-9.


