



The Australian Prevention
Partnership Centre
Systems and solutions for better health

A rapid review of evidence

Effective portion size strategies

June 2017



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A rapid review of evidence prepared for the Australian Government Department of Health on behalf of The Australian Prevention Partnership Centre.

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A rapid review of evidence: Effective portion size strategies

Key messages

- This report is a rapid review of the evidence of effective portion size strategies that have been the subject of high-quality review or meta-analysis 2006–2016.
- This review identified six main types of portion size interventions reviewed in the literature: (i) restricting amounts offered; (ii) changing dishware size; (iii) changing food labelling; (iv) product reformulation; (v) changing unit pricing; and (vi) novel approaches, such as changing frequency of portions offered.
- Results indicated which interventions are likely to be effective based on the quality and consistency of evidence available for review.
- Our major finding is that the compelling evidence that larger portion sizes of both five food group foods and discretionary food and drinks¹ increase consumption is unmatched currently by specific evidence on how to reduce this effect.
- Meta-analysis and modelling indicates that eliminating larger portion sizes from the diet could reduce average daily energy consumed (estimated range from 12–16% among UK adults and 22–29% among US adults).
- Relatively few specific effective strategies to achieve this were identified, especially related to meals and snacks freely chosen in real-world settings, where a wide range of foods and drinks are available, or over a prolonged period.
- Major limitations in the reviews identified included the study settings, which were primary laboratories, lack of specificity in description of interventions, short time frames and heterogeneity of studies.
- Effective strategies include: restricting portion size of discretionary foods and drinks in public sector settings, and adding portions of healthy low-energy dense foods (such as vegetables) to the first course to reduce energy intake in the second course.
- Potentially promising interventions with mixed results include: restricting portion size of discretionary choices in private sector settings; changing dishware size; and changing nutrition information labelling from single column (serving size only) to dual column (serving size and whole pack).
- Interventions that are not effective include: changing food labelling to provide comparison to a reference portion size; dividing foods into smaller portions and offering at different times and frequency; and those that reduce portion size of discretionary choices (fast food and drinks) without concomitant reduction in price (that is, non-linear unit price reductions).
- A combination of regulatory and non-regulatory measures is likely to be needed. Process evaluations of voluntary industry agreements to reduce portion size indicate ad hoc sign-up, suggesting mandatory agreements and/or regulation may be required. Impact and outcome evaluation of these agreements are lacking.
- It is unclear whether reducing portion sizes may have unintended compensatory effects, such as encouraging consumption of multiple smaller portions or additional foods and/or drinks.
- Barriers and enablers of effective portion size interventions strategies were identified from the literature.
- Potential interventions were identified for testing further in Australia, such as the acceptability and feasibility of potential strategies in different contexts.

1. In this report the terminology in the included reviews has been changed as per the glossary to meet the requirements of the Portion Size Working Group for consistency with the terminology adopted by the Healthy Food Partnership.

Introduction

Poor diet is now the major preventable disease risk factor contributing to burden of disease, globally and in Australia (IHME 2015). Less than 4% (ABS 2016) of the population consume diets consistent with the evidence-based Australian Dietary Guidelines (NHMRC 2013); at least 35% of the energy intake of adults and at least 39% of the energy intake of children are now derived from discretionary² choices (ABS 2013; NHMRC 2013). Poor diets contribute substantially to the high and rising rates of overweight and obesity; 25% of Australian children and over 63% of Australian adults are now overweight or obese (ABS first results or AIHW 2016 recent data). There is an urgent need for implementation of nutrition policy actions that can help shift the current intake of the whole population to a healthier diet consistent with dietary recommendations in Australia (Lee et al 2013).

The determinants of poor diet and obesity are complex and multi-factorial (WHO 2000, 2004, 2013). One factor contributing to overconsumption of foods and drinks, particularly discretionary choices, is large portion sizes (Steenhuis and Vermeer 2009; Marteau et al 2015). Portion sizes of foods and drinks have been increasing (Marteau et al 2015); people consistently consume more food and drinks when offered larger-sized portions, packages or dishware (tableware) than when offered smaller-sized versions, especially when associated with non-linear unit price reductions (Hollands et al 2015; Crino et al 2016). Furthermore, consumers do not appear to compensate for larger portion sizes by consuming less at subsequent meals or over time (Crino et al 2016). However, clear, well-defined, objective evidence around effective portion size strategies³ in the 'real world' is lacking (Raynor 2014; Ledikwe et al 2005; Benton 2015; Crino et al 2016).

Purpose of review

The Healthy Food Partnership aims to improve the dietary habits of Australians by making healthier food choices easier and more accessible and by raising awareness of better food choices and portion sizes (Dept. Health 2017). Several working groups report to the Healthy Food Partnership, including the Healthy Food Partnership Portion Size Working Group (PSWG). One of the key deliverables in the work plan of the PSWG is to undertake an evidence and policy analysis to assess effectiveness of potential (portion size) strategies, to identify 'best buys' and/or evidence-informed strategies for optimal portion control. This will be used by the PSWG to develop a short list of portion size strategies to consider and test with key stakeholders (e.g. feasibility assessment with industry, public health and consumers). The PSWG will produce a final report recommending effective and feasible portion size interventions for implementation.

The Australian Commonwealth Department of Health and the PSWG approached The Australian Prevention Partnership Centre in early 2017 to conduct a review of the literature regarding effective portion size strategies to feed into these processes.

The overarching research question was: "What is the effectiveness of potential portion size strategies for optimising⁴ portion sizes, and why are these effective (ineffective)?"

Sub-questions were:

1. "What are the most effective portion size strategies to optimise five food group food (and drink) intake at specific eating occasions and/or in total per day?"
2. "What are the key learnings and characteristics of success (failure) of portion size /serve/serving policies/activities in improving five food group food intake at specific eating occasions and/or in total per day?"
3. "What are the most effective portion size strategies to decrease discretionary food intake at specific eating occasions and/or in total per day?"
4. "What are the key learnings and characteristics of success (failure) of portion size /serve/serving policies/activities in decreasing discretionary food intake at specific eating occasions and/or in total per day?"

2. Foods and drinks high in saturated fat, added sugar, salt and/or alcohol, that are not required for health (NHMRC 2013; ABS 2014).
3. In the international literature, an effective portion size strategy is defined commonly as one that helps decrease intake of "unhealthy 'energy dense' foods and drinks".
4. Optimising portion sizes refers to the Healthy Food Partnership objective to increase intake from the five food groups and decrease discretionary food and drink intake, in line with the Australian Dietary Guidelines.

Summary of review method

A tiered approach was agreed, due to the nature and complexity of the topic and the tight timelines involved. Tier 1, reported here, constitutes a systematic literature review of what works/does not work, for three terms ('portion size', 'serve size' and 'serving size') considering initiatives in the five countries (Australia, Canada, NZ, UK, USA) looking at quality review articles only. Tiers 2–4 systematic reviews of original studies were identified and are detailed as potential areas for future review on page 14 of this report.

- The scope of the literature review was limited to a synthesis of evidence reviews (i.e. systematic reviews, meta-analyses, narrative reviews, scoping reviews and rapid reviews), reports and policy documents published in the English language between 2006 and 2016 in academic data bases and grey literature. Literature from Australia, and selected comparable international jurisdictions (New Zealand, Canada, the USA and UK) was included.
- The search strategy involved four phases:
 - A systematic electronic search of three electronic databases (Medline, PubMed & Cochrane database of systematic reviews)
 - Online searches were conducted to identify published reports in the grey literature. Sources included government websites, professional organisations and agencies and non-government agencies, and included existing national and state/territory chronic disease prevention strategies and policies
 - Consultation with experts in the field to identify literature
 - Hand searching of quoted papers, provided papers and reports, and reference lists of key papers.
- Tier 1: rapid review
 - Following title and abstract screening, full-text papers (n=46) were retrieved and assessed in detail to determine if they met the eligibility criteria. Articles were included if they reviewed the effectiveness of interventions targeted at optimizing portion size delivered to the whole of population and/or population sub-groups in any settings, including laboratory, home, workplace, education or community settings in the five countries of interest.
 - Articles that met the inclusion criteria (n=31) were assessed for quality using a 10-point assessment tool (Health Evidence Canada 2016); only high quality evidence reviews (score 8 and above) were included.
 - Data from the high-quality articles (n=8) were reviewed to assess the evidence of effectiveness. There were four rating levels (green = evidence of effectiveness; amber = mixed or inconclusive evidence of effectiveness; red = evidence of no effectiveness; blue = quality studies required).
 - (Note) All of the reviews identified used the term 'portion size' in keywords and/or the title to describe interventions that targeted portion size, serve size or serving size, either alone or in addition to the latter two terms.
 - Similar intervention types were grouped together and findings synthesised (Table 1).
 - Included reviews, and related comprehensive commentaries such as Marteau et al (2015), were scrutinised for barriers and enablers, and these were transcribed and summarised.

Details of the search strategy are included at Appendix 1.

Details of the review process are included at Appendix 2.

What this review does

- Provides a review of the evidence for potential effective portion size interventions that have been the subject of high-quality reviews, meta-analyses [and original studies] 2006–2016
- Indicates which interventions are likely to be effective based on the evidence available for review. This provides a signal as to which interventions may warrant further attention to consider suitability, applicability and likely effectiveness of implementation in the current Australian context.

What this review doesn't do

- Provide an exhaustive overview of potentially effective interventions. Time constraints limited this
- Capture evidence for potentially effective interventions that have not been the subject of high-quality reviews, meta-analyses [and original studies] 2006–2016
- Provide estimates of the effect size of interventions
- Consider the detailed impact of follow-up time on the judgment of intervention effectiveness, or consider the cost-effectiveness of interventions.

The Healthy Food Partnership Portion Size Working Group's response to this review

The Portion Size Working Group (PSWG) has been tasked with developing a suite of voluntary activities for businesses, governments and non-government organisations to implement under the Healthy Food Partnership.

In order to do this, the PSWG is:

- Identifying appropriate terminology in promoting appropriate portion sizes for industry and consumers
- Identifying, assessing and prioritising strategies to optimise portion sizes for the five food group foods and as well as discretionary foods in a variety of sectors (retail and food service).

From the outset of this work, the PSWG identified that the issues surrounding portion size are varied and complex. In order to develop an effective and feasible suite of voluntary activities, the PSWG commissioned a rapid review of the evidence surrounding portion size strategies.

The rapid review *Effective portion size strategies* prepared by The Australian Prevention Partnership Centre provides a snapshot of recently published evidence and, more importantly, a signal for where research-based interventions and policy evaluations have been effective in changing portion sizes.

Reflecting the complexity of the issue, the PSWG acknowledges that few specific and effective strategies were identified, especially in real world settings. Nonetheless, the review advances the understanding of the gaps and opportunities relating to portion size policies.

The PSWG will draw on the insights from this review which will complement the information being gathered on existing, potential and novel portion size strategies which are unlikely to be found in published or grey literature. The PSWG acknowledges the contribution of this review to the wider, and still emerging, evidence-base on policy-relevant recommendations for portion size.

The PSWG will consult with stakeholders to help identify and then to implement strategies that are most likely to be feasible and achievable in the Australian context.

Key findings

Types of portion size interventions assessed

A diverse range of portion size strategies has been studied, as indicated by range of approaches in the summary of reviews data extraction table (Appendix 3). These were categorised in the data extraction by intervention table (Appendix 4) according to the following schema:

- 1. Interventions changing/restricting the portion size offered.** Further classified by:
 - The nature of change (portion size increased to test effect on energy intake, or portion size decreased with intention to reduce energy intake)
 - The category of food or drink (item from the five food groups, discretionary choice, mixed or ill-defined)
 - The nature of the food or drink ('amorphous' food served by scoop, unit/package item or ill-defined).
- 2. Interventions changing the dishware used:**
 - Catered provision or self-selection of food into provided dishware.
- 3. Interventions targeting food and drink labelling:**
 - Pertaining to 'usual' serving size or entire package
 - Comparison to reference portion size.
- 4. Interventions involving product reformulation:**
 - Voluntary industry pledges to reduce energy density or reduce portion size of discretionary foods or change the packaging size of a product.
- 5. Interventions targeting unit pricing:**
 - Elimination of value size pricing.
- 6. Other 'novel' interventions:**
 - Such as offering portions of low energy-dense foods from the five food groups (such as vegetables) as a first course to test amount of other foods consumed in second course, or those changing frequency of offering as well as portion size, rather than portion size per se.

The study setting (laboratory, public sector facility, home or unclear from review) and target population (age, gender, vulnerable groups) were also recorded.

Most studies only considered the effect of portion size strategies on dietary intake at one sitting, rather than in subsequent meals or on habitual intake. Some studies assessed different outcomes, for examples food selected, rather than food consumed.

Effectiveness of potential portion size strategies for optimising portion sizes

Results are detailed in Appendix 3 and Appendix 4. Results are summarised in Table 1.

Our major finding is that the compelling evidence that larger portion sizes of both five food group foods and discretionary food and drinks increase consumption is unmatched currently by evidence on how to reduce this effect. Eliminating larger portion sizes from the diet could reduce average daily energy consumed (meta-analyses and modelling indicates an estimated range from 12–16% among UK adults and 22–29% among US adults). However, few specific strategies to achieve this were identified, especially related to meals and snacks freely chosen in real-world settings over a prolonged period, where a wide range of foods and drinks are available.

In this rapid review several school-based interventions were identified and included in analysis. Only a few studies targeted vulnerable groups, which were Hispanics and Black American mothers and children in the USA studies (Appendix 3).

What works: evidence of effectiveness

- Most of the research available has investigated the problem, not potential solutions. People consume more food and/or drinks when offered larger portion sizes of either five food group foods or discretionary foods and drinks
 - This holds whether larger portion sizes are achieved by offering larger individual serves of 'amorphous' foods, larger units of discrete foods or larger individual units of packaged foods
 - This effect tends to be stronger in studies of discretionary choices (especially snack foods and drinks) than of five food group foods
 - This effect is weaker among children than adults and tends to be weaker among women and some overweight groups than others, but does not vary significantly by gender, body mass index (BMI), hunger, dietary restraint or dietary disinhibition.
- Restricting portion size of discretionary foods and drinks in public sector settings, such as childcare centres, schools and universities, can reduce intake of discretionary choices at specific eating occasions
- Adding portions of low-energy dense foods from the five food groups (such as vegetables) to the first course results in less energy intake during the second course.

What might work: mixed evidence of effectiveness

- Restricting portion size of discretionary choices in provision of foods and drinks in private sector settings
- Providing larger dishware to subjects choosing foods from the five food groups
- Providing smaller dishware to subjects choosing discretionary foods
- Changing nutrition information labelling from single column (serving size only) to dual column (serving size and whole pack)
- Process evaluation of voluntary industry agreements to reduce portion size, for example, through Public Health Responsibility Deal (UK) and Healthy Weight Commitment Foundation - Calorie Reduction Pledge (USA) indicates ad hoc sign-up
- Reducing portion sizes may/may not have unintended compensatory effects, such as encouraging consumption of multiple smaller portions or additional foods and/or drinks.

What doesn't work: evidence of lack of effectiveness

- Changing food labelling to provide comparison to a reference portion size amount
- Dividing foods into smaller portions and offering these at the same time or at spaced intervals
- Interventions to reduce portion size of discretionary choices (fast food and drinks) without concomitant reduction in price (non-linear unit price reductions).

What needs studying: lack of quality studies to provide evidence

- How food and drink portion size interventions can best be achieved at micro level to reduce intake of discretionary choices, for example the optimum mix of restricted portion sizing, availability, placement/display of large portion sizes, package design (e.g. portion control unit sizing), marketing and pricing
- How food and drink portion size interventions can best be achieved at micro level to increase intake of foods from the five food groups for example, the optimum mix of increased portion sizing, availability, placement/display of large portion sizes, package design (e.g. portion upsizing) and marketing
- How interventions can best be achieved at macro level, for example, the optimum mix of regulatory and non-regulatory measures; whether or what disincentives and sanctions may be required
- Whether different approaches to reduce dishware and cutlery size, for example through design (such as shallow plates, straight-sided glasses, cutlery that accommodates smaller mouthfuls) would have different effects on portion size

- Economic interventions on the effect of unit pricing on portion size intake of a wide range of foods from the five food groups and/or discretionary choices
- Impact and outcome evaluation of voluntary industry agreements to reduce portion size, for example, through Public Health Responsibility Deal (UK) and Healthy Weight Commitment Foundation – Calorie Reduction Pledge (USA) and any future work in this area under the Healthy Food Partnership (Australia)
- Acceptability and feasibility of potential strategies in different contexts, including in Australia.

Legend

The legend refers to the evidence table (Table 1).

Category	Definition
	What works: evidence of effectiveness Indicates evidence of effectiveness of the intervention - further evidence is unlikely to change our judgment of the evidence
	What might work: mixed evidence of effectiveness Indicates mixed evidence of effectiveness of the intervention - further evidence may change our judgment of the evidence
	What doesn't work: evidence of lack of effectiveness Indicates evidence of lack of effectiveness of the intervention - further evidence is unlikely to change our judgment of the evidence
	What needs studying: lack of quality studies to provide evidence Indicates no evidence of effectiveness of the intervention - studies may inform our judgment of the evidence
	Number of discrete studies in reviews with this finding. M is a finding of meta-analysis.

Table 1: Evidence table

What works: evidence of effectiveness		What might work: mixed evidence of effectiveness		What doesn't work: evidence of lack of effectiveness		What needs studying: lack of quality studies to provide evidence		Number of discrete studies in reviews with this finding. M is a finding of meta-analysis.	
Intervention		Effect at single occasion		Effect over time					
Observational studies, no specific intervention: larger portion sizes and dishware sizes offered leads to increased intake		M 19 1		1		1			
1. Interventions changing the portion size offered									
Interventions increasing portion size of choices from the five food groups offered		1							
Interventions reducing/restricting portion size of discretionary choices offered		3				1			
Interventions changing portion size of mixed or ill-defined foods or drinks offered		1 1				1			
2. Interventions changing dishware size									
Interventions increasing dishware size – choices from the five food groups offered		2 1							
Interventions decreasing dishware size –discretionary choices offered		1 1							
Interventions changing portion size of mixed or ill-defined foods or drinks offered		4							
3. Labelling Interventions									
Extending serving size labelling to entire package		1							
Labelling comparison to reference portion size		1							
4. Interventions involving product reformulation									
Voluntary industry pledges to reduce energy density or reduce portion size of discretionary foods		4							
5. Interventions targeting unit pricing									
Elimination of value size pricing		1							
6. Other interventions									
Offering increased portions of low energy dense choices from the five food groups as a first course		2							
Changing frequency of offering		1							

Why these strategies are effective (ineffective)

Barriers and enablers

Several reviews and commentaries identified barriers and enablers that may affect the effectiveness of interventions to optimise portion size of choices from the five food groups and discretionary foods and drinks (Benton 2015; Marteau et al 2015; Crino et al 2015).

Enablers

- Adopting learnings from prior efforts to reduce salt in the food supply in many countries, such as:
 - Using quality consumption data to target the most problematic discretionary foods and drinks first
 - Setting specific or absolute goals to be phased in over time
 - Regular and rigorous monitoring of progress
 - Mandating regulatory reform
 - Inclusion of meaningful sanctions for non-compliance
- Aligning the will of the public, private industry, and political leadership
- Considering a combination of regulatory and non-regulatory measures, including mandatory agreements where there is low industry sign up to voluntary agreements
- Considering incorporating pricing strategies into other interventions, such as switch from non-linear to linear pricing
- Engaging and increasing consumer support
- Excluding vested interests with conflict of interest with public interest goals from policy development processes
- Government leadership implementing portion size restriction in settings owned, managed or controlled by the public sector, such as schools, hospitals, workplaces and community centres
- Government leadership setting targets and focus areas
- Standardising a framework for declared serving size labelling for the food industry and consumers.

Barriers

- Active opposition from sectors of the food industry, particularly around restrictions to portion sizes of discretionary foods and drinks, such as invoking “nanny state” claims
- Consumers’ misunderstanding that declared serving sizes on packaged food labels are recommended amounts and a guide to the quantity that should be consumed
- Failing to consider the full range of confounding factors, including pricing, packaging, labeling, advertising, and unit and/or package size in determining effectiveness of portion size strategies
- Failing to consider intake of food, drinks and energy over an extended time (a product of the portion size and frequency of consumption) rather than at a specific setting. The total amount of food or drinks consumed over an extended period is the key variable in food, diet, health relationships, not the quantity consumed at a single sitting (NHMRC 2013, 2013a)
- Failing to consider that the optimum portion sizes for specific five food group foods and specific discretionary choices are likely to vary for different age and gender groups, and at a single sitting, depending on context
- Failing to consider consumers’ potential compensation to portion size strategies
- Inability to control ‘non-compliant’ foods and beverages brought into specific policy intervention settings, such as schools
- Lack of standardisation of declared portion sizes across food categories
- Likely low rates of implementation, particularly of restrictions to portion sizes of discretionary foods and drinks
- Low sign up to voluntary industry agreements
- Scaling up successful interventions to the dose required.

Portion size strategies that could be tested in Australia

The following suggestions have been drawn from the discussion section of the most recent comprehensive reviews (Holland et al 2015; Crino et al 2016) and commentaries (Marteau et al 2015; Benton 2015).

Restricting food and drink portions

- Identifying portion sizes more clearly through packaging, e.g. individual wrapping of biscuits
- Making default unit serving sizes of discretionary choices smaller, e.g. in packages of chips and confectionary and cakes in cafés
- Placing large portion sizes in less accessible locations, e.g. not at supermarket checkouts or other points of sale
- Prohibiting marketing of large portion sizes of discretionary choices
- Reducing availability of large serve sizes of discretionary choices.

Changing dishware (plates, cups, glasses and cutlery)

- Availability – Increasing availability of smaller dishware and reducing availability of larger dishware for home use
- Design – Developing and testing dishware that maximises the mechanisms underlying the portion-size effect (for example, shallow plates, straight-sided glasses, cutlery that holds smaller mouthfuls)
- Sizing – Making smaller dishware and cutlery the default for self-service and served foods and drinks.

Changing economic environment

- Pricing dishware in relation to size
- Restricting price promotions on larger portion and package sizes
- Restricting pricing practices whereby larger portion and package sizes cost less in relative (and sometimes absolute) monetary terms than smaller sizes.

Limitations of studies available

- Most reviews have drawn on randomised controlled trials (RCTs); by their nature these have been conducted mostly under laboratory conditions and provide limited insight into the potential effectiveness of the intervention in 'real-world' settings
- Most studies have investigated dietary change at a single setting; there is a need to investigate foods/meals freely chosen over a prolonged period, as habitual dietary intake is the key outcome of interest
- There is a high degree of heterogeneity between studies
- Most studies have not differentiated choices from the five food groups with choices of discretionary foods and drinks
- Most studies investigate the problem, i.e. change in consumption when larger portion sizes, packages or dishware are offered; relatively few investigate the effect of interventions restricting portion sizes, packages or dishware. The latter are most relevant to address obesity and improve dietary patterns
- Both studies of the problem and interventions were included in the available meta-analyses (Zlatevska et al 2014; Holland et al 2015). Hence the strong relationship between increased consumption with larger portion sizes, potentially may have masked the relative lack of effect observed in intervention studies
- Most studies have not considered confounding variables that influence the size of the portion size chosen; these include packaging, pricing, labeling, advertising and the unit size, rather than portion size, of the food item
- Most studies do not describe the methods used to alter portion size
- Searches for 'portion size', 'serve size' and 'serving size' may not have returned all relevant studies on unit size pricing or value size pricing.

Potential areas for future review

- Tier 2: Tier 1 plus systematic literature review of what works / does not work, for the term 'portion size' only, considering initiatives predominantly in the five countries (Australia, Canada, NZ, UK, USA) looking at original research and review articles
- Tier 3: Tier 2 plus specific focus on reviews and original studies of interventions (for the term 'portion size' only) targeted specifically at priority population groups (e.g. Aboriginal and Torres Strait Islander populations, low socioeconomic groups)
- Tier 4: Tier 3 plus reviews in education settings (primary, secondary and tertiary).

Definitions/glossary

Reviews included original research intervention studies (meta-analysis, systematic reviews, scoping reviews, rapid reviews, reviews of reviews):

- of interventions delivered to whole of population and/or in quick service restaurant, workplace, education or community settings
- of interventions targeting children over 12 months of age and adults
- of interventions designed to increase intake of five food group foods and drinks, decrease intake of discretionary foods and drinks and/or decrease total energy intake
- that consider intervention effectiveness.

Original research articles included original research studies (RCTs, prospective cohort studies, cohort studies):

- of interventions delivered to whole of population or in workplace, or community settings
- of interventions delivered to adults
- of interventions designed to increase intake of five food group foods and drinks, decrease intake of discretionary foods and drinks and/or decrease total energy intake
- that consider intervention effectiveness.

Specific terms

Serve size: In Australia, the term 'serve size' denotes the reference unit used in the Australian Dietary Guidelines. It is used along with the 'serves per day' to work out the total amount of food required from each of the five food groups (used in the 2013 Australian Dietary Guidelines). In other settings, or colloquially, it may be used interchangeably with 'Serving size'.

Serving size: In Australia, the term 'serving size' refers to the information listed in the nutrition information panel and is determined by the food business. Food Standards Australia New Zealand advises it should reflect a realistic portion of the product the person might normally consume on one eating occasion. This explains why it sometimes varies from one product to the next. (It may or may not align with the 2013 Australian Dietary Guidelines serve sizes). In other settings, namely US and Canada, it is often used in the same way but may be accompanied by government or non-government guidelines.

Portion size: 'Portion size' is a term often used in research to refer to the amount people actually eat at a specified eating occasion. In Australia, the Australian Dietary Guidelines also use the term when communicating with the community *e.g. some people's portion sizes are smaller than the 'serve size' and some are larger. This means some people may need to eat from the five food groups more often than others.*

Portion control: Portion control is a device, tool or means or mechanism assists consumers to select a specific portion of a food or beverage. It may be a single serve pack or a single unit within a pack (e.g. a biscuit) or a portion measuring device. Consumers may also use portion control devices at home – for example a specific bowl each morning for their breakfast cereal.

Discretionary foods: As per the Australian Bureau of Statistics definition of discretionary food and drinks.⁵ According to the Australian Dietary Guidelines (NHMRC 2013) these include foods and drinks not necessary to provide the nutrients the body needs, but that may add variety. However, many of these are high in saturated fats, sugars, salt and/or alcohol, and are therefore described as energy dense. They can be included sometimes in small amounts by those who are physically active, but are not a necessary part of the diet. Foods in this category include cakes, biscuits; confectionary, chocolate; pastries, pies; ice confections, butter, cream, and spreads which contain predominantly saturated fats; potato chips, crisps and other fatty or salty snack foods; sugar-sweetened soft drinks and cordials, sports and energy drinks and alcoholic drinks.

Five food group foods: As per the Australian Dietary Guidelines (NHMRC 2013). All foods in the five food groups are nutritious and include (i) fruits, (ii) vegetables, (iii) grain (cereal) foods (particularly wholegrain varieties), (iv) lean meats and poultry, fish, eggs, tofu, nuts, seeds and legumes/beans, and (v) milk, cheese, yoghurt and their alternatives. The Australian Dietary Guidelines recommend enjoying a wide variety of nutritious foods from these five groups every day and drinking plenty of water.

5. Source: www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/4364.0.55.007~2011-12~Main%20Features~Discretionary%20foods~700

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Appendix 1: Search strategy

This review is based on literature reviews published in the English language between 2006 and 2016. The search strategy involved systematically searching three electronic databases: Medline, PubMed and Cochrane database of reviews.

Database search strategy

MedLine (via EbscoHost)

(portion size OR serve size OR serving size)

Limit to: Review articles and year 2006–2016

Cochrane (via OVID)

(portion size OR serve size OR serving size)

Limit to: full systematic reviews and reviews

PubMed

((portion size OR serve size OR serving size OR (Portion size Mesh term) OR (Serving size Mesh term)) AND filter: reviews) OR ((portion size OR serve size OR serving size OR (Portion size Mesh term) OR (Serving size Mesh term)) AND Title: review)

Filters: Year 2006-2016

Online agencies searched

Australia: The Australian Prevention Partnership Centre, Australian Health Policy Collaboration, Public Health Association of Australia, National Health and Medical Research Council, National Preventive Health Task Force, Commonwealth Health department, Australian Institute of Health and Welfare, Grattan Institute, The Sax Institute.

New Zealand: Ministry of Health New Zealand, Public Health Association of New Zealand, Health Research Council of New Zealand, New Zealand College of Public Health Medicine.

United States: Centers for Disease Control and Prevention, US Preventive Services Taskforce, Johns Hopkins Medicine, Agency for Healthcare Research and Quality, National Academies of Sciences - Health and Medicine Division (formerly IOM), Robert Wood Johnson Foundation.

Canada: Canadian Public Health Association, Effective Public Health Practice Project, Canadian Task Force on Preventive Health Care, Public Health Agency of Canada.

United Kingdom: The National Institute for Health and Care Excellence, Centre for Reviews and Dissemination, UK Government, Evidence for Policy and Practice Information and Coordinating Centre, UK Foresight reports and project, Food Standards Agency, Scottish Government.

International: Organisation for Economic Co-operation and Development, World Health Organization, World Cancer Research Fund International.

Appendix 2: Review process

Article screening and quality appraisal

Review articles were screened for inclusion in three phases: 1. Title and abstract screening; 2. Full text review; 3. Quality assessment. Title/abstract and full text screening were performed according to the inclusion and exclusion criteria detailed below.

Quality assessment was performed using a 10-point quality assessment tool (Health Evidence Canada 2016). Articles were given an overall score out of 10 and classified into three categories: strong (8–10), moderate (5–7) or weak (0–4). Only reviews that were classified as ‘strong’ were included in this synthesis.

Inclusion and exclusion criteria

Tier 1

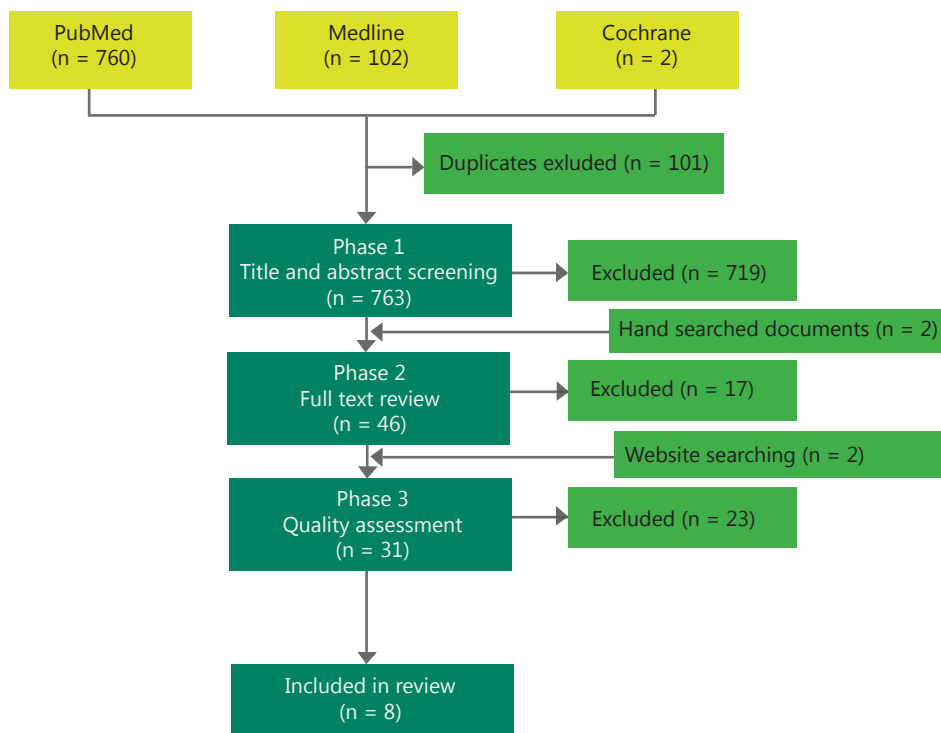
Include:

- Reviews of original intervention studies (meta-analysis, systematic reviews, scoping reviews, rapid reviews, reviews of reviews)
- Reviews that consider intervention effectiveness
- Reviews of interventions delivered to whole of population and population sub-groups
- Reviews of interventions delivered in any settings, including laboratory, home, workplace, education or community settings
- Reviews of interventions targeted at optimizing portion size at specific eating occasions and/or in total per day with respect to improving diet and preventing/ addressing obesity
- Reviews of interventions in Australian and comparable jurisdictions and populations to Australia (Canada, NZ, UK, USA list)
- Reviews published in English language published 2006–2016.

Exclude:

- Duplicate reviews (and studies)
- Original studies
- Low quality reviews
- Reviews, studies, reports and policy documents that do not have an intervention component
- Reviews (or studies) that do not consider interventions (e.g. reviews of association between portion size and obesity)
- Reviews of modelling studies (or modelling studies)
- Reviews (or studies) that do not consider intervention effectiveness (e.g. that focus on intervention implementation. Note that separate work will be undertaken to identify these studies, as such this remains outside the scope of this rapid review.)
- Reviews (or studies) of clinical interventions or interventions delivered in clinical settings
- Reviews (or studies) of interventions targeted specifically at narrow population groups (e.g. infants under 12 months of age, pregnant women)
- Reviews (or studies) of ‘high risk’ prevention interventions (i.e. those targeted to people identified as having or at-risk of developing chronic disease e.g. portion size intervention for patients with diabetes)
- Reviews (or studies) of interventions in populations and jurisdictions that are not comparable to Australia (e.g. interventions in low and middle income countries)
- Reviews (or studies) that only consider cost-effectiveness or economic evaluations without considering intervention effectiveness.

Tier 1 PRISMA Flow chart of article selection process



Data extraction and synthesis

Data from the high-quality articles (n=8) were reviewed to assess the strength of evidence. Similar intervention types were grouped together and findings synthesised (Table 1).

Included articles were reviewed to assess the evidence for effectiveness of the interventions. There were four rating levels: green = evidence of effectiveness; amber = mixed or inconclusive evidence of effectiveness; red = evidence of no effectiveness; blue = no quality studies available to inform evidence.

In order to assign these ratings to the evidence for each intervention, we examined each included review to extract information concerning: the nature of intervention(s); intervention effectiveness, including summaries of results from included studies in the review; the number and quality of studies that demonstrated intervention effectiveness; the results of any meta-analyses; and the conclusions of the review.

On the basis of the information extracted from each review, we made a judgment as to the likely effectiveness of the intervention(s) reviewed. We did not make an assessment on the strength of the evidence of effectiveness, as the information required to determine this was not available consistently in the reviews. Judgment of the evidence for intervention effectiveness does not take effect size or follow-up into account. See below for the criteria for each evidence rating.

Green

What works (evidence of effectiveness): This rating reflects evidence that the intervention is effective, e.g. meta-analyses or reviews of high-quality well-designed studies demonstrating consistently that the intervention is effective.

Amber

What might work (inconclusive; mixed evidence of effectiveness): This rating reflects mixed evidence that the intervention is effective (e.g. quality reviews have identified a mix of negative and positive results) or evidence that the intervention may be effective, (e.g. reviews that have identified positive results in a small number of well-designed studies with some limitations, or a group of less suitable studies (e.g. before and after studies) taken together). More studies are required to establish effectiveness or lack of effectiveness.

Red

What doesn't work (evidence of lack of effectiveness): This rating reflects evidence that the intervention is unlikely to be effective or is ineffective.

Blue

What needs studying: lack of quality studies to provide evidence: Indicates no evidence of effectiveness of the intervention - studies are required to establish effectiveness or lack of effectiveness.

Each review and meta-analysis was considered separately. Where a review considered the effectiveness of different interventions, a separate rating was provided for each intervention. The effectiveness of different intervention types in meta-analyses were considered together. Data for similar interventions were then combined to provide a synthesis of the evidence. To ensure consistency of the judgments, one coder (ML) reviewed each paper and assigned a rating. To enhance reliability, the ratings were reviewed by a second coder (AL) and disagreements were discussed and resolved through consensus.

Included reviews and studies were scrutinised for analysis of barriers and enablers, and these were transcribed and summarised directly into the report.



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