



RAPID REVIEW: FOOD REGULATORY APPROACHES TO ADDRESS CHILDHOOD OBESITY

PREPARED BY:

DR HELEN VIDGEN, MS ELHAM MONSEF AND MS KAMILA DAVIDSON

SCHOOL OF EXERCISE AND NUTRITION SCIENCES

FACULTY OF HEALTH

QUEENSLAND UNIVERSITY OF TECHNOLOGY

MARCH 2018

INTRODUCTION

Childhood overweight and obesity is a priority health issue globally in low, middle and high income countries. In Australia, while the rate of increase may have plateaued, it remains high at around a quarter of all Australian children. As with all public health issues, they are best addressed using multiple co-ordinated strategies to target a range of determinants at varying levels. Within this strategy mix, approaches which operate through the use of regulatory frameworks have the potential to reach a large number of individuals. A range of international, national, state and local regulations influence our food supply system. These exist within and outside the health sector. Opportunities for health to interface with this system to address obesity has been well documented and is summarized in Hawke's *Conceptual Framework for the Link between Trade Liberalization and Diet* [1].

Australian Health Ministers have agreed to consider collective action to improve children's health by limiting the promotion and availability of unhealthy food and drink [2]. The use of Australia's food regulation system has been identified as a potential strategy area. This review will be used to inform the development of potential new food regulation initiatives that could be investigated for adoption. The audience for this review is senior policy makers. As a result, the review team worked closely with policy makers to ensure the results presented were pragmatic, and did not duplicate existing government efforts. This review specifically seeks to answer the following questions:

Question 1 What are the food regulation activities in international jurisdictions that aim to address obesity?

Question 2 What food regulation activities to address obesity have been suggested but not necessarily implemented?

METHOD

This rapid review was conducted during September – November 2017. In order to explore grey and peer reviewed literature, two review processes were conducted in parallel as shown in Figure 1. The review focused on work published in the English-language between 2007 and 2017. There was an ongoing communication with the funder to ensure the search focused on identifying food regulation activities which were within the intended scope of the review. This resulted in a range of different exclusion criteria being applied at various stages of the review as summarised in Figure 1.

Food regulatory approaches to addressing childhood obesity that were identified in the grey and systematic literature review were analysed against the *Conceptual Framework for the Link Between Trade Liberalization and Diet* [1]. Based on the remit of this review, findings are limited to the following domains within the Industry and Consumer Food Environments as described below:

The Industry Food Environment domains of:

- Food Advertising (labelling and packaging)
- Food Processing
- Food Retail

The Consumer Food Environment domains of:

- Food Availability (includes food composition and nutrition quality)
- Food Promotion (marketing)

Interventions were then categorised into the following areas, according to their level of implementation:

- Implemented and recommended as best practice
- Implemented interventions with evaluation
- Implemented interventions
- "Innovations" that are recommended but may not have been implemented

FINDINGS

The systematic and grey literature searches revealed that there were several existing reviews of food regulation activity to address obesity. The quality and quantity of data identified through the grey literature, in particular from NOURISHING and the Australian Food-EPI project, was comprehensive and current. The work by both of these two groups identified food regulation activities in international jurisdictions that aim to address obesity (review question 1) and identified activities that have been suggested but not necessarily implemented (review question 2). As these two sources focus on implementation at scale, they reported food regulation approaches that were executed at a local, state or national government level making findings more applicable to this review. As the quality and quantity of data identified through the grey literature search was so comprehensive and current, the findings of the systematic peer reviewed literature search were less relevant. The systematic peer reviewed literature search identified few additional papers. Peer reviewed literature tended to report programs implemented at a small scale e.g. a university cafeteria, with no indication of transferability at scale.

Table 1 summarises food regulatory approaches to address childhood obesity against Industry (food advertising, processing and retail) and Consumer (availability and promotion) Food Environments with expanded details of each of these domains later in the full report. Interventions are then colour coded according to their level of implementation.

- A. Implemented regulations and recommended as best practice [green shaded]
- B. Implemented regulations with evaluation [blue shaded]
- C. Implemented regulations [yellow shaded]
- D. “Innovations” are regulations recommended by WHO and/or McKinsey report [orange shaded]

A regulatory approach may have more than one colour as a particular country’s experience may be recommended as best practice following implementation and evaluation, in other countries it may have been implemented and evaluated, and in other countries implemented but no evaluation data is available. Innovations represent expert consensus and recommendations and may or may not have been implemented.

The review question results are presented as follows:

Question 1 What are the food regulation activities in international jurisdictions that aim to address obesity?

Green, blue and yellow interventions answer review question one, as they have all been implemented.

Question 2 What food regulation activities to address obesity have been suggested but not necessarily implemented?

Green and orange interventions answer review question two as they describe programs that may or may not have been implemented at scale but have been identified through expert consensus as being innovative approaches which may have potential to address obesity through the food regulation system.

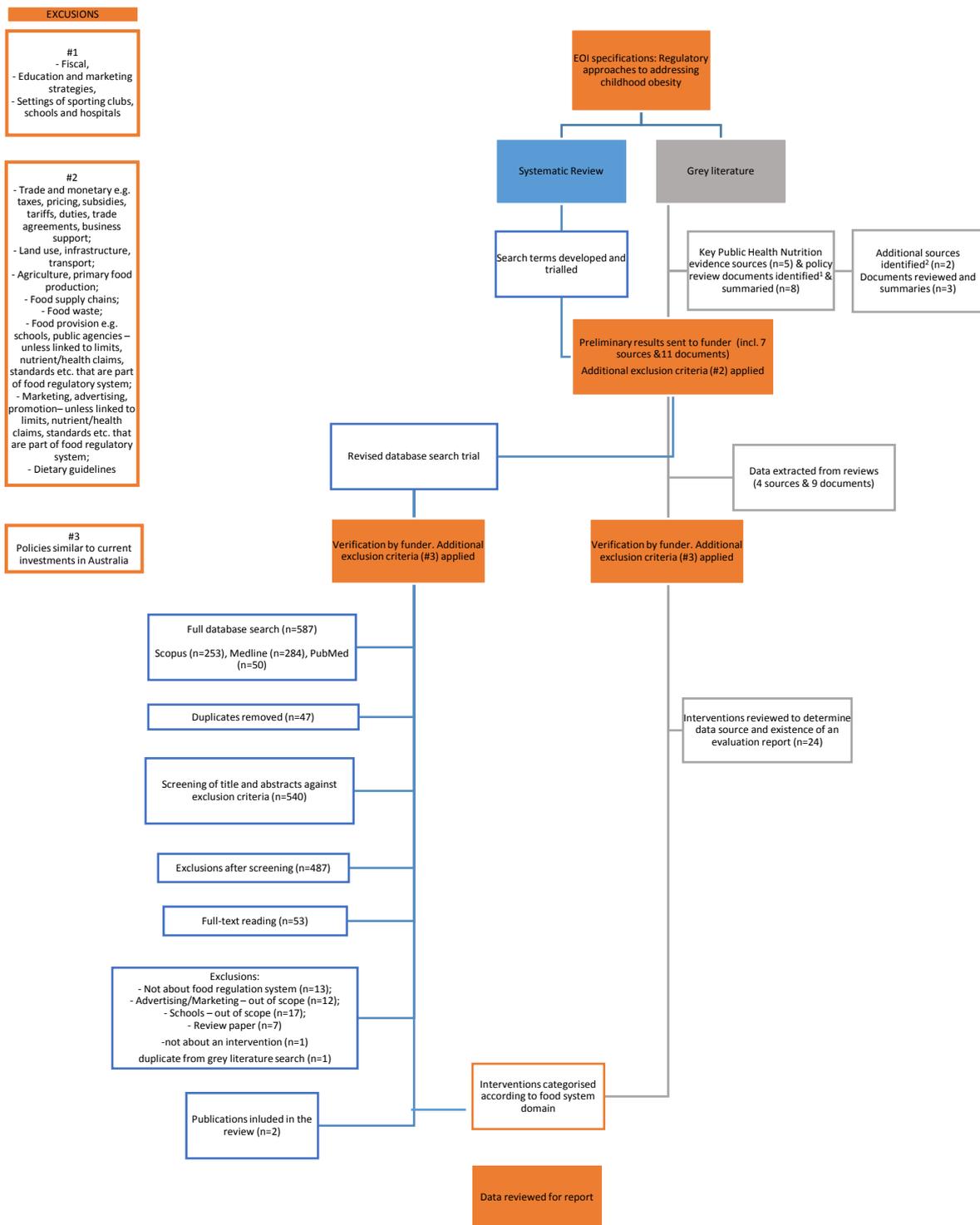


Figure 1: Overview of the Systematic and Grey Literature Review

¹ World Health Organization, World Cancer Research Fund International (specifically the NOURISHING Framework), the Rudd Center for Food Policy and Obesity, World Obesity Federation (specifically work undertaken by INFORMAS group), Centers for Disease Control and Prevention

² The Obesity Policy Coalition, McKinsey Global Institute

Table 1: A Summary of Regulatory Approaches to Addressing Childhood Obesity by Level of Implementation and Country

1. INDUSTRY	
Regulatory approach	Country/ Reference
1.1 Food Processing	
Mandatory limits on sodium levels in processed foods	Argentina, USA [3-5]
	South Africa, Belgium, Bulgaria, Greece, Hungary, Iran, Paraguay, Portugal, South Africa [3-5]
Improve nutritional quality of the whole food supply by public-private partnership	UK (2011) [4, 5]
Voluntary reformulation of food products	France [6], New Zealand ,Netherlands, Switzerland [5]
Reformulation based on by public-private partnership	Argentina; Austria Belgium, Brazil, Canada, Chile, Costa Rica, Croatia, Czech Republic, Ecuador, Hungary, Ireland, Italy, Mexico, Netherlands, New Zealand, South Korea, Spain, USA, Uruguay, Kuwait [4, 5]
Voluntary Industry standards for deep-frying	New Zealand[3]
New “better for you” products	[7]
Stealth product reformulation: food/beverages/restaurants	[7, 8]
1.2 Food Retail	
Improve nutritional quality of the whole food supply by public-private partnership	USA [4, 5]
Improve nutritional quality of whole food supply by reducing portion size	Malaysia, Thailand [5]
Reduce number of calories served to children in quick service restaurants	[8]
Reduce portion size of processed meals, dishes, snacks, food and drinks	[8]
Reduce availability of high calorie food and drink	[7]
1.3 Food Labelling and Advertising	
Mandatory warning label for packaged foods exceeding limits for fat, saturated fat, cholesterol, and/or sodium	Chile [3, 4, 9]
	South Korea [3, 4, 9], USA , Finland, Latvia, Solomon Islands, Fiji [3, 4, 9]
Mandatory labelling of trans fat on packaged food	USA, Canada [4, 9]
	South Korea [4, 9]
	Argentina, Brazil, Chile, Hong Kong, Paraguay, Taiwan, Uruguay [4, 9]
Mandatory warning labels on menus and display in foodservice setting.	USA [3]
"Plain" calorie/nutrition, Front-of-package nutrition fact panel labelling mandated by government on all packaged foods to include calories, saturated and trans-fats, sodium and added sugars	[7, 8]
Simple information with consistent format and placement, "engaging" calorie/nutrition	[7, 8]

Regulatory approach	Country/ Reference
2. CONSUMER	
2.1 Food Availability (includes composition and nutrition value)	
Mandatory removal of trans-fats for foodservice	Denmark [5]
	USA [3], Argentina, Austria, Hungary, Iceland, Iran, Latvia, Norway, Singapore, South Africa, Switzerland [5]
Mandatory limits on the availability of high-fat meat products	Ghana [4, 5]
	Samoa, Fiji [5]
Voluntary reduction of portion size	UK [5]
Mandatory restriction on sale of energy drinks	Latvia, [3, 4, 9], Lithuania [5]
Reduce portion size of processed meals, dishes, snacks, foods, and drinks e.g. remove “supersize” items from menus	[8]
Reduce number of calories served to children in quick service restaurants	[8]
Ban sugar-sweetened beverages (including flavoured/sweetened milk) and limit the portion size of 100% juice	[8]
2.2 Food Marketing	
Ban/limit promotion and marketing of foods and beverages high in nutrients of concern to children	South Korea, Ireland, UK , USA [6, 10]
	Chile, Iran, Mexico, Norway, Taiwan [6]
Mandatory requirement for advertisements to carry health message or warning for items high in nutrients of concern	France [6]
Mandatory regulation of food marketing (high in nutrients of concern) in schools/children's settings	Chile, Poland, Uruguay [6]
Voluntary regulation of food advertising to children	Denmark, Latvia, Malaysia, Norway, Spain [6]
“Protective” messaging used during gaming	Netherlands, Spain [11]
Regulated media restrictions on high calorie foods advertising	[7]
Retailers and producers restrict promotional activity of high-calorie food and beverages	[7]

Implemented regulations and recommended as best practice [green shaded]; Implemented regulations with evaluation [blue shaded]; Implemented regulations [yellow shaded]; “Innovations” are regulations recommended by WHO and/or McKinsey report [orange shaded]

DISCUSSION

The purpose of this review was to:

1. Describe the food regulation activities in international jurisdictions that aim to address obesity
2. Identify food regulation activities to address obesity that have been suggested but not necessarily implemented

The review identified that the use of the food regulation system to address obesity is widely adopted internationally and recommended as best practice. As a result, many organizations have prepared review documents and clearing houses to monitor activity in this area and provide advice to policy makers. The NOURISHING Framework is regularly updated and reviewed. It contains the most current and comprehensive review of food regulation activity to address obesity. The Australian Food-EPI project provides advice to the Australian context.

Mapping Australia's food regulatory activities against Hawke's *Conceptual Framework for the Link between Trade Liberalization and Diet* was helpful in describing where existing activity is focused. For this review, this mapping was used to define the scope of our project, however it may be a useful activity for decision makers to investigate the emphasis of current investment and opportunities for future investment and activity.

Best practice policies focused on mandatory implementation of regulations. From this review, evaluations from a number of mandatory regulations demonstrated positive outcomes. For example, the Canadian mandatory regulation of requirement for trans-fat labelling on packaged foods lead to a reduction in dietary intake of trans-fats post implementation in human milk [12]. A similar success was achieved in Denmark with the introduction of mandatory removal of trans-fats for out-of-home meals. Voluntary regulations/commitments, self-regulation, voluntary compliance or public-private partnership have shown weaker policy implementation with ultimately reduced impact for the population.

Regulatory approaches are most effective when part of a suite of related strategies. To effectively create an environment where healthier options is an easier choice for consumers, requires a concentrated, comprehensive and holistic effort across the whole trade-food-diet-disease framework. This can be seen in various strategies for the same dietary outcome, in particular salt and trans fats, being seen across several domains. The Chilean Law of Food Labelling (in 2012) and Advertising (in 2016) targeting packaged foods was supported by strategies including mandatory regulations of broadcast and non-broadcast communication channels, food marketing in schools and restrictions on promotion of unhealthy foods.

This review highlights that the use of food regulation activities to address childhood obesity is well accepted. A number of potential regulatory approaches to addressing childhood obesity have been adopted, implemented and evaluated in other jurisdictions. This review also summarises current recommendations for actions by peak bodies and expert consensus. Childhood obesity is a global health issue. Few interventions, however, were comprehensively evaluated with respect to outcomes. Evaluations are needed to inform development activity in this area. Investment in this area in Australia should include monitoring and evaluation reported publically.

CONTENTS

Executive Summary	2
Introduction.....	2
Method	2
Findings.....	3
Discussion	7
Introduction.....	9
Methodology	11
Grey literature review	11
Systematic review.....	12
Analysis	17
Findings.....	18
Results of the search process	18
Summary of results according to food system framework.....	18
Industry Food Environment.....	22
Food Processing Domain	22
Food Retail Domain	28
Food Advertising and labelling Domain.....	30
Consumer Food Environment.....	34
Food Availability Domain (including food composition/nutritional value).....	34
Food Marketing and Promotion Domain.....	37
Limitations of this Review.....	43
Discussion	43
Appendix 1.....	45
Search strategy	45
Appendix 2.....	48
Case study - Chile’s law on food labelling and advertising	48
References	49

INTRODUCTION

Childhood overweight and obesity is a priority health issue globally in low, middle and high income countries. In Australia, while the rate of increase may have plateaued, it remains high at around a quarter of all Australian children [13]. Childhood obesity has physical, psychological and social health consequences in the short term and in the long term as obesity during childhood tends to track to adulthood where the increased risk of chronic disease is well established [8].

Overweight and obesity is fundamentally a result of energy imbalance. Energy intake (i.e. food) is greater than energy expenditure resulting in excess weight gain. Within this equation, strategies which address energy intake have been determined to be more effective [14]. Energy intake can be reduced by decreasing the portion of food eaten, the energy density of foods or the overall total amount. Reorienting diets to predominantly Core Foods has the additional benefit of improving health and wellbeing beyond that related to bodyweight [15]. This is particularly important for optimal growth and development during childhood.

As with all public health issues, overweight and obesity is best addressed using multiple co-ordinated strategies to target a range of determinants at varying levels. Within this strategy mix, approaches which operate through the use of regulatory frameworks have the potential to reach a large number of individuals. A range of international, national, state and local regulations influence our food supply system. Opportunities for health to interface with this system to address obesity has been well documented and is summarized in this diagram [1].

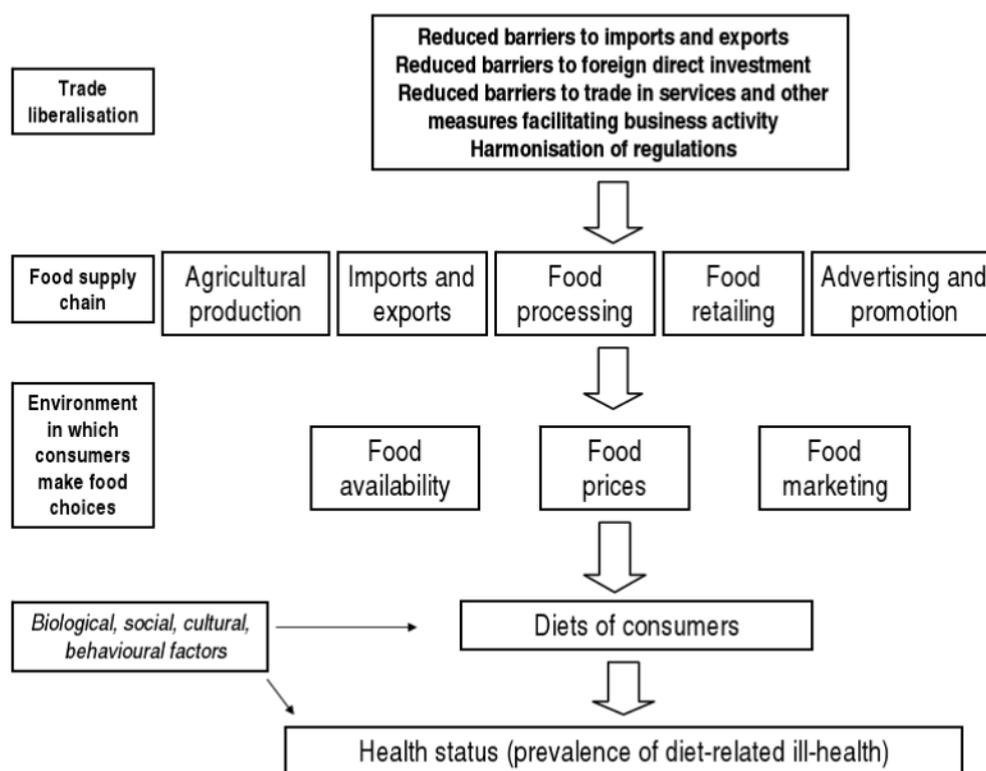


Figure 2: A conceptual framework for the link between trade liberalization and diet (p37) [1]

Australian Health Ministers have agreed to consider collective action to improve children's health by limiting the promotion and availability of unhealthy food and drink [2]. The use of Australia's food regulation system has

been identified as a potential strategy area. This review will be used to inform the development of potential new food regulation initiatives that could be investigated for adoption. The audience for this review are senior policy makers. As a result, the review team worked closely with policy makers to ensure the results presented were pragmatic, and did not duplicate existing government efforts. This review specifically seeks to answer the following questions:

Question 1 What are the food regulation activities in international jurisdictions that aim to address obesity?

Question 2 What food regulation activities to address obesity have been suggested but not necessarily implemented?

The review team worked closely with policy makers to ensure the results presented were pragmatic and did not duplicate existing government efforts. The complexity of regulatory action with respect to balancing public health gain, industry interest, public perception and political philosophy is well documented but was not addressed in this report [16] [17].

METHODOLOGY

This rapid review was conducted during September – November 2017. In order to explore grey and peer reviewed literature, two review processes were conducted in parallel as shown in Figure 3. The review focused on work published in the English-language between 2007 and 2017. There was an ongoing communication with the Funder to ensure the search focused on identifying food regulation activities which were within the intended scope of the review. This resulted in a range of different exclusion criteria being applied at various stages of the review as summarised in Figure 3 and described in more detail below.

GREY LITERATURE REVIEW

The review team were aware that the use of food regulatory frameworks to address obesity was the subject of much review locally and internationally, therefore, the review began with the identification and analysis of key public health nutrition review and policy tracking documents. These documents were identified by the review team, peer-reviewed by the funder, and forward and back reference checked to ensure key policy advice documents had been included. As a result of this process, five potential public health nutrition evidence sources of information relevant for this review were identified as described below. Websites of these organisations were searched for food regulation policies as per the rapid review scope. From this, eight policy review documents were identified, reviewed and summarised.

- World Health Organization (WHO),
 - Consideration of the evidence on childhood obesity for the Commission on Ending Childhood Obesity: report of the ad hoc working group on science and evidence for ending childhood obesity [8]
 - Population-based approaches to childhood obesity prevention [18]
- World Cancer Research Fund International (specifically the NOURISHING Framework)
 - Nutrition label standards and regulations on the use of claims and implied claims on food [9]
 - Offer healthy food and set standards in public institutions and other specific settings [19]
 - Restrict food advertising and other forms of commercial promotion [6]
 - Improve nutritional quality of the whole food supply [5]
- Rudd Center for Food Policy and Obesity [20] and CDC Chronic Disease State Policy Tracking System [21] included a database with past and current policies from the USA including childhood obesity and food regulation.
- World Obesity Federation (WOF) including INFORMAS [22]
 - StanMark : A junk-free childhood [23]
 - The PolMark Project: Policies on marketing food and beverages to children [24]

Through this process additional sources of grey literature were identified. They were:

- The Australian Food Epi Project
 - Policies for tackling obesity and creating healthier food environments: scorecard and priority recommendations for Australian governments [4]
 - Australian Federal government: summary of current government policy action to 8 May 2016 [3]
- McKinsey Global Institute
 - How the world could better fight obesity [7]

Although some of these documents were discussing marketing and/or advertising policies these were considered relevant due to searching for any innovative policy actions at this stage of the rapid review.

An initial meta-review of these documents was presented to the funder. Following this, the Rudd Centre and CDC databases were excluded due to the other sources (especially NOURISHING framework) having the most

comprehensive, up to date and wide range of information on food regulation policies which included USA policies. The World Obesity Federation work had been applied to Australia through the work of the Food Epi project and so, it too was excluded.

At this stage, key documents included in this review were reviewed and each policy action assessed against the inclusion and exclusion criteria. A table with recommended policy actions was drafted and the results discussed with the funder. Further exclusions were provided (#3 exclusions) and applied to the literature identified via database searches and to the documents and findings included to date. This resulted in the WHO's Population-based approaches to childhood obesity prevention [18] being excluded as it only gave an overview of a range of interventions with a small section on food regulation policies with limited information and examples, and NOURISHING's Offer healthy food and set standards in public institutions and other specific settings [19] being excluded as interventions focused on schools which were out of the scope of this review.

The final set of grey literature documents included in this review is presented in Table 2, alongside a description of each document and its limitations.

SYSTEMATIC REVIEW

The process of the systematic review is summarised in Figure 3. The systematic review of peer reviewed literature began with a trial of search strategies. A combination of various search terms was trialled on three electronic databases, Scopus, Medline and PubMed. The titles were preliminarily screened to determine the breadth of literature available for this review. The trialled search terms are included in Appendix 1. A brief overview of these preliminary findings was prepared for the funder and discussed. The previously provided exclusion criteria were refined and new exclusions provided (#2 exclusions).

Scopus, Medline and PubMed databases were systematically searched for studies published in the English language between 2007 and 2017. The following search terms were used: Food AND (regulation OR "selfregulation" OR self-regulation OR legislation OR law OR polic* OR act OR standard* OR code* OR enforcement*) AND ("childhood obesity" OR "childhood overweight") NOT (tax* OR pric* OR tariff* OR "trade agreement*" OR agriculture OR infrastructure OR transport* OR "food waste*"). Database specific filters were applied and are listed in Appendix 1. All citations and abstracts were downloaded to Endnote X8 citation manager software. Duplicates were removed, and the results screened for eligibility.

There were 587 results identified via database searches. After duplicates were removed (47) there were 540 papers for which titles and abstracts were screened according to the inclusion and exclusion criteria. Fifty-three papers were read in full-text independently by two researchers, the results were compared, and disagreements resolved. Forty-nine papers were excluded with reasons (not about food regulation system (n=13); advertising/marketing – out of scope (n=12); schools – out of scope (n=17); not an original research – reviews (n=7); not reporting an intervention (n=1)). This resulted in three papers kept for this review. One paper was a duplicate of an evaluation paper found in the NOURISHING framework documents, leaving two papers included in this review.

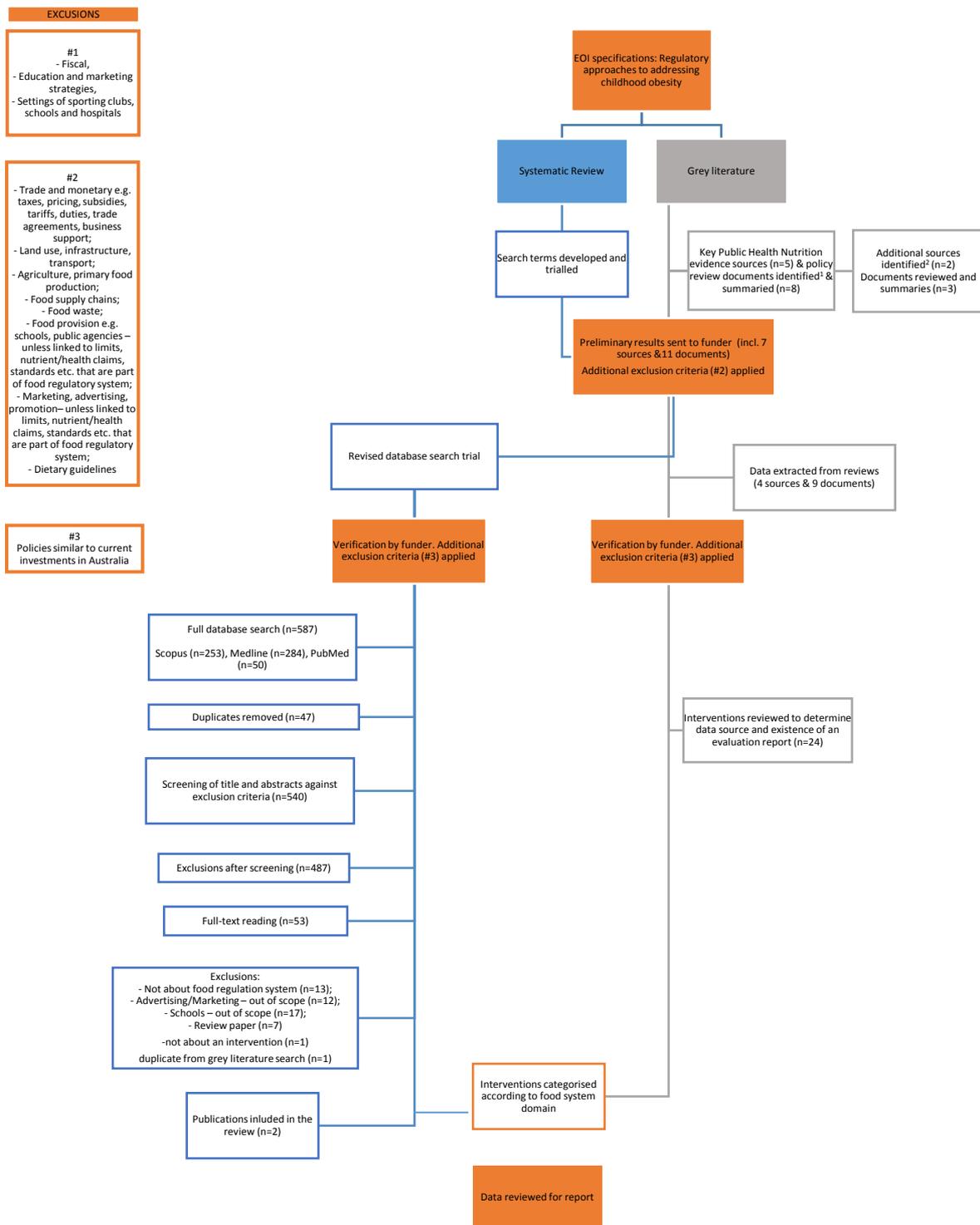


Figure 3: An Overview of the Systematic and Grey literature review process

¹ World Health Organization, World Cancer Research Fund International (specifically the NOURISHING Framework), the Rudd Center for Food Policy and Obesity, World Obesity Federation (specifically work undertaken by INFORMAS group), Centers for Disease Control and Prevention

² The Obesity Policy Coalition, McKinsey Global Institute

Table 2: Description of Key Public Health Nutrition evidence and policy review documents

Description of Key Public Health Nutrition evidence and policy review documents		
1. SOURCE: WORLD HEALTH ORGANIZATION		
Document	Description	Limitations
<p>World Health Organization, Consideration of the evidence on childhood obesity for the Commission on Ending Childhood Obesity: report of the ad hoc working group on science and evidence for ending childhood obesity. 2016. [8]</p>	<p>Prepared by the Ad hoc working group on science and evidence – a group of academics, researchers and experts in various areas relevant to childhood obesity established to support the work of the Commission on Ending Childhood Obesity. The Commission was established by the WHO Director - General to develop a comprehensive strategy to address childhood obesity.</p>	<p>Food sector policies and interventions are not the main focus – this document covers a wide range of action areas (incl. trade, agriculture, built environment and food environment and education).</p> <p>Worldwide focus hence many interventions or policies may not be applicable to Australia.</p> <p>Recommendations for policies overlap with those suggested in previous documents and these are cited in-text.</p>
2. SOURCE: WORLD CANCER RESEARCH FUND INTERNATIONAL: NOURISHING FRAMEWORK		
Document	Description	Limitations
<p>World Cancer Research Fund International. NOURISHING framework. Nutrition label standards and regulations on the use of claims and implied claims on food. 2017. [9]</p> <p>World Cancer Research Fund International. NOURISHING framework. Restrict food advertising and other forms of commercial promotion. 2017 [6]</p> <p>World Cancer Research Fund International. NOURISHING framework. Improve nutritional quality of the whole food supply. 2017. [5]</p>	<p>International database of implemented government policy actions to promote healthy eating and reduce overweight and obesity. Regularly updated two-three times a year. It includes approximately 400 policy actions from 127 countries and five regional bodies.</p> <p>A verification process is undertaken to ensure policies are implemented in a country. This includes sourcing and reviewing policy actions, communication with local experts and searching for any published evaluations.</p> <p>NOURISHING Framework (only italicized areas were reviewed for this project)</p> <p><u>Food environment:</u></p> <p><i>N = Nutrition label standards and regulations on the use of claims and implied claims on food;</i></p> <p><i>O = Offer healthy food and set standards in public institutions and other specific</i></p>	<p>Limited information on effectiveness or evaluation of policies (which could be related to lack of such data); includes policies for various countries some of which may not be applicable within an Australian context.</p>

Description of Key Public Health Nutrition evidence and policy review documents		
	<p><i>settings;</i></p> <p>U = Use economic tools to address food affordability & purchase incentives;</p> <p><i>R = Restrict food advertising and other forms of commercial promotion;</i></p> <p><i>I = Improve nutritional quality of the whole food supply;</i></p> <p>S = Set incentives and rules to create a healthy retail and food service environment;</p> <p><u>Food supply:</u></p> <p>H = Harness food supply chain & actions across sectors to ensure coherence with health;</p> <p><u>Behaviour change communication:</u></p> <p>I = Inform people about food & nutrition through public awareness; N = Nutrition advice and counselling in health care settings;</p> <p>G = Give nutrition education and skills</p>	
3. SOURCE: OBESITY POLICY COALITION		
Document	Description	Limitations
<p>Sacks G. for the Food-EPI Australia project team, Policies for tackling obesity and creating healthier food environments: scorecard and priority recommendations for Australian governments. 2017. [4]</p> <p>Food-EPI Australia Project, Australian Federal government: summary of current government policy action to 8 May 2016. 2017 [3]</p>	<p>Aim: to assess the extent to which Australia is implementing recommended policies and to identify areas for improvement.</p> <p>The document is a consensus statement of over 100 Australian experts from 53 organisations.</p> <p>The documents provide a summary of policy actions of the Australian Federal Government related to the food environment. They include benchmarks of good practice with international examples for each domain and policy area as identified by INFORMAS* (International Network for Food and Obesity/NCDs Research, Monitoring and Action Support). INFORMAS is a global network of public-interest organisations and researchers that seek to monitor and benchmark public and private sector actions to create healthy food environments and reduce obesity and non-communicable diseases.</p>	<p>Consensus statement not a systematic review. International examples of implementation in practice as according to INFORMAS standards.</p>

Description of Key Public Health Nutrition evidence and policy review documents		
4. SOURCE: MCKINSEY GLOBAL INSTITUTE		
Document	Description	Limitations
<p>Dobbs R, Sawers C, Thompson F, Manyika J, Woetzel J, Child P, McKenna S, Spatharou A, How the world could better fight obesity. 2014. [7]</p>	<p>Aim: to provide approaches which could assist with implementation of a holistic program for addressing obesity and provides an assessment of its cost-effectiveness and potential scale of impact when applied at a national level (United Kingdom used as an example).</p> <p>Provides a comprehensive list of interventions either used or piloted worldwide. Identifies 74 interventions in 18 areas, meta-analysis of research available on 44 of these interventions</p> <p>Interventions were identified through literature review and expert interviews. All included interventions have been trialed somewhere and evidence exists on their impact. Evidence on the interventions was critiqued according to its strength (based on the Oxford Centre for Evidence-Based Medicine 2011 Levels of Evidence system)</p> <p>Work guided by existing research, discussions with policy advisers, population-health academics, industry representatives, McKinsey Global Institute's understanding of micro- and behavioural economics and experience across consumer-facing, public and health-care sectors.</p>	<p>Initial assessment only, may have missed some interventions, over-estimated impact of these, focus on UK, may not be applicable to Australia, details of recommended policy actions not provided.</p>

ANALYSIS

Food regulatory approaches to addressing childhood obesity that were identified in the grey and systematic literature review were analysed against the *Conceptual Framework for the Link Between Trade Liberalization and Diet* [1]. Based on the remit of this review, findings are limited to the following domains within the Industry and Consumer Food Environments as highlighted in Figure 4 and described below:

The Industry Food Environment domains of:

- Food Advertising (labelling and packaging)
- Food Processing
- Food Retail

The Consumer Food Environment domains of:

- Food Availability (includes food composition and nutrition quality)
- Food Promotion (marketing)

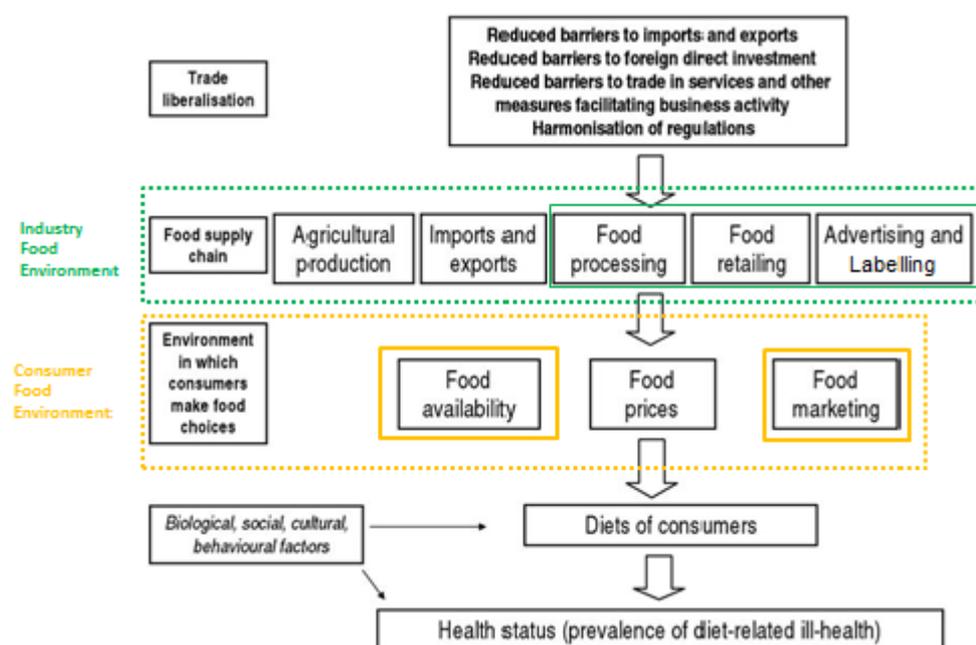


Figure 4: Elements of the Food Regulation System that were focused on in this review as described by Hawke's *Conceptual framework for the link between trade liberalization and diet* (p37) [1]

Interventions were then categorised into the following areas, according to their level of implementation:

- Implemented and recommended as best practice
- Implemented interventions with evaluation
- Implemented interventions
- "Innovations" that are recommended but may not have been implemented

FINDINGS

RESULTS OF THE SEARCH PROCESS

The systematic and grey literature searches revealed that there were several existing reviews of food regulation activity to address obesity. The quality and quantity of data identified through the grey literature, in particular from NOURISHING and the Australian Food-EPI project, was comprehensive and current. The work by these two groups both identified food regulation activities in international jurisdictions that aim to address obesity (review question 1) and identified activities that have been suggested but not necessarily implemented (review question 2). As these two sources focus on implementation at scale, they reported food regulation approaches that were executed at a local, state or national government level making findings more applicable to this review.

The NOURISHING framework database is updated at least six monthly with the last revision published in October 2017. This database includes policy actions from 127 countries and a thorough verification process is undertaken to ensure policies are implemented. This verification includes a literature search and contacting local experts to seek information. Links to evaluation publications of listed policies (when available) are also available and were used in locating data for this review.

Documents prepared by the Food-EPI group identify countries which are best practice examples of policy implementation together with brief information about the policy action. Due to the documents prepared by this group being published in 2017 and the NOURISHING framework being updated regularly, these sources were thought to provide the most up to date and comprehensive data hence were mainly used in this review.

The remaining documents, two WHO reports and one from the McKinsey Global Institute, provide brief and limited information about food regulation policy actions. Although some new policy ideas emerged from these sources and are included in the tables below, these documents cited the NOURISHING framework or did not provide a clear reference. This reinforced that NOURISHING framework was the more comprehensive source of data for this review.

As the quality and quantity of data identified through the grey literature search was so comprehensive and current, the findings of the systematic peer reviewed literature search were less relevant. The systematic peer reviewed literature search identified few additional papers. Peer reviewed literature tended to report programs implemented at a small scale e.g. a university cafeteria, with no indication of transferability at scale.

SUMMARY OF RESULTS ACCORDING TO FOOD SYSTEM FRAMEWORK

Table 3 summarises food regulatory approaches to address childhood obesity against Industry (food advertising, processing and retail) and Consumer (availability and promotion) Food Environments with expanded details of each of these domains later in the results section. Interventions are then colour coded according to their level of implementation.

- E. Implemented regulations and recommended as best practice [green shaded]
- F. Implemented regulations with evaluation [blue shaded]
- G. Implemented regulations [yellow shaded]
- H. "Innovations" are regulations recommended by WHO and/or McKinsey report [orange shaded]

A regulatory approach may have more than one colour as a particular country's experience may be recommended as best practice following implementation and evaluation, in other countries it may have been implemented and evaluated, and in other countries implemented but no evaluation data is available. Innovations represent expert consensus and recommendations and may or may not have been implemented.

The review question results are presented as follows:

Question 1 What are the food regulation activities in international jurisdictions that aim to address obesity?

Green, blue and yellow interventions answer review question one, as they have all been implemented.

Question 2 What food regulation activities to address obesity have been suggested but not necessarily implemented?

Green and orange interventions answer review question two as they describe programs that may or may not have been implemented at scale but have been identified through expert consensus as being innovative approaches which may have potential to address obesity through the food regulation system.

A detailed overview of approaches is presented on each domain area in the following sections.

Table 3: A Summary of Regulatory Approaches to Addressing Childhood Obesity by Level of Implementation and Country

1. INDUSTRY	
Regulatory approach	Country/ Reference
1.1 Food Processing	
Mandatory limits on sodium levels in processed foods	Argentina, USA [3-5]
	South Africa, Belgium, Bulgaria, Greece, Hungary, Iran, Paraguay, Portugal, South Africa [3-5]
Improve nutritional quality of the whole food supply by public-private partnership	UK (2011) [4, 5]
Voluntary reformulation of food products	France [6], New Zealand ,Netherlands, Switzerland [5]
Reformulation based on by public-private partnership	Argentina; Austria Belgium, Brazil, Canada, Chile, Costa Rica, Croatia, Czech Republic, Ecuador, Hungary, Ireland, Italy, Mexico, Netherlands, New Zealand, South Korea, Spain, USA, Uruguay, Kuwait [4, 5]
Voluntary Industry standards for deep-frying	New Zealand[3]
New “better for you” products	[7]
Stealth product reformulation: food/beverages/restaurants	[7, 8]
1.2 Food Retail	
Improve nutritional quality of the whole food supply by public-private partnership	USA [4, 5]
Improve nutritional quality of whole food supply by reducing portion size	Malaysia, Thailand [5]
Reduce number of calories served to children in quick service restaurants	[8]
Reduce portion size of processed meals, dishes, snacks, food and drinks	[8]
Reduce availability of high calorie food and drink	[7]
1.3 Food Labelling and Advertising	
Mandatory warning label for packaged foods exceeding limits for fat, saturated fat, cholesterol, and/or sodium	Chile [3, 4, 9]
	South Korea [3, 4, 9], USA , Finland, Latvia, Solomon Islands, Fiji [3, 4, 9]
Mandatory labelling of trans fat on packaged food	USA, Canada [4, 9]
	South Korea [4, 9]
	Argentina, Brazil, Chile, Hong Kong, Paraguay, Taiwan, Uruguay [4, 9]
Mandatory warning labels on menus and display in foodservice setting.	USA [3]
"Plain" calorie/nutrition, Front-of-package nutrition fact panel labelling mandated by government on all packaged foods to include calories, saturated and trans-fats, sodium and added sugars	[7, 8]
Simple information with consistent format and placement, "engaging" calorie/nutrition	[7, 8]

Regulatory approach	Country/ Reference
2. CONSUMER	
2.1 Food Availability (includes composition and nutrition value)	
Mandatory removal of trans-fats for foodservice	Denmark [5]
	USA [3], Argentina, Austria, Hungary, Iceland, Iran, Latvia, Norway, Singapore, South Africa, Switzerland [5]
Mandatory limits on the availability of high-fat meat products	Ghana [4, 5]
	Samoa, Fiji [5]
Voluntary reduction of portion size	UK [5]
Mandatory restriction on sale of energy drinks	Latvia, [3, 4, 9], Lithuania [5]
Reduce portion size of processed meals, dishes, snacks, foods, and drinks e.g. remove “supersize” items from menus	[8]
Reduce number of calories served to children in quick service restaurants	[8]
Ban sugar-sweetened beverages (including flavoured/sweetened milk) and limit the portion size of 100% juice	[8]
2.2 Food Marketing	
Ban/limit promotion and marketing of foods and beverages high in nutrients of concern to children	South Korea, Ireland, UK , USA [6, 10]
	Chile, Iran, Mexico, Norway, Taiwan [6]
Mandatory requirement for advertisements to carry health message or warning for items high in nutrients of concern	France [6]
Mandatory regulation of food marketing (high in nutrients of concern) in schools/children's settings	Chile, Poland, Uruguay [6]
Voluntary regulation of food advertising to children	Denmark, Latvia, Malaysia, Norway, Spain [6]
“Protective” messaging used during gaming	Netherlands, Spain [11]
Regulated media restrictions on high calorie foods advertising	[7]
Retailers and producers restrict promotional activity of high-calorie food and beverages	[7]

Implemented regulations and recommended as best practice [green shaded]; Implemented regulations with evaluation [blue shaded]; Implemented regulations [yellow shaded]; “Innovations” are regulations recommended by WHO and/or McKinsey report [orange shaded]

FOOD PROCESSING DOMAIN

A full list of approaches and countries of adoption is provided in Table 4. Approaches describe mandatory and voluntary strategies.

Argentina's *Less salt, more life* Initiative made a salt reduction target mandatory in a wide range of food categories including meat products and their derivatives, breads and cereal food group products, soups, seasoning mixes and tinned foods [5].

Evaluation of the public-private partnership of the USA's *National Salt Reduction Initiative* (started in 2009) showed that monitoring the implementation was feasible with a partnership of local, state, and national health organisations. The overall sales-weighted mean sodium in 2014 was found to have declined by 6.8%. Though this reduction was found to be statistically significant, it is "a very modest progress by the industry" compared to the goal which was to reduce sodium in packaged and restaurant foods by 25% over 5 years [25].

To improve the nutritional quality of the whole food system a number of countries were collaborating with the food industry on voluntary reformulation such as the UK's *Responsibility Deal*, France's *Charter of Engagement*, New Zealand's *HeartSAFE program*, Netherland's *National Agreement to Improve Product Composition* and Switzerland's *Make the Healthy Choice Easy Choice*.

The outcome of efforts to build public-private partnerships to improve the overall nutritional quality of the whole food supply are demonstrated in the *Public Health Responsibility Deal* (RD) food pledges implemented in the UK and the *National Salt Reduction Initiative* in the USA. The six pledges covered nutrition labelling (out-of-home calorie labelling, front-of-pack labelling), salt reduction, calorie reduction, fruit and vegetable consumption and reduction of saturated fats. Evaluations of the RD show that the food pledges were not evidence-based or the most effective strategies to improve diet; overall there was poor quality reporting and the partners appear to have committed to interventions that probably were already underway [26]. The evaluators concluded that "irrespective of the nature of a public health policy to improve nutritional health, pledges or proposed actions need to be evidence-based, well-defined, and measurable, pushing actors to go beyond 'business as usual' and setting out clear penalties for not demonstrating progress." They recommend that in the future if such deals are to more effectively the government should consider formal sanctions and incentives, monitor adherence to the pledges and provide support to the companies involved. Evaluation of the specific pledge for example to reduce trans fat revealed that the businesses which have the highest use of trans-fats, quick service and take away restaurants, failed to participate in this pledge and thus weakening the impact of the RD in out-of-home meals [24].

The New Zealand *HeartSAFE* program demonstrated a successful partnership in reformulation of existing products to make them healthier "better for you" by reducing the levels of sodium and saturated fats in processed foods with the industry and coordinated by the National Heart Foundation. It targeted low cost, high volume foods [5] and set up maximum level of sodium for bread, breakfast cereals, soups, processed meat, savoury pies, soups, savoury snacks, cheese, cooking sauces and edible oil spreads and maximum levels of saturated fats for savoury pies. The program has successfully achieved its objectives for the majority of categories (bread, breakfast cereals and processed meats) one year ahead of its proposed timeline of 2017.

Reformulations of existing and new products can enhance nutrient composition and as such innovations/recommendations by the WHO Commission on Childhood Obesity and the McKinsey report focus on new "better for you" products, and stealth "silent" product reformulation of food/beverages/restaurants [8] [7]. For example, reducing the amount of sugar gradually without explicitly making the consumer aware.

Table 4: Food Processing Regulatory Approaches to Address Childhood Obesity According to Level of Implementation and Country

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
Mandatory limits on sodium levels in processed foods	Argentina (2013) [3-5]	<p>'Less salt-more life' Initiative</p> <p>Includes categories: meat products and their derivatives, breads and farinaceous products, soups, seasoning mixes and tinned foods</p>
	USA (2009) [3-5]	<p>National Salt Reduction Initiative</p> <ul style="list-style-type: none"> • Nationwide partnerships - food manufacturers and restaurants • Reduce sodium content in packaged and restaurant foods • Salt reduction targets for 25 restaurant food categories • In June 2016, the FDA announced draft voluntary sodium reduction targets <p>Evaluation</p> <p>US food industry progress during the National Salt Reduction Initiative: 2009–2014[25]</p> <ul style="list-style-type: none"> • Analysis of top-selling products from 61 categories from The National Salt Reduction Initiative Packaged Food Database during 2009-2014 • In 2009 (Initiative came into effect) – no categories met 2012 or 2014 targets • By 2014, 26% of categories met 2012 targets and 3% met 2014 targets • Sales-weighted mean sodium density declined significantly in 3% of categories • Overall sales-weighted mean sodium declined significantly, by 6.8%
	South Africa (2013) [3-5]	<p>The South African Department of Health</p> <p>Mandatory targets for salt reduction in 13 food categories e.g. bread, breakfast cereals, margarines and fat spreads, savoury snacks</p>
	Belgium (1985), Bulgaria (2011/12), Greece (1971), Hungary (2012), Iran, Paraguay (2013),	<p>Targets and limits set for food manufacturers</p> <p>Limits vary across the countries</p>

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
	Portugal (2009), South Africa (2013) [3-5]	
Improve nutritional quality of the whole food supply by public-private partnership	UK (2011) [4, 5]	<p>“The Responsibility Deal” – food industry made voluntary commitments (“pledges”) to reduce the content of nutrients of concern in foods</p> <p>Evaluation</p> <p>Has a public-private partnership resulted in action on healthier diets in England? An analysis of the Public Health Responsibility Deal food pledges [26]</p> <ul style="list-style-type: none"> • Systematic evaluation of effectiveness of six food pledges proposed under the Responsibility Deal (RD): nutrition labelling (out-of-home calorie labelling, front-of-pack labelling), salt reduction, calorie reduction, fruit and vegetable consumption, reduction of saturated fats • Progress reports were of poor quality overall • Most RD partners appear to have committed to interventions that probably were already underway • The RD food pledges do not reflect the most effective strategies to improve diet • Voluntary agreements need to push partners to go beyond business as usual <p>An evaluation of a public–private partnership to reduce artificial trans fatty acids in England, 2011–16 [17]</p> <ul style="list-style-type: none"> • To evaluate the Responsibility Deal’s effectiveness at encouraging signatory organizations to remove artificially produced fatty acid from their products • Analysis of organisations’ plans and progress • Comparison of progress reports against delivery plans • The first part of the trans fat pledge urges organisations to declare that they do not use trans-fats. The second part of the pledge, assessed encourages removal of artificial trans-fats • Organisations which use the most of artificial trans-fats, fast food and

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
		<p>take away restaurants, failed to participate in this pledge.</p> <ul style="list-style-type: none"> The second part of the trans fat Responsibility Deal’s pledge had limited contribution in reducing artificial trans-fats from food supply <p>An evaluation of the Public Health Responsibility Deal: Informants’ experiences and views of the development, implementation and achievements of a pledge-based, public–private partnership to improve population health in England [27]</p> <ul style="list-style-type: none"> 44 semi-structured interviews (representatives of businesses, hospitality companies, service-related business, trade bodies, public sector, non-government organisations and charities). RD partners’ motivation to participate in RD pledges were corporate social responsibility and improve reputation Pledges made were often related to work either already being implemented or planned for implementation prior to joining RD RD pledge enhancement included reformulation (alcohol units, calorie and salt reduction), labelling activities, introduction of physical activity or health at work interventions It is suggested that for deals such as RD to be more effective the government should consider introducing formal sanctions and incentives, monitoring adherence to pledges and provide support to companies
Voluntary reformulation of food products [5]	France (2008) [6]	<p>Charter for Engagement with the food industry led by the Ministry of Health</p> <p>Aim to improve nutritional composition of food by reducing the content of nutrients of concern and increasing fibre</p>
	New Zealand (2007) [5]	<p>HeartSAFE (Sodium Advisory and Food Evaluation) program</p> <ul style="list-style-type: none"> Maximum levels of sodium in mg per 100g for bread, breakfast cereals, soups, processed meat, savoury pies, soups, savoury snacks, cheese, cooking sauces and edible oil spreads including proposed timelines until 2017 for reformulation. For savoury pies, maximum levels of saturated fat in g per 100g are also included. By 2016, majority of categories (e.g. bread, breakfast cereals, processed meats) had met the objective

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
	Netherlands (2014) [5]	Ministry of Health, Welfare and Sport – agreement with trade organisations to lower the levels of salt, saturated fat, calories in food products
	Switzerland (2009) [5]	Ministry of Health – “Make the healthy choice the easy choice” – voluntary agreement with the food industry To reduce the content of nutrients of concern and calories in bread and processed foods
Reformulation based on by public-private partnership	Argentina [4, 5]	2011 voluntary, 2013 mandatory <ul style="list-style-type: none"> • The Less Salt, More Life Initiative – 3 components: reduction of salt in processed foods (2011 voluntary agreement with food manufacturers and retailers), reduction of salt in bread (bakers), creating public awareness of the health effects and the need to reduce discretionary salt • Targets are set through negotiation with industry • Aim: 5-10% reduction of salt content 2013-2015 • Government – 2013 law on mandatory maximum levels of sodium
	Austria (2011) [4, 5]	The Less Salt is Healthier programme – initiative between Ministry of Health and industry (bakers) Voluntary target to decrease salt content by 15% (by 2015)
	Belgium (2009) [4, 5]	Agreement between industry and Ministry of Public Health to reduce salt Content in food products by 10% (by 2012) - self-reporting framework
	Brazil (2010) [4, 5]	National strategy for reducing salt consumption Food industry is involved – sets biannual category-specific targets and focuses on education and information distribution of salt reduction
	Canada (2010), Chile (2011), Costa Rica	Salt

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
	(2011), Croatia (2012), Czech Republic (2008), Ecuador, Hungary, Ireland (2003), Italy (2009), Mexico (2012), Netherlands (2014), New Zealand (2007), South Korea (2012), Spain (2005), USA (2009), Uruguay (2013) [4, 5]	
	Kuwait (2013) [4, 5]	Ministry of Health established The Kuwait Salt and Fat Intake Reduction Taskforce
Voluntary Industry standards for deep-frying	New Zealand[3]	The Chip Group initiative Standards set for deep-frying and salt content for deep-fried chips
New “better for you” products	[7]	
Stealth product reformulation: food/beverages/restaurants	[7] [8]	

Implemented regulations and recommended as best practice [green shaded]; Implemented regulations with evaluation [blue shaded]; Implemented regulations [yellow shaded]; “Innovations” are regulations recommended by WHO and/or McKinsey report [orange shaded]

FOOD RETAIL DOMAIN

A full list of approaches and countries of adoption is provided in Table 5. Data on strategies focused on the food retail setting was limited. Nevertheless, the recommendation from WHO and the McKinsey report is highlighted. The main innovations/recommendation focused on reducing calories either via reducing portion size of processed meals, dishes, snacks, food and drinks, such as removing 'supersize' items from the menu; and reducing the number of calories served to children in quick service restaurants.

The NOURISHING framework gave several examples on interventions that have been implemented in schools as food retail setting. These fell out of the scope of this report but may be a useful consideration when targeting retail specific to children. Similarly, the systematic review identified smaller scale interventions which had used retail settings however these had not interfaced with the food regulation system as such, and so were not included in this review. Retail may be an under-explored regulatory environment for which smaller scale interventions may be useful informing policy and practice decisions.

Table 5: Food Retail Regulatory Approaches to Addressing Childhood Obesity by Level of Implementation and Country

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
Improve nutritional quality of the whole food supply by public-private partnership	USA [4, 5]	National Salt Reduction initiative – voluntary salt levels for packaged and restaurant foods In June 2016, the FDA announced draft voluntary sodium reduction targets
Improve nutritional quality of whole food supply by reducing portion size	Malaysia (2014) [5]	Ministry of Health in collaboration with major fast-food restaurants Reduction of portion sizes and provision of healthier choices for high-calorie meals, food, beverages
	Thailand (2015) [5]	Voluntary policy to reduce sugar packets’ size – from 6-8g to 4g
Reduce number of calories served to children in quick service restaurants	[8]	
Reduce portion size of processed meals, dishes, snacks, food and drinks	[8]	
Reduce availability of high calorie food and drink	[7]	

Implemented regulations and recommended as best practice [green shaded]; Implemented regulations with evaluation [blue shaded]; Implemented regulations [yellow shaded]; “Innovations” are regulations recommended by WHO and/or McKinsey report [orange shaded]

FOOD ADVERTISING AND LABELLING DOMAIN

This domain encompasses labelling and packaging regulations. A full list of approaches and countries of adoption is provided in Table 6. The table highlights only those approaches not currently in use in Australia. The main policy areas were front-of-pack (FOP), mandatory labelling, warning labelling and on-the-shelf labelling. The Food Epi project best practice for warning labels were from Chile, Canada and the USA.

The Chilean regulation enacted in 2012, sets the high limit for energy, saturated fat, sugar and sodium content in food and beverages. Any product that exceeds the high limit must have a FOP warning label “HIGH IN” inside a STOP sign followed by the concerned nutrient. The warning label is per nutrient of concern, therefore, if two nutrients exceed the high limit then two STOP warning signs will be on the FOP. Norms are set for the formatting and graphics of the warning message. This formed part of a suite of related strategies which acted at multiple parts of the food and nutrition system. The Chilean experience is detailed in appendix 2.

Evaluations on the impact of mandatory labelling on trans-fats showed that it successfully reduced dietary intake of trans-fats in Canada [28], the USA [4], and South Korea [12].

In relation to other nutrients of concern such as sugar, in 2016, the US issued a mandatory regulation requiring added sugar to be included on labelling of packaged foods. Compliance is staggered beginning July 2018 and the final requirement by all manufacturers is set for 2021 [3].

There are five innovations/recommendations on food labelling and packaging from the World Health Organisation (WHO) [8] and the McKinsey report [7] that legislators and the food industry should consider. They were:

- Mandatory “plain” calorie/nutrition FOP nutrition fact panel labelling on all packaged foods to include calories, saturated and trans-fats, sodium and added sugar
- Simple information with consistent format and placement, e.g. using the traffic light scheme
- Point of purchase identifying and promoting healthy food options
- Clear information on portion size with nutrition information per portion
- Endorsement schemes on front-of-package, e.g. healthy choice symbols

Table 6: Food Labelling and Advertising Regulatory Approaches to Addressing Childhood Obesity by Level of Implementation and Country

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
Mandatory warning label for packaged foods exceeding limits for fat, saturated fat, cholesterol, and/or sodium [3, 4, 9]	Chile [3, 4, 9]	<ul style="list-style-type: none"> • ‘High limits’ set for energy, saturated fat, sugar, sodium content in food and beverages • Items exceeding set limits must have a warning label inside a stop sign (front of pack): ‘HIGH IN’ followed by CALORIES, SATURATED FAT, CALORIES or SUGAR OR SODIUM, as well as ‘Ministry of Health’. • Warning added per nutrient exceeding the limits (i.e. two signs if limits exceeded for salt and sugar) • Norms set for formatting and graphics of the warning message
	South Korea [3, 4, 9]	<ul style="list-style-type: none"> • Foods high in nutrients which may cause negative health effects must have a warning label
	USA [3, 4, 9]	<ul style="list-style-type: none"> • FDA-authorized list of nutrients in the Food Labelling Guide 1994, last updated in 2013 • Packaged foods containing more than 13g of fat, 4g of saturated fat, 60mg of cholesterol or 480mg of sodium/serve must include a disclosure statement <p>Mandatory labelling of added sugar on packaged food</p> <p>Compliance starting July 2018, with the final requirement by 2021</p> <ul style="list-style-type: none"> • Amount of added sugars (in grams and as percent Daily Value) needs to be included on the label, just below the line for total sugars)
	Finland (1993) [3, 4, 9]	<ul style="list-style-type: none"> • Warning for salt “high salt content” if food items exceed set limits • Applied to all food categories that include substantial amount of salt • Heart symbol on products with lower content of sodium and salt (Finnish Heart Foundation and Finnish Diabetes Foundation)
	Latvia (2016) [3, 4, 9]	<ul style="list-style-type: none"> • Energy drinks are to be displayed separately from all other drinks and food • Energy drinks are to be displayed separately from all other drinks and food • Warning label is required “High caffeine content. Not recommended for

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
		children and pregnant and breastfeeding women”
	Solomon Islands [3, 4, 9]	<ul style="list-style-type: none"> • The Pure Food (Food Control) Regulation 2009 • foods which have 20% or more of fat have a label “this brand of (name of the food) is high in fat. For healthy diet eat less”
	Fiji [3, 4, 9]	<p>The Food Safety Act 2009</p> <p>foods which have 20% or more of fat have a label “this brand of (name of the food) is high in fat. For healthy diet eat less”</p>
Mandatory labelling of trans fat on packaged food	USA [4, 9]	<p>Updated estimate of trans fat intake by the US population [29]</p> <ul style="list-style-type: none"> • Dietary intake of trans-fats in children 0-18 years post implementation of labelling requirements decreased • Changes in fat content of US snack foods in response to mandatory trans fat labelling [28] • Pre-post labels for more than 500 child and cookie products are compared according to lipid and fat profile • Decrease of the content of partially hydrogenated vegetable oil in chips by 45% and cookies by 42%. Increase of 0.49g in the average saturated fat content per 30g (cookies), and increase by 9% in the average ratio of saturated to total fat. • No significant changes in the content of fat for chips.
	Canada [4, 9]	<p>A comparison of the fat composition and prices of margarines between 2002 and 2006, when new Canadian labelling regulations came into effect [12]</p> <ul style="list-style-type: none"> • Average amounts of trans-fats and monounsaturated fatty acids decreased • Average amount of polyunsaturated fatty acids increased significantly • Average cost of margarines lower in trans-fats was higher than those with higher content of trans-fats, relationship stronger in 2006 than 2002 <p>Trans fatty acids in human milk in Canada declined with the introduction of trans fat food labelling[30]</p>

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
		<ul style="list-style-type: none"> Data from 87 women in 2004-2006 compared to data from 103 women in 1998 Trans fat content in human milk significantly decreased
	South Korea [4, 9]	<p>Trans fatty acids content and fatty acid profiles in the selected food products from Korea between 2005 and 2008 [31]</p> <ul style="list-style-type: none"> Assessment of the effect of trans fat labelling regulation (2007) on trans-fats content in food products Foods from 7 different categories were assessed in 2005 and 2008 Trans fat content decreased in all 2008 foods
	Argentina, Brazil, Chile, Hong Kong, Paraguay, Taiwan, Uruguay [4, 9]	
Mandatory warning labels on menus and display in foodservice setting.	USA [3]	<p>New York Code came into effect in 2015</p> <ul style="list-style-type: none"> Chain restaurant (with 15 stores or more) must put a warning label on menus and menu boards – salt shaker symbol (when content is 2300mg or more) Warning statement - at the point of sale ‘Warning: [salt shaker symbol] indicates that sodium (salt) content of this item is higher than the total daily recommended limit (2300mg). High sodium intake can increase blood pressure and risk of heart disease and stroke’
"Plain" calorie/nutrition, Front-of-package nutrition fact panel labelling mandated by government on all packaged foods to include calories, saturated and trans-fats, sodium and added sugars	[7, 8]	
Simple information with consistent format and placement, "engaging" calorie/nutrition, (e.g. traffic light scheme)	[7, 8]	

Implemented regulations and recommended as best practice [green shaded]; Implemented regulations with evaluation [blue shaded]; Implemented regulations [yellow shaded]; “Innovations” are regulations recommended by WHO and/or McKinsey report [orange shaded]

FOOD AVAILABILITY DOMAIN (INCLUDING FOOD COMPOSITION/NUTRITIONAL VALUE)

Regulatory approaches in this domain primarily focusing on restricting the sale of products or nutrients of concern to particular populations or in particular settings. These approaches are detailed in Table 7.

The most comprehensive examples relate to trans-fats. Denmark was the first country in the world to legislate prohibiting the sale of products containing any trans-fats in 2003 [5]. Two evaluations conducted on the impact of this policy showed that the trans-fat content in food was reduced to non-significant levels by 2006 [32], and that had contributed to a decrease in cardiovascular disease mortality rates [33].

Examples from Pacific Islands to address high fat meats are notable in their interface with other aspects of the food regulation system such as trade.

The innovations/recommendations suggested by the WHO Commission on Childhood Obesity included:

- Reduce portion size of processed meals, dishes, snacks, foods and drinks e.g. remove “supersize” items from menus
- Reduce number of calories served to children in quick service restaurants
- Ban sugar-sweetened beverages (including flavoured/sweetened milk) and limit the portion size of 100% juice (e.g. in schools)

Table 7: Food Availability Regulatory Approaches to Addressing Childhood Obesity by Level of Implementation and Country

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
Mandatory removal of trans-fats for foodservice	Denmark (2003) [5]	<p>Government legislation prohibits the sale of products containing any trans-fats</p> <p><u>Evaluation</u></p> <p>Denmark’s policy on artificial trans fat and cardiovascular disease [33]</p> <ul style="list-style-type: none"> • Assessment of annual mortality rates in OECD countries to determine the effect of trans fat policy in Denmark on its mortality rates due to CVD • Trans fat policy contributed to a decrease of CVD mortality rates <p>The effect of the regulation on trans fatty acid content in Danish food [32]</p> <ul style="list-style-type: none"> • Denmark’s 2003 Order – maximum level of 2g/100g fat on industrially produced trans-fats • Analysis of foods in 2003 and 2005 • Trans-fats content in food has been reduced to non-significant for the intake level
	USA [3]	<p>The New York City Health Code 2015</p> <p>Restriction for any menu item or served in any food service establishment or by any mobile food unit (including restaurants, bakeries, cafeterias, caterers, mobile food vendors, and concession stands)</p>
	Argentina, Austria (2009), Hungary (2013), Iceland (2010), Iran (2005), Latvia (2016), Norway (2014), Singapore (2012), South Africa (2011), Switzerland (2008)[5]	<p>Targets and limits set for food manufacturers</p> <p>Limits vary across the countries</p>
Mandatory limits on the availability of high-fat meat products	Ghana [4, 5]	<p>Introduced 1990s fat level limits set for – pork, beef, mutton, poultry, turkey tails and chicken feet, applied also to domestically produced meat</p> <p>Standards set for maximum percentage of fat. Standards were the result of trade and health sector collaboration</p>

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
		<u>Evaluations</u> Development, implementation and outcome of standards to restrict fatty meat in the food supply and prevent NCDs: learning from an innovative trade/food policy in Ghana [34] <ul style="list-style-type: none"> • Semi-structured policy analysis interview with stakeholders • There was a reduction of fatty meat availability in the food supply post introduction of standards • Import from USA decreased however there has been little effect on local agriculture
	Samoa (2011) [5]	Ban sales of turkey tails and turkey tail products (this replaced an import ban of turkey tails)
	Fiji (2000) [5]	Ban on sales of mutton flaps (high in fat and low in meat content)
Voluntary reduction of portion size [5]	UK (2011) [5]	A part of the “Responsibility Deal” (refer to above for details)
Mandatory restriction on sale of energy drinks	Latvia, (2016) [3, 4, 9]	Ban sale of energy drinks exceeding set limits for certain stimulants to persons under 18 Energy drinks are to be displayed separately from all other drinks and food
	Lithuania (2014) [5]	Ban sales of energy drinks to persons under 18
Reduce portion size of processed meals, dishes, snacks, foods, and drinks e.g. remove “supersize” items from menus	[8]	
Reduce number of calories served to children in quick service restaurants	[8]	
Ban sugar-sweetened beverages (including flavoured/sweetened milk) and limit the portion size of 100% juice (e.g. in schools)	[8]	

Implemented regulations and recommended as best practice [green shaded]; Implemented regulations with evaluation [blue shaded]; Implemented regulations [yellow shaded]; “Innovations” are regulations recommended by WHO and/or McKinsey report [orange shaded]

FOOD MARKETING AND PROMOTION DOMAIN

Food marketing and promotion includes a wide array of mediums. Based on the parameters for this review the search was limited to marketing and promotion regulations that used limits or standards that were part of the food regulation system. Table 8 summarises policy areas in use internationally to limit, restrict or ban the marketing and promotion of foods high in nutrients of concern. While marketing, advertising and promotion of unhealthy foods fell outside the scope of this review, these interventions and approaches were included because they demonstrate a blend of mandatory and voluntary approaches, both wholly and partially, applied to various marketing mediums and types of foods. These approaches may describe opportunities to extend or amend the existing Australian Code, particularly to more contemporary marketing mediums such as gaming.

The South Korean experience of restricting advertising of energy-dense and nutrient-poor foods targeting children on television, radio, internet including incentives to purchase (e.g. toys) showed positive changes in television advertising. The total budget, number of advertisements and gross rating points decreased during regulated and non-regulated hours. The total budget for non-energy-dense, nutrient poor (non-EDNP) foods increased. The authors concluded that the latter could “encourage food companies to shift their focus more towards non-EDNP foods and advertise products that are more beneficial to children” [35].

In the UK, Code of Broadcasting Advertising restricts advertising of foods high in nutrients of concern. The restriction system is paid for by the industry and enforced by an independent agency. A cross sectional study conducted one week pre and post restrictions came into effect showed there was good adherence to the restrictions however this did not change the relative exposure of children to advertisement of foods high in nutrients of concern [36].

Examining compliance in the first USA state to introduce state-wide law banning junk food and beverage advertising in Maine schools revealed that food and beverage marketing on vending machines, posters, signs, scoreboards, school equipment, in yearbooks, marketing via fundraising, sponsorship and scholarship continued to exist, and that the soft drink companies were the most common non-compliant product advertised in schools [37].

Overall, many regulations restricting promotion and marketing of foods high in nutrients of concern to children are in place. However, from the evaluations it is clear that when the industry is involved in either self-regulation, voluntary compliance or financially contributing towards the system, compliance is weakened.

Table 8: Food Marketing and Promotion Regulatory Approaches to Addressing Childhood Obesity by Level of Implementation and Country

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
Ban/limit promotion and marketing of foods and beverages high in nutrients of concern to children	South Korea (2010) [6]	<p>Special Act on Safety Management of Children's Dietary Life</p> <ul style="list-style-type: none"> • Restrictions for energy dense, nutrient poor foods • Restriction for TV (times for advertising), radio, internet that includes incentives to purchase (e.g. toys) <p><u>Evaluation</u> Restriction of television food advertising in South Korea: impact on advertising of food companies [35]</p> <p>Effect of TV food advertising restriction on food environment for children in South Korea [38]</p>
	Ireland (2013) [6]	<p>Children's Commercial Revision</p> <p>Advertising, sponsorship, teleshopping, product placement of foods high in the nutrients of concern are prohibited in children's TV and radio (where 50% are children) limits for advertising of items high in nutrients of concern</p> <p>Advertising to children cannot include nutrient, health claim, licensed characters</p> <p><u>Evaluation</u> Food and beverage advertising during children's television programming [39]</p>
	UK (2010) [6]	<p>Code of Broadcast Advertising</p> <p>Restrictions of advertising foods high in nutrients of concern</p> <p>Scoring system is calculated for children's programmes and restrictions apply for those scoring 120 and over</p>

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
		<p>The advertising restricting system is paid for by industry and enforced by an independent agency</p> <p><u>Evaluation</u> Effect of restrictions on television food advertising to children on exposure to advertisements for ‘less healthy’ foods: repeat cross-sectional study [36]</p> <p>The extent of food advertising to children on UK television in 2008 [40]</p>
	USA [6]	<p>2007: State of Maine: prohibition of brand-specific advertising of certain food items. Ban applies to “food on minimum nutritional value”</p> <p><u>Evaluation</u> Examining compliance with a state-wide law banning junk food and beverage marketing in Maine schools [37]</p> <p>Restriction on toy premium in fast foods: Policy and marketing changes to help curb childhood obesity: government ban vs. industry self-regulation [10]</p>
	Chile [6]	<p>2012 Law of Nutritional Composition of Food and Advertising came into effect in 2016</p> <ul style="list-style-type: none"> • Norms define food and beverages high in nutrients of concern • Law restricts advertising these items to children under the age of 14 • Limits on when advertisements can run • Promotional strategies and incentives (e.g. cartoons animations, toys) are banned • Advertising in schools is not allowed
	Iran [6]	<p>Soft drink advertising prohibited since 2004</p> <p>24 food items are prohibited from advertising in all media (list prepared in 2014)</p>

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
	Mexico (2014) [6]	Restrictions for advertising items high in nutrients of concern (TV and films)
	Norway (1992) [6]	Broadcasting Act Prohibition of marketing and advertising in connection with children's programmes on television, radio, teletext The use of persons or figures who were a part of a radio or TV programme for children or young adults in the past 12 months is not allowed for advertising
	Taiwan (2016) [6]	Restrictions of advertising foods high in nutrients of concern including snacks, candies, drinks, ice products (limits provided for fats, saturated fat, sodium, added sugar) Restricted foods cannot be promoted with toys that are given free or with an additional price incl. at fast food chain restaurants
Mandatory requirement for advertisements to carry health message or warning for items high in nutrients of concern	France (2007) [6]	Items high in nutrient of concern must include a message e.g. "For your health eat at least five fruit and vegetables a day", "For your health, avoid eating too many foods that are high in fat, sugar or salt", "For your health, avoid snacking between meals"
Mandatory regulation of food marketing (high in nutrients of concern) in schools/children's settings	Chile [6]	2012 Law of Nutritional Composition of Food and Advertising came into effect in 2016
	Poland[6]	2006 Act on Food and Nutrition Safety amended in 2014, came into effect 2015 Limits set for foods and beverages high in nutrients of concerns sold in pre-schools, primary and secondary schools Advertising and promotion of foods that do not meet the standards is prohibited
	Uruguay [6]	2013 law, in effect since 2015 Law prohibits the advertising and marketing of foods and drinks that fail to meet the nutrition standards Advertising in all forms is prohibited, including posters, billboards, and use of logos/brands on school supplies, sponsorship, and distribution of prizes,

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
		free samples on school premises and the display and visibility of food
Voluntary regulation of food advertising to children	Denmark (2008) [6]	<p>The Danish Code of Responsible Food Marketing Communication— cooperation between industry organisations (food and beverages), retail and media (Forum)</p> <ul style="list-style-type: none"> • Voluntary, self-regulatory initiative applicable to food/beverages marketing to children applicable to food and beverage marketing to children aged 13 and under via media outlets (TV, radio, internet, SMS, newspapers, comic books). • Set of guidelines for limits for the content of nutrients of concern • Compliance is checked by the secretariat of the Forum • Danish government follows the results of the Code, and annual status meetings are held between the Danish Veterinary and Food Administration and the Forum
	Latvia (2011) [6]	Memorandum of Cooperation signed between the Government and soft food companies to encourage companies not to advertise to children
	Malaysia (2008) [6]	<p>Voluntary Guidelines of Advertisement and Nutrition Labelling for Fast Food Restaurants (not monitored)</p> <p>Encourages not to advertise to children or act as a sponsor of children’s programmes</p>
	Norway (2011) [6]	Voluntary standards encourage companies not to advertise soft drinks to children in specific settings/media
	Spain (2005) [6]	Code developed by government and industry – restricts product placement and use of celebrities in advertising
“Protective” messaging used during gaming	Netherlands, Spain [11]	<p>Aim: To examine the effectiveness of a “protective” message in a video game containing an advertisement (advergame) on children’s snack intake.</p> <p>Results: Playing an advergame increased energy intake in children. Including a “protective” message in an advergame was ineffective in reducing energy intake</p> <p>Netherlands (n=211) and Spain (n=351); Children aged 6-12 years</p>

Regulatory Approach	Country/ Reference	Details of intervention and evaluation (if conducted)
Regulated media restrictions on high calorie foods advertising	[7]	
Retailers and producers restrict promotional activity of high-calorie food and beverages	[7]	

Implemented regulations and recommended as best practice [green shaded]; Implemented regulations with evaluation [blue shaded]; Implemented regulations [yellow shaded]; “Innovations” are regulations recommended by WHO and/or McKinsey report [orange shaded]

LIMITATIONS OF THIS REVIEW

This review aimed to give pragmatic advice which included the application of various exclusion criteria concerned with focusing the scope on food regulation approaches and minimising duplication of activities already being undertaken in Australia. The scope of food regulation in Australia was defined by the funders as:

the laws, policies, standards and processes that we use to make sure our food is safe to eat. Viewed broadly, this might include matters related to trade, agriculture, transport, land use and many other matters. This review was limited to the food laws, policies, standards and processes within the decision making power of the Ministerial Forum on Food Regulation. These include: consumer protection laws requiring information about food to be truthful and not misleading; food laws that cover a more specific range of food issues including safety, labelling, composition and food handling requirements; food policies that provide the framework on a given topic; and food standards for labelling and end product standards for foods for sale. Food standards are mandatory requirements that must be followed by law when they are adopted by Food Acts and other food related legislation.

This definition included subjective elements which meant it was at times difficult to apply and may have restricted the findings. Findings often described activities that were similar to existing activities by Australian governments but provided insights on how this could be enhanced (e.g. front of pack labelling). Some findings described regulatory activities which were out of scope but demonstrated effectiveness in other countries (e.g. mandatory bans on advertising to children). Others described value add activities similar to existing Australian government activities that extended their effectiveness and reach. This was particularly true for the schools setting.

Given the scope of this review was regulatory approaches, included interventions were those delivered at scale, predominantly by State agencies. As a result, grey literature was a more contemporary reflection of activity. The review of peer reviewed literature resulted in few additional programs being identified. A review of the peer review literature may be more beneficial once a particular approach has been determined, to provide detail on particular interventions and aspects of implementation.

DISCUSSION

The purpose of this review was to:

1. Describe the food regulation activities in international jurisdictions that aim to address obesity
2. Identify food regulation activities to address obesity have been suggested but not necessarily implemented

The review identified that the use of the food regulation system to address obesity is widely adopted internationally and recommended as best practice. As a result, many organizations have prepared review documents and clearing houses to monitor activity in this area and provide advice to policy makers. The NOURISHING Framework is regularly updated and reviewed. It contains the most current and comprehensive review of food regulation activity to address obesity. The Australian Food-EPI project provides advice to the Australian context.

Mapping Australia's food regulatory activities against Hawke's *Conceptual Framework for the Link between Trade Liberalization and Diet* was helpful in describing where existing activity is focused. For this review, this mapping was used to define the scope of our project, however it may be a useful activity for decision makers to investigate the emphasis of current investment and opportunities for future investment and activity.

Best practice policies focused on mandatory implementation of regulations. From this review, evaluations from a number of mandatory regulations demonstrated positive outcomes. For example, the Canadian mandatory

regulation of requirement for trans-fat labelling on packaged foods lead to a reduction in dietary intake of trans-fats post implementation in human milk [12]. A similar success was achieved in Denmark with the introduction of mandatory removal of trans-fats for out-of-home meals.

Voluntary regulations/commitments, self-regulation, voluntary compliance or public-private partnership have shown weaker policy implementation with ultimately reduced impact for the population. Case in point are two examples from the US and UK. Firstly, after six years of introducing the voluntary reduction of salt in packaged and restaurant foods through the USA's National Salt Reduction Initiative, evaluation reports showed that against the goal of reducing salt by 25 percent in five years, the industry managed a modest 6.8 percent [12]. This result is poor when compared with the success achieved in the removal of trans fat from packaged and restaurant foods [4, 5, 6, 7, 8]. The second example is the voluntary commitment "pledges" the food industry made in the UK's Public Health Responsibility Deal. Evaluation of one of the pledges related to trans fat revealed that the organisations that use most of the trans fat, the quick service and take away restaurants, were in fact not participating in the pledge. It also appeared that the partners committed to interventions that probably were already underway, so the deal was in fact "business as usual" by the industry [22, 23]. The New Zealand's HeartSAFE is an example of a voluntary industry-led salt reduction program working. A salient difference is that the National Health Foundation is contracted by the Government to manage the program, and encourages and supports the industry on the reformulation work.

Regulatory approaches are most effective when part of a suite of related strategies. To effectively create an environment where not eating foods high in nutrients of concern or eating healthier options is an easier choice to make by consumers requires a concentrated, comprehensive and holistic effort to be put in place across the whole trade-food-diet-disease framework if the rates of NCD are to be reversed. This can be seen in various strategies for the same dietary outcome, in particular salt and trans fats, being seen across several domains. The Chilean the Law of Food Labelling (in 2012) and Advertising (in 2016) targeting packaged foods was supported by strategies including mandatory regulations of broadcast and non-broadcast communication channels, food marketing in schools and restrictions on promotion of unhealthy foods in broadcast media and non-broadcast media.

This review highlights a number of potential regulatory approaches to addressing childhood obesity adopted, implemented and evaluated in other jurisdictions. It also summarises current recommendations for actions by peak bodies and expert consensus. Investment in this area in Australia should include monitoring and evaluation reported publically. Childhood obesity is a global health issue. The use of food regulation activities to address childhood obesity is well accepted. Few interventions, however, were comprehensively evaluated with respect to outcomes. Evaluations are needed to inform development activity in this area.

APPENDIX 1

SEARCH STRATEGY

Database search journey:

#1

("food regulation" OR "food selfregulation" OR "food self-regulation") AND ("childhood obesity" OR "childhood overweight")

#2

food and (regulation OR selfregulation OR self-regulation) AND ("childhood obesity" OR "childhood overweight")

#3

food and (regulation OR selfregulation OR self-regulation) AND ("childhood obesity" OR "childhood overweight") not (school OR hospital OR education OR sport*)

#4

food AND (regulation OR selfregulation OR self-regulation OR legislation OR law OR policy) AND ("childhood obesity" OR "childhood overweight") not (school OR hospital OR sport*)

#5

((("food regulation" OR "food selfregulation" OR "food self-regulation") OR (food AND (legislation OR law OR policy)))) AND ("childhood obesity" OR "childhood overweight")

#6

((("food regulation" OR "food selfregulation" OR "food self-regulation") OR (food AND (legislation OR law OR policy)))) AND ("childhood obesity" OR "childhood overweight") and not (school OR hospital OR sport*)

#7

((("food regulation" OR "food selfregulation" OR "food self-regulation")OR (food AND (legislation OR law OR policy)))) AND ("childhood obesity" OR "childhood overweight") and not (school OR hospital OR sport*) and (population OR "public health" OR "health promotion") AND (sugar OR salt OR fat OR fibre)

#8

food and (regulation OR selfregulation OR self-regulation OR legislation OR law OR policy) AND ("childhood obesity" OR "childhood overweight") AND (sugar OR salt OR fat OR fibre) and not (school OR hospital OR education OR sport*)

#9

food and (regulation OR selfregulation OR self-regulation OR legislation OR law OR policy) AND ("child* obesity" OR "child* overweight") AND (sugar OR salt OR fat OR fibre) not (school OR hospital OR education OR sport*)

#10

food and (regulation OR selfregulation OR self-regulation OR legislation OR law OR policy) AND (“child* obesity” OR “child* overweight”) AND label* not (school OR hospital OR education OR sport*)

#11

food AND (regulation OR selfregulation OR self-regulation OR legislation OR law OR policy OR act OR standard OR code) AND (“child* obesity” OR “child* overweight”) AND (population OR public OR prevent* OR promotion) NOT (school OR hospital OR sport*)

#12

food AND (regulation OR selfregulation OR self-regulation OR legislation OR law OR policy OR act OR standard OR code) AND (“child* obesity” OR “child* overweight”) AND (population OR public OR prevent* OR promotion) NOT (school OR hospital OR sport*) NOT (advert* OR market* OR tax*)

#13

food AND (regulation OR selfregulation OR self-regulation OR legislation OR law OR policy OR act OR standard OR code) AND (“child* obesity” OR “child* overweight”) AND (population OR public OR prevent* OR promotion) NOT (school OR hospital OR sport*) AND label*

#14

food AND (regulation OR selfregulation OR self-regulation OR legislation OR law OR policy OR act OR standard OR code) AND (“child* obesity” OR “child* overweight”) NOT (school OR hospital OR sport*) NOT (advert* OR market* OR tax*)

#15

food AND (regulation OR selfregulation OR self-regulation OR legislation OR law OR policy OR act OR standard OR code) AND (“childhood obesity” OR “childhood overweight”) AND (population OR public OR prevent* OR promotion) NOT (school OR hospital OR sport*)

#16

food AND (regulation OR selfregulation OR self-regulation OR legislation OR law OR policy OR act OR standard OR code) AND (“childhood obesity” OR “childhood overweight”) NOT (school OR hospital OR sport*)

Database specific filters applied:

Scopus (253 results)

- Search terms in keywords
- 2007-2017
- English

PUBMED (50 results)

- 2007-2017
- Search terms in Mesh Terms
- English

Medline (284 results)

- English
- 2007-2017
- Keywords in Abstract

Full-text papers - exclusion reasons:

- Not about food regulation system (n=12)
- Advertising/Marketing – out of scope (n=12)
- Schools – out of scope (n=17)
- Not an original research – reviews (n=7)

CASE STUDY - CHILE'S LAW ON FOOD LABELLING AND ADVERTISING

POLICY AREA	POLICY ACTION	DETAILS
Front-of-pack labelling 2012	Warning labels	<ul style="list-style-type: none"> - High limits set for energy, saturated fat, sugar, sodium in food and beverages - Items exceed limit must have a warning label - Warning added per nutrient exceeding the limit - Norms set for formatting and graphics of the warning message - Warning label in inside a STOP sign, e.g. "HIGH IN CALORIES"
Mandatory regulations of <u>broadcast</u> food advertising to children 2016	Ban food and beverages high in nutrients of concern	<ul style="list-style-type: none"> - Restricts advertising of food and beverages high in nutrients of concern - Limits on when advertisements can run - Restricts advertising of these items to children aged 14 years and under - Promotional strategies and incentives (e.g. cartoons animations, toys) are banned - Advertising of foods high in nutrients of concern in schools is not allowed
Mandatory regulations of food advertising on <u>non-broadcast</u> communication channels 2016	Ban promotional and incentive strategies	<ul style="list-style-type: none"> - Promotional strategies and incentives (e.g. cartoons animations, interactive games, apps, toys) are banned - Advertising of foods high in nutrients of concern in schools is not allowed
Mandatory regulations of food marketing in <u>schools</u> 2016	Ban advertising foods high in nutrients of concern in schools	<ul style="list-style-type: none"> - Advertising of foods high in nutrients of concern in schools is not allowed
Restricted promotion of unhealthy food: <u>broadcast media</u> 2016	Restrictions on advertising of foods high in calories, saturated fat, sugar and sodium to children	<ul style="list-style-type: none"> - Limits of energy, saturated fat, sugar and sodium content - Kinder surprise eggs and toys in McDonald's 'Happy meals' are prohibited
Restricted promotion of unhealthy food: <u>non-broadcast media</u> 2016	Restriction of advertising foods high in nutrients of concern to children	<ul style="list-style-type: none"> - Restrictions on advertising in. internet, social media, food packaging, sponsorship, outdoor and public transport advertising

REFERENCES

1. Hawkes, C., et al., *Trade, Food, Diet and Health : Perspectives and Policy Options*. 2009, Hoboken, : John Wiley & Sons, Incorporated.
2. COAG Health Council, *COAG Health Council, incorporating the Australian Health Workforce Ministerial Council Communique*. 2016: www.health.gov.au.
3. Food-EPI Australia Project, *Australian Federal government: summary of current government policy action to 8 May 2016*. 2017, Deakin University: Melbourne.
4. Sacks, G., *Policies for tackling obesity and creating healthier food environments: scorecard and priority recommendations for Australian governments*. 2017, Deakin University: Melbourne.
5. World Cancer Research Fund International. *NOURISHING framework. Improve nutritional quality of the whole food supply*. 2017 [cited 2017 October 30]; Available from: www.wcrf.org.
6. World Cancer Research Fund International. *NOURISHING framework. Restrict food advertising and other forms of commercial promotion*. 2017 [cited 2017 October 30]; Available from: www.wcrf.org.
7. Dobbs, R., et al., *How the world could better fight obesity*. The McKinsey Global Institute, 2014.
8. World Health Organization, *Consideration of the evidence on childhood obesity for the Commission on Ending Childhood Obesity: report of the ad hoc working group on science and evidence for ending childhood obesity, Geneva, Switzerland*. 2016.
9. World Cancer Research Fund International. *NOURISHING framework. Nutrition label standards and regulations on the use of claims and implied claims on food*. 2017 [cited 2017 October 30]; Available from: www.wcrf.org.
10. Dumitrescu, C., R. Shaw Hughner, and C.J. Shultz, II, *Policy and marketing changes to help curb childhood obesity: government ban vs. industry self-regulation*. *International Journal of Consumer Studies*, 2016. **40**(5): p. 519-526.
11. Folkvord, F., et al., *Does a 'protective' message reduce the impact of an advergame promoting unhealthy foods to children? An experimental study in Spain and The Netherlands*. *Appetite*, 2017. **112**: p. 117-123.
12. Ricciuto, L., K. Lin, and V. Tarasuk, *A comparison of the fat composition and prices of margarines between 2002 and 2006, when new Canadian labelling regulations came into effect*. *Public health nutrition*, 2009. **12**(8): p. 1270-1275.
13. Australian Bureau of Statistics. *National health survey results 2014-15*. 2015 [cited 2017 22 March]; Available from: www.abs.gov.au.
14. Swinburn, B.A., et al., *Estimating the effects of energy imbalance on changes in body weight in children 1-3*. *The American Journal of Clinical Nutrition*, 2006. **83**(4): p. 859-863.
15. National Health and Medical Research Council, *A review of the evidence to address targeted questions to inform the revision of the Australian Dietary Guidelines* D.o.H.a. Ageing, Editor. 2011, Commonwealth of Australia: Canberra.
16. Buse, K., S. Tanaka, and S. Hawkes, *Healthy people and healthy profits? Elaborating a conceptual framework for governing the commercial determinants of non-communicable diseases and identifying options for reducing risk exposure*. *Globalization and Health*, 2017. **13**(1): p. 34.
17. Knai, C., et al., *An evaluation of a public-private partnership to reduce artificial trans fatty acids in England, 2011-16*. *The European Journal of Public Health*, 2017: p. 605-608.

18. World Health Organization, *Population-based approaches to childhood obesity prevention*. 2012.
19. World Cancer Research Fund International. *NOURISHING framework. Offer healthy food and set standards in public institutions and other specific settings*. 2017 [cited 2017 October 30]; Available from: www.wcrf.org.
20. The Rudd Center. *UConn Rudd Center for food policy and obesity*,. [cited 2018 5 February 2018]; Available from: uconnruddcenter.org.
21. Centers for Disease Control and Prevention. *Chronic Disease State Policy Tracking System*,. 2017 [cited 2018 5 February 2018]; Available from: nccd.cdc.gov.
22. Brinsden, H., et al., *Monitoring policy and actions on food environments: Rationale and outline of the INFORMAS policy engagement and communication strategies*. *Obesity Reviews*, 2013. **14**(S1): p. 13-23.
23. Persson, M., et al., *A junk-free childhood 2012: The 2012 report of the StanMark project on standards for marketing food and beverages to children in Europe*. IASO July, 2012.
24. International Association for the Study of Obesity. *The PolMark Project: Policies on Marketing Food and Beverages to Children*. 2010 [cited 2018 5 February 2018]; Available from: www.worldobesity.org.
25. Curtis, C.J., et al., *US food industry progress during the National Salt Reduction Initiative: 2009–2014*. *American Journal of Public Health*, 2016. **106**(10): p. 1815-1819.
26. Knai, C., et al., *Has a public–private partnership resulted in action on healthier diets in England? An analysis of the Public Health Responsibility Deal food pledges*. *Food Policy*, 2015. **54**: p. 1-10.
27. Durand, M.A., et al., *An evaluation of the Public Health Responsibility Deal: Informants' experiences and views of the development, implementation and achievements of a pledge-based, public–private partnership to improve population health in England*. *Health Policy*, 2015. **119**(11): p. 1506-1514.
28. Van Camp, D., N.H. Hooker, and C.-T.J. Lin, *Changes in fat contents of US snack foods in response to mandatory trans fat labelling*. *Public health nutrition*, 2012. **15**(6): p. 1130-1137.
29. Doell, D., et al., *Updated estimate of trans fat intake by the US population*. *Food Additives & Contaminants: Part A*, 2012. **29**(6): p. 861-874.
30. Friesen, R. and S.M. Innis, *Trans fatty acids in human milk in Canada declined with the introduction of trans fat food labeling*. *The Journal of Nutrition*, 2006. **136**(10): p. 2558-2561.
31. Lee, J.H., et al., *Trans fatty acids content and fatty acid profiles in the selected food products from Korea between 2005 and 2008*. *Journal of food science*, 2010. **75**(7): p. 647-652.
32. Leth, T., et al., *The effect of the regulation on trans fatty acid content in Danish food*. *Atherosclerosis (Supplements) (Component)*, 2006. **7**(2): p. 53-56.
33. Restrepo, B.J. and M. Rieger, *Denmark's policy on artificial trans fat and cardiovascular disease*. *American journal of preventive medicine*, 2016. **50**(1): p. 69-76.
34. Thow, A.M., et al., *Development, implementation and outcome of standards to restrict fatty meat in the food supply and prevent NCDs: learning from an innovative trade/food policy in Ghana*. *BMC PUBLIC HEALTH*, 2014. **14**(1): p. 249.
35. Kim, S., et al., *Restriction of television food advertising in South Korea: impact on advertising of food companies*. *Health Promotion International*, 2012. **28**(1): p. 17-25.

36. Adams, J., et al., *Effect of restrictions on television food advertising to children on exposure to advertisements for 'less healthy'foods: repeat cross-sectional study*. PloS one, 2012. **7**(2): p. e31578.
37. Polacsek, M., et al., *Examining compliance with a statewide law banning junk food and beverage marketing in Maine schools*. Public Health Reports, 2012. **127**(2): p. 216-223.
38. Lee, Y., et al., *Effect of TV food advertising restriction on food environment for children in South Korea*. Health promotion international, 2013. **32**(1): p. 25-34.
39. Scully, P., et al., *Food and beverage advertising during children's television programming*. Irish Journal of Medical Science (1971-), 2015. **184**(1): p. 207-212.
40. Boyland, E.J., et al., *The extent of food advertising to children on UK television in 2008*. Pediatric Obesity, 2011. **6**(5-6): p. 455-461.