IMPLEMENTING SCHOOL FOOD AND NUTRITION POLICIES

A REVIEW OF CONTEXTUAL FACTORS

World Health Organization

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Contents

Acknowledgements

Abbreviations

BIC	Breakfast in the Classroom
CACFP	Child and Adult Care Food Program (United States)
CRC	Convention on the Rights of the Child
FNAB	food and non-alcoholic beverage
GCNF	Global Child Nutrition Foundation
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HHFKA	Healthy, Hunger-Free Kids Act (United States)
ICESCR	International Covenant on Economic, Social and Cultural Rights
MDM Scheme	Mid-day Meal Scheme (India)
NCD	noncommunicable disease
NSLP	National School Lunch Program (United States)
NUGAG	Nutrition Guidance Expert Advisory Group
RCF	review of contextual factors
SES	socioeconomic status[1]
SSB	sugar-sweetened beverage
UDHR	Universal Declaration of Human Rights
UN	United Nations
UNICEF	United Nations Children's Fund
USDA	United States Department of Agriculture
WFP	World Food Programme
WHO	World Health Organization

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[1] Socioeconomic status is used as a synonym for "socioeconomic position", "socioeconomic strata" and "socioeconomic group", which were all used in the identified literature.

Executive summary

Healthy dietary practices starting early in life are the foundation for good nutrition, health and development during childhood and beyond. Yet, unhealthy diets are a leading global public health risk, contributing to a rise in unhealthy weight gain and noncommunicable diseases (NCDs), including diabetes, heart disease, stroke and cancer.

Governments play a leading role in reducing the burden of diet-related noncommunicable diseases, addressing malnutrition in all its forms and promoting healthy diets. The food environment plays a critical role in shaping people's diets. In 2014, the Second International Conference on Nutrition emphasized the importance of improving the food environment, including through policy actions.

School food and nutrition policies are implemented within complex systems (including the food system) that are largely country specific. These policies are affected by the country's political, legal, economic, cultural and ethical contexts.

This review provides contextual information for school food and nutrition policies. This information was considered by the World Health Organization (WHO) Nutrition Guidance Expert Advisory Group (NUGAG) Subgroup on Policy Actions when formulating the WHO guideline on school food and nutrition policies, and moving from evidence to policy recommendations. The factors considered in the review are:

➔ Factor 1 – values;

➔ Factor 2 – resource implications, including the costs and cost-effectiveness of interventions;

➔ Factor 3 – human rights, equity and equality;

➔ Factor 4 – acceptability, reflecting the perspectives, attitudes and opinions of consumers, government and industry, and the support of these stakeholders for school food and nutrition policies; and

➔ Factor 5 – feasibility, focusing on the feasibility of developing, implementing, administering, monitoring and evaluating school food and nutrition policies.

Searches were conducted for information on each of these factors, for the following five interventions that influence the school food environment; these interventions were prioritized by the NUGAG Subgroup on Policy Actions for the WHO guideline on school food and nutrition policies, based on the outcomes of the scoping review:

➔ Nutrition standards or rules that determine the quality of food served or sold in and around schools.

➔ Marketing restrictions on unhealthy foods and non-alcoholic beverages in and around schools.

➔ Nudging interventions promoting healthy food behaviour in the school environment (e.g. product placement).

➔ Pricing policies to promote healthier alternatives (e.g. subsidies for healthy foods, higher costs for unhealthy options).

➔ Direct food provision to students in schools (e.g. meal programmes, vegetable and fruit distribution).

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The types of literature that informed the review included systematic reviews, primary studies and grey literature, including government reports. Search terms were defined based on factors proposed in evidence to decision (EtD) frameworks used in the WHO guideline development process, including the GRADE (Grading of Recommendations Assessment, Development and Evaluation) EtD framework and the WHO-INTEGRATE EtD framework. Only literature published in English was included, and the search was restricted to publications after 2004.

A total of 350 publications were identified for one or more of the five factors; the majority were relevant for Factors 4 (acceptability; n = 116) and 5 (feasibility; n = 168). Most information was identified for intervention group 1 (food standards); only a few studies related to pricing policies and marketing restrictions. The majority of publications were identified from high-income countries.

Evidence identified on **values** included children's perceptions, views and understanding of what constitutes healthy and unhealthy food, and implications of consumption of these foods. The review found that children generally had a good understanding of healthy food, although "feelings" and perceptions about implications of healthy eating seemed to vary. Students most often linked healthy eating to body image, and feeling fit and energized. Students valued options and the autonomy to choose the food they purchase and consume. Taste and appearance were important in influencing choice (whether foods were healthy or not). Some studies identified peer pressure to consume unhealthy foods as an important factor influencing choice.

Evidence on **resource implications** was identified for the implementation of nutrition standards and direct food provision. Resource implications varied greatly by context. The costs of implementing nutrition standards differed: some studies found costs associated with ensuring that school meals served align with standards (existing, new or updated), whereas other studies found no costs. The costs associated with direct food provision depended on the scale and scope of the school meal programme, and the country of implementation; costs ranged from US$ 20 to US$ 1500 per child per year. The few references identified that assessed cost-effectiveness or cost–benefit ratios showed returns on investment.

With regard to **human rights and equity**, no direct references to school food and nutrition policies were identified in the Universal Declaration of Human Rights; the International Covenant on Economic, Social and Cultural Rights; or the Convention on the Rights of the Child (CRC). However, the CRC states that "institutions, services and facilities responsible for the care or protection of children shall conform with the standards established by competent authorities, particularly in the areas of safety and health" (Article 3). Special Rapporteurs on numerous occasions have recommended the implementation of school food and nutrition policies to realize the right to health and the right to food. The review also found that, in some countries, school food and nutrition is driven by a rights-based approach.

Generally, implementation of school food and nutrition policies (including on nutrition standards and direct food provision) was found to reduce inequities. However, depending on implementation and uptake, interventions may differ in effectiveness across socioeconomic groups. Some studies that showed an increase in inequities highlighted the importance of strategies that optimize the programme's impact on equity and maximize uptake – for example, pre-order systems for meals or cashless payments.

Most studies identified for the **acceptability** factor were from high-income countries. Considerable information was found for acceptability to governments, policy-makers, the public (including parents), school-based stakeholders and students. Fewer studies were identified that discussed acceptability to industry of implementing school food and nutrition policies. In general, stakeholders supported implementation of school food and nutrition policies. Acceptance of implementing **standards** appeared to be lower among students than among parents, but acceptability increased

over time for both groups. Among school-based stakeholders, views on implementation of standards varied; some studies found standards to be too restrictive and their implementation too burdensome. Some studies also reported an increase in food waste with new nutrition standards. **Nudging** interventions were generally accepted among students and school-based stakeholders, in the presence of supportive school system factors (such as time and space to implement the intervention). In relation to **food provision**, acceptability among parents and students varied, and depended on the available food options and the price (if food was not provided for free); school-based stakeholders, including teachers, principals and catering staff, were generally supportive. Implementation of a school breakfast programme that used donated food was found to reduce food waste.

The abundance of information identified on school food and nutrition policies that have been implemented points to their **feasibility**. Results on feasibility were grouped into elements that hinder or support development and implementation; elements that hinder or support monitoring, evaluation and enforcement; and impacts on health systems, food systems and the policy environment. Evidence on implementation of standards came mainly from high-income countries. Levels of compliance with standards varied by type of school and type of standard. Evidence on implementation of food provision came from low- and middle-income countries, as well as high-income countries. In general, feasibility was found to increase over time – for example, once schools settled into efficient routines. Elements supporting food provision included political will, local leadership, school infrastructure (e.g. equipment, sufficient space to prepare and store food, size of dining areas), ability to predict demand for school meals, programme coordination, school community involvement, and mechanisms for collaboration and engagement with a range of stakeholders. Programme costs, lack of supervision and staffing concerns (e.g. insufficient trained and skilled nutritionists and cooks) were identified as hindering elements.

This review of contextual factors showed great variability in resource implications, acceptability and feasibility of developing and implementing school food and nutrition policies. Acknowledging that most of the identified information is from high-income and English-speaking countries, results suggest the need to consider the local context, including the nutritional situation, cultural considerations, locally available foods and local dietary customs, when developing and implementing school food and nutrition policies. Overall, effective implementation of school food and nutrition policies could contribute to achievement of the right to health, a core WHO value.

Background

Nutrition during childhood and adolescence is key to ensuring optimal growth, health and well-being during childhood and beyond *(1–3)*. Healthy dietary practices – the foundation for good nutrition – are initiated early in life. Their impact on healthy growth during childhood is seen in rapid growth spurts. They also have long-term health impacts, including preventing noncommunicable diseases (NCDs) later in life. As well, they have an intergenerational impact through ensuring that mothers, particularly those who are adolescent girls, have an optimal nutritional status *(1, 4)*.

Unhealthy diets are a leading global public health risk, contributing to a rise in unhealthy weight gain and NCDs, including diabetes, heart disease, stroke and cancer *(5)*. NCDs now account for about 70% of all deaths globally *(6)*. The dietary risks cluster[1] results in more than 10 million deaths from NCDs per year. It is responsible for 16.45% of all disability-adjusted life years (DALYs) lost to NCDs and 10.2% of DALYs lost to all causes worldwide.[2] Overweight and obesity in childhood is one of the most prominent global public health challenges today. Virtually no progress has been made in reducing the spread of overweight in more than 15 years *(7)*. Globally, 38.3 million children under the age of 5 years are estimated to be overweight, and 36% of these children live in low- and middle-income countries *(5)*. These numbers escalate by an order of magnitude in the age group 5–19 years: 337 million children in this age group were estimated to be overweight or obese in 2016 *(8)*. At the same time, 47 million children under 5 years of age have wasting, and 144 million are stunted *(7)*.

Governments play a leading role in reducing the burden of diet-related NCDs, addressing malnutrition in all its forms and promoting healthy diets, including through policy actions *(9, 10)*. The Second International Conference on Nutrition, held in 2014, emphasized the importance of improving the food environment, which shapes norms and values of food consumption, through the ways food is labelled, marketed and provided *(11, 12)*. In the current food environment, dietary patterns have shifted, and people are consuming more foods high in energy, saturated fats, trans-fatty acids, free sugars and salt. Many people do not eat enough dietary fibre such as that provided by fruit, vegetables, whole grains and legumes *(13)*. It is timely to implement policy actions that contribute to creating a food environment that promotes and enables healthy diets for all.

To support Member States in developing and implementing food and nutrition-related policy measures, as recommended by the Framework for Action from the 2014 Second International Conference on Nutrition *(11, 12)*, the World Health Organization (WHO) Department of Nutrition and Food Safety started work to develop evidence-informed policy guidelines on the food environment.

As a first step in this process, in 2018, the WHO Department of Nutrition and Food Safety established a guideline development group: the WHO Nutrition Guidance Expert Advisory Group (NUGAG) Subgroup on Policy Actions. Initial priority areas for policy guidelines included policies to protect children from the harmful impact of food marketing, nutrition labelling policies, and fiscal and pricing policies. In 2019, the Department of Nutrition and Food Safety started preparing to develop a WHO guideline on a fourth priority policy measure: school food and nutrition policies.

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[1] The "dietary risks cluster" includes diets that are low in whole grains, fruit, nuts and seeds, vegetables, fibre, legumes, polyunsaturated fatty acids, calcium or milk, and/or are high in sodium, trans-fatty acids, processed meat, red meat or sugary drinks (Global Burden of Disease risk factors).

[2] Global Burden of Disease statistics, 2017

Numerous calls to action have been made to protect, promote and support good nutrition and healthy diets in the school environment. Schools play an important role in promoting healthy diets and good nutrition, and can create an enabling environment for children. The interlinkages between good nutrition and education have long been recognized. A child who has good health and nutrition performs better in school *(14, 15)*, and a good education provides a child with a foundation for the future, which in turn contributes to nations' economic and social development *(12, 13)*. The WHO Nutrition-Friendly Schools Initiative[1] provides a framework for improving the nutritional status of school-age children. Despite these initiatives, a notable weakening in most specific programme components and programming for school health and nutrition was observed when comparing the outcomes of the second global nutrition policy review with those of the first *(18)*. Moreover, complementary actions to support healthy diets or improve the school food and beverage environment were less common in the second review. The underused opportunity to create enabling school food environments supported by school food and nutrition policies increases the urgency for evidence-informed guidelines in this policy area.

The process for developing the WHO guideline on school food and nutrition policies follows the *WHO handbook for guideline development (19)* (the WHO Handbook).

The WHO Handbook requires that, when developing a guideline and its recommendations, explicit consideration must be given to decision criteria (i.e. contextual factors) when moving from the evidence on the impact of interventions to recommendations; these contextual factors may affect the direction and strength of the recommendations. They include equity, human rights, resource implications, acceptability of the policy to the various stakeholders, and feasibility of adapting the recommendations, including the availability of infrastructure and mechanisms necessary for implementation, enforcement, monitoring and evaluation *(20)*. The NUGAG Subgroup on Policy Actions, at its first meeting in December 2018, therefore requested reviews of contextual factors to be conducted for all policy guidelines in addition to systematic reviews on the effectiveness of the policy measure. This is because policy measures to promote healthy diets are implemented in complex systems (including the food system), which are country specific and unique to the interplay of each country's contextual features. Contextual features are shaped and defined within each country's political, legal, economic, cultural or ethical context.

The factors considered in these reviews include those outlined in the WHO Handbook: priority of the problem, values, resource implications, equity and human rights, acceptability, feasibility, and balance of benefits and harms *(21)*. The reviews also include relevant subcriteria of the WHO-INTEGRATE evidence to decision framework *(22)* (e.g. the impact of the policy action on, or the policy action's interaction with, existing health and food systems).

A logic model depicting pathways from school food and nutrition policies to health and educational outcomes also visualizes the complexity of school food and nutrition policies, and the range of contextual factors that influence a policy's impact on the outcomes of interest (Fig. 1).

The overall aim of this review was to search for, identify, summarize and present information on the impact of contextual factors on implementation of school food and nutrition policies.

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[1] https://www.who.int/nutrition/topics/nutrition_friendly_schools_initiative/en/

Fig. 1. Logic model depicting pathways from school food and nutrition policies to health and educational outcomes

Inputs (within each country context)

Resources, structures, mechanisms (at school, community and other levels)
- Organizational structures
- Governance mechanisms (including for accountability and transparency)
- Available capacity
- Available resources, financing mechanisms
- Mechanisms to protect against conflicts of interest and safeguard public health
- Enforcement mechanism (including capacity to enforce), strategies to minimize noncompliance

Policy context
- Legal system and options for regulatory instruments (including existing related policies on food/nutrition, advertising, school health, education, social protection)
- Signatory to human rights treaties
- Political economy

Stakeholders

Interventions and target population[a]

Outcomes

School food and nutrition policies and interventions

Policies and interventions that influence the school food environment
1. Nutrition standards or rules that determine the quality of food served or sold in and around schools
2. Marketing restrictions on unhealthy foods in and around schools
3. Nudging of healthy food behaviour in the school environment (e.g. product placement)
4. Pricing policies to promote healthier alternatives
5. Direct food provision to students in schools (e.g. meal programmes, vegetable and fruit distribution)

Target group

Children >2 years of age, attending pre-, primary-, and secondary school

Behaviours

Attitudes towards food

Purchasing behaviour or sales data

Consumption of healthy foods in school, out of school and overall

Consumption of discretionary foods in school, out of school and overall

Diet (energy, total food and/or nutrient intake, nutritional quality)

Non-health outcomes

Participation with school environment

Portion sizes served

Food prices

Exposure to marketing of foods

Health outcomes

Anthropometric outcomes

Micronutrient status

Blood glucose, blood lipids (TC, LDL-C, HDL, TG), blood pressure

Morbidity (e.g. caries)

Educational outcomes

School absenteeism, educational attainment, school achievement

Sociodemographic, sociocultural and other factors

[a] Interventions, target population and outcomes shown in the figure are those prioritized by the members of the WHO Nutrition Guidance Expert Advisory Group (NUGAG) Subgroup on Policy Actions in formulating the research question for the evidence review to inform the guideline on school food and nutrition policies.

Methodology

The review of contextual factors (RCF) for school food and nutrition policies was conducted in line with the requirements of the WHO guideline development process, taking into consideration the complexity of the policy interventions *(21, 25)*. The protocol for the RCF also aligns with the protocol for the systematic review of the impact of school food and nutrition policies commissioned by WHO. Using best-practice methodologies for systematic reviews, rapid reviews and scoping reviews, the review process sought to respect the key principles of knowledge synthesis. These include a clear statement of objectives, predefinition of eligibility criteria, assessment of the validity of findings, and systematic presentation and synthesis of results.

In contrast to previous reviews, this RCF includes literature on the contextual factors of five groups of interventions that influence the school food environment:

➔ Nutrition standards or rules that determine the quality of food served or sold in and around schools.

➔ Marketing restrictions on unhealthy foods and non-alcoholic beverages (FNABs) in and around schools.

➔ Nudging interventions promoting healthy food behaviour in the school environment (e.g. product placement).

➔ Pricing policies to promote healthier alternatives (e.g. subsidies for healthy foods, higher costs for unhealthy options).

➔ Direct food provision to students in schools (e.g. meal programmes, vegetable and fruit distribution).

Framework and guidance questions

A framework was developed to guide the review process. This was based on the guidance from the WHO Handbook to consider social determinants of health in the guideline process *(20)*, the relevant decision criteria listed in Table 10.1 of the WHO Handbook *(21)*, and discussions at the second meeting of the NUGAG Subgroup on Policy Actions (on 9–13 December 2019 in Qingdao, China). The review for school food and nutrition policies includes all factors (and criteria) listed as relevant for determining the direction and strength of recommendations in Table 10.1, with the exception of the "certainty of evidence", which has been assessed through the systematic review on the effectiveness of such policies on selected health and non-health outcomes. Building on decision frameworks proposed by the WHO Guidelines Review Committee *(21, 22)*, guidance questions and search terms were developed to inform each of these criteria.

The factors fall under the broader categories that were used to inform discussion on the guideline and decisions on the strength of the recommendations formulated by the NUGAG Subgroup on Policy Actions for each of the policy guidelines:

➔ Factor 1 – values, focusing on the values of health outcomes and values linked to the implementation of the intervention;

➔ Factor 2 – resource implications, including the costs and cost-effectiveness of interventions, as well as a description of the use of revenue and impacts on productivity;

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- → Factor 3 – human rights, equity and equality, focusing on health equity;
- → Factor 4 – acceptability, reflecting the perspectives, attitudes and opinions of consumers, government and industry, and the support of these stakeholders for school food and nutrition policies; and
- → Factor 5 – feasibility, focusing on the feasibility of developing, implementing, administering, monitoring and evaluating school food and nutrition policies.

Literature search

Types of literature to inform the review included systematic reviews, primary studies and grey literature.

Only literature published in English was included. Editorials, commentaries, industry statements, blog posts, newspaper articles, posts from social media outlets and so on were not included in the review. Other relevant inclusion and exclusion criteria are listed in the following sections. In addition to the search strategies listed below, the review also applied the "snowballing technique" – that is, searching reference lists of eligible literature. This is a recommended method to identify additional relevant literature when conducting scoping reviews and rapid reviews *(26)*.

Date of publication for all literature was restricted to 2004 and later. The WHO Global Strategy on Diet, Physical Activity and Health *(27)* was endorsed in 2004. Other initiatives that have occurred since 2004 include the Nutrition-Friendly Schools Initiative *(28)*; the 2008–2013 Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases *(29)*; the Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020 *(30)*; the Comprehensive Implementation Plan on Maternal, Infant and Young Child Nutrition *(31)*; the Second International Conference on Nutrition *(11, 12)*; and the *Report of the Commission on Ending Childhood Obesity (9)*, which all emphasized the importance of school food and nutrition policies to promote healthy diets.

Systematic reviews

Systematic reviews were searched for in the Cochrane Library, the Campbell Library and PubMed.

Primary studies

Primary studies were searched for in PubMed, Scopus and JSTOR using search terms adapted for each of these databases.

Some identified studies were relevant for multiple contextual factors. For example, some studies provided evidence relevant to both Factor 4: Acceptability (acceptability to stakeholders) and Factor 5: Feasibility: (development and implementation). If primary studies identified as relevant were part of systematic reviews also deemed relevant, the primary study was not included unless it contributed important findings not captured by the systematic review.

Both qualitative studies (e.g. stakeholder interviews, focus groups, open-ended consumer surveys and interviews) and quantitative studies (including modelling studies of non-implemented policies) were included. In the WHO guideline development process, qualitative studies provide important insights when assessing the values, perspectives and opinions of stakeholders, and may complement quantitative studies in informing acceptability of interventions and policies, and implementation considerations *(32–34)*.

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Grey literature

Different search strategies were applied to identify relevant grey literature, including strategically searching for literature through relevant source sites (listed below). Types of grey literature retrieved and used in the review included reports, articles, reviews, case studies, policy briefs and, for human rights, declarations and constitutions.

Publications available through the **WHO Institutional Repository for Information Sharing (IRIS)**:

➔ WHO reports, case studies and policy briefs, published both by WHO headquarters and at a regional level. This also included literature developed and published with the support of WHO but where WHO was not the primary author.

Publications in journals by **WHO Regional Offices**:

➔ Articles published in the *Bulletin of the World Health Organization*, the *WHO South-East Asia Journal of Public Health*, the *Pan American Journal of Public Health*, the *Eastern Mediterranean Health Journal* and *Public Health Panorama*.

Publications by other **United Nations (UN) organizations**, including:

➔ UN General Assembly documents, declarations and constitutions, including General Comments on the Convention of the Rights of the Child published by the Committee on the Rights of the Child, reports by the Special Rapporteur on the Right to Food and the Special Rapporteur on the Right to Health, and literature published by the UN Standing Committee on Nutrition

➔ United Nations Children's Fund (UNICEF)

➔ Food and Agriculture Organization of the United Nations

➔ World Food Programme (WFP)

➔ United Nation's Educational, Scientific and Cultural Organization.

Publications by **other global intergovernmental organizations, partnerships, committees and research institutions**, including:

➔ International Food Policy Research Institute

➔ Scaling Up Nutrition Movement

➔ Global Child Nutrition Foundation (GCNF)

➔ World Cancer Research Fund International

➔ NCD Alliance

➔ Organisation for Economic Co-operation and Development

➔ World Obesity Federation

➔ Save the Children

➔ European Commission

➔ International School Health Network

➔ Partnership for Child Development

➔ Alive and Thrive

➔ World Bank Group

➔ Global Panel on Agriculture and Food Systems for Nutrition.

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As well, **government reports** on implemented policies in Member States were considered relevant data sources by NUGAG members, as these may provide additional evidence for the resource implications, acceptability and feasibility of such policies.

Because of resource constraints, it was not possible to conduct a comprehensive search for government reports. Therefore, a strategic, targeted search for government reports was conducted based on the following two criteria:

→ knowledge of existing policies, policies in a development phase and ceased policies[1] at national or subnational level; this was informed by evidence retrieved from peer-reviewed journal articles and other grey literature, as well as suggestions, inputs and advice from NUGAG members and WHO regional advisors for nutrition; and

→ use of English on government online sites and in government reports.

For the purpose of this review, government reports were defined as reports authored, co-authored or commissioned by government departments or ministries. Examples include self-evaluations, implementation evaluations, stakeholder consultations, public consultations, Treasury statements, impact analyses and cost analyses. To be eligible, reports had to:

→ be publicly available in full-text versions on government websites; and

→ provide information relevant to Factor 2: Resource implications; Factor 3: Human rights, equity and equality; Factor 4: Acceptability; or Factor 5: Feasibility, for the respective policy guideline.

The search for government reports was conducted in Google by:

→ using the following search terms – school (food OR foods OR nutrition OR snack OR snacks OR feeding OR meal OR meals) (standard OR standards OR policy OR policies OR guideline OR guidelines);

→ if available, using the title (or abbreviation) of an implemented policy in addition to the search terms (e.g. Ghana School Feeding Programme). However, for some policy guidelines, including the title of policies was not applicable (e.g. when searching for reports on nutrient declarations), in which case only the list of search terms was used;

→ restricting hits to government URLs;[2]

→ restricting hits to pdf files (filetype:pdf);

→ screening the first 100 hits sorted by relevance; and

→ using snowballing[3] as needed to retrieve other relevant government reports for the identified country.

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1   To be eligible for inclusion as a "policy in a development phase", there must be official records of government-led action or consultations with the objective of drafting or implementing the policy. For example, Health Canada initiated consultations with stakeholders in 2016 on restricting food and beverage marketing to children. In 2018, the proposed Child Health Protection Act (Bill S-228) passed the third reading in the House of Commons and was sent to the Senate for consideration. Bill S-228 was not called for a vote before the end of the 2019 Senate session, and the Parliament later dissolved for the 2019 federal election.

2   For the countries search in this review, the following government sites were used: Australia (site:gov.au), Barbados (site:gov.bb), Canada (site:canada.ca), Ghana (site:gov.gh), Grenada (site: gov.gd), India (site:gov.in), Ireland (site:gov.ie), Jamaica (site:gov.jm), Kenya (site:go.ke), New Zealand (site:govt.nz), Philippines (site:gov.ph), South Africa (site:gov.za), Sri Lanka (site:gov.lk), Trinidad and Tobago (site:gov.tt), United Kingdom (site:gov.uk) and United States (site:fda.gov or site:usda.gov).

3   Snowballing involves seeking out other relevant documents identified in the screened government reports.

Screening, data extraction and synthesis

All literature was screened by first title, and then abstract (if available). Literature identified as potentially relevant based on abstract was further screened by reading the full text to decide whether it should be included or excluded. All studies were screened by a single reviewer, who also critically appraised the identified literature. A charting record was kept describing characteristics of the included studies and the key information relevant to the guidance questions and contextual factors. A narrative synthesis for each factor and intervention group was written. A second reviewer oversaw screening, data extraction and synthesis.

Synthesis by factor and intervention group

All included literature was synthesized by factor and intervention group. Some policies or interventions fit into multiple intervention groups; these were included in more than one group. For example, the Brazilian National School Feeding Programme mandates food provision to all schoolchildren (intervention group 5), which has to comply with nutrition standards and guidelines (intervention group 1). To the extent possible, literature on this policy was synthesized in the intervention group most relevant to the results presented. For example, literature on barriers to adhering to the specific nutrition standards in the policy was synthesized under intervention group 1, whereas the national cost of providing meals was summarized under intervention group 5 (unless the cost analysis was specific to changes in nutrition guidelines).

Terms used in synthesis

Various uses, definitions and interpretations exist across the literature for terms such as "healthy foods", "unhealthy foods", "junk foods" and "discretionary foods". The synthesis of findings was written applying the terms used in the included literature. This resulted in a heterogeneity of terms used, but ensured that the original findings in the literature were adequately conveyed. However, the term "student" is used in this review to refer to a child, regardless of age, attending any of the school settings included.[1] The only exception is when a study sampled and included children in the capacity of being a *child only*, with no reference to school settings – for example, examining children's values towards healthy foods in general.

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[1] Other terms used in the identified literature as substitutes for "student" in this review included "pupil", "child", "adolescent" and "beneficiary".

Factor 1: Values

Values are central to consumers' food choices. Values go beyond the taste, safety, healthiness, convenience and price of foods; they are also shaped by cultural, social and environmental beliefs. Aspects relating to environmental concerns, including how foods are produced and distributed, are increasingly shaping food consumption values. Elements of the food environment – in particular, how foods are marketed (including how they are packaged and promoted) – have long been recognized to shape and change consumption norms, and to affect value systems (35, 36). Although an in-depth exploration of how food values are shaped goes beyond the scope of this RCF, it is important to keep in mind the interlinkage between values and the acceptability of proposed policy actions that affect the food environment.

This section also presents a narrative synthesis of literature identified as relevant to the importance to affected populations (those affected by exposure and/or outcome)[1] of "non-health" outcomes of implementing or not implementing school food and nutrition policies to promote healthy diets. This includes values on quality and healthiness of foods, food choice and purchasing behaviour or sales data, consumption of healthy and unhealthy foods in school and out of school, and exposure to marketing of FNAB. For the purposes of this review, "value" also includes beliefs or perceptions the affected population holds about these outcomes. Values assigned to the health outcomes of body weight status/body mass index and diet-related NCDs are also summarized here.

This section does not discuss the value that the population places on the policy or intervention itself (literature assessing the acceptability of the intervention is synthesized in Factor 5: Acceptability).

To the extent possible, the section presents evidence on how values vary within and across population subgroups, and the uncertainty of the importance or variability of values.

Children's perceptions, views and understanding of what constitutes healthy and unhealthy food, and implications of its consumption

Studies identified generally showed that children had a good understanding of healthy foods (37–42), although feelings associated with "healthy eating" seemed to vary. In a survey among Australian students (aged 11–12 years), many of the children admitted that, despite understanding the implications of consuming too many discretionary foods, they were willing to consume such foods as a means to satisfy their mood or ease emotional distress (43). Students mentioned the energizing effects of fruit and vegetables by using phrases such as "feeling good and ready to go", and healthier options were perceived to be the "antithesis" of discretionary foods, described as "sometimes foods" or "treats" (43). A study from the Netherlands found that secondary school students reported healthier foods to be less filling. Healthiness was associated with light and salad-type meals that "do not help you through the day". Some students reported that they "feel a need for unhealthy foods" at the end of a long school day or in winter (44). Primary school students (aged 10–11 years) in Flanders (Belgium) and the Netherlands most often reported expecting positive health outcomes from eating fruits and vegetables, or positive attributes of fruits and vegetables, as a reason to consume them (45). A qualitative study in England found that secondary school

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[1] While other stakeholders arguably also are affected, students or school-aged children constitute "the population" in this section.

students could attach negative feelings to eating healthy food, particularly when others were seen to eat chips *(37)*. In Ontario, secondary school students were cognizant of the positive impact of healthy foods on their health and wellbeing. The students also linked body image, self-esteem and mental health to healthy eating *(46)*. A qualitative study from Malaysia with students aged 7–9 years from Selangor and Kuala Lumpur found that most students reported liking eating unhealthy food; however, the authors noted that all students had "negative ideas about fast food including how fast foods can cause bad effects to their health, contains high fat and is unhealthy" *(47)*. In Iran, a study with female students aged 12–15 years in two middle schools in a socioeconomically diverse district of Tehran found that students were well informed about the negative health consequences of eating unhealthy snacks. A clear majority identified snacks such as crisps, puffed cheese and soft drinks as low value and harmful. Body size and appearance were important for a majority of participants, and obesity and inadequate growth were mentioned as the most harmful consequences of eating unhealthy snacks, but students were still less likely to eat healthy snacks than unhealthy ones *(48)*.

In a mixed-methods study from the Netherlands, most adolescents stated that healthy eating was important. This was primarily discussed in relation to perceived short-term benefits: "not getting fat", "a clean skin without pimples", "feeling fit" and "performing better at sports". To a lesser degree, it was mentioned that healthy eating was also important for "not getting ill in the future". Adolescents felt that they would only change their current eating patterns if noticeable body changes occurred, such as visible weight gain (mostly mentioned by girls) or a lower performance in sports (mostly mentioned by boys) *(49)*.

Values on (healthy) options available in and around schools, and factors influencing their choice

A number of studies were identified that reported the importance for students of being able to choose the food they purchase and consume *(37, 44, 49, 50)*. Some qualitative studies reported children valuing individual choice, and having a large selection and variety of foods *(41, 51)*. Whether healthy or not, it was often perceived as important that foods should be fresh, appealing and affordable, and taste good *(37, 41, 45, 49, 52)*. Perceptions were not always negative towards healthy options and positive towards unhealthy options among students. For example, a qualitative study in England reported that students aged 7–10 years perceived school meals as frequently being "unhealthy", "fatty" or "soggy" *(39)*. Another study from the United Kingdom reported students wanting healthy options to be available within schools, which was not always perceived to be the case *(53)*. Additionally, a United States study on installation of salad bars in two elementary schools in urban Virginia found that more than half of the students agreed or strongly agreed that they liked the salad bar and the types of fruits and vegetables offered (61%), and 85% liked the ability to choose their own fruits and vegetables from the salad bar *(54)*. First Nations students (grades 4–12) in Canada were interested in consuming traditional foods of their Cree culture *(42)*.

Overall, taste seemed to be an important factor affecting support for what is available in schools. A study from the United States among 6th–8th grade students in a rural middle school in Kansas with a high proportion of students from ethnic minorities, where almost all students qualified for free or reduced-price lunch, found taste to be the most important sensory property of foods and food choice. Many students expressed negative feelings towards foods that neither tasted nor looked good *(38)*. A mixed-methods study among secondary school students in England showed that many young people prioritize wanting "tasty" food at prices that they feel offer value for money at lunchtime *(53)*. A qualitative study from Iran with female students aged 12–15 years found that taste of healthy snacks was reported as a reason to consume unhealthy snacks *(48)*. In a qualitative study with primary school students (aged 10–11 years) in Flanders (Belgium) and the Netherlands, taste preferences (in addition to health aspects) were mentioned often as a factor related to eating fruits

and vegetables. Some students said they did not want to eat fruit when, for example, it contained seeds, or was too hard, too sweet, too sour or too bitter *(45)*. One study reported that girls found the healthiness, freshness, appearance and low caloric content of products significantly more important than boys *(49)*. Some students expressed feelings of anger and frustration about being forced to eat foods they did not like at school *(38)*. Secondary school students in England reported being prepared to shop further than 800 metres from school to buy food or drink that meets "their needs" (i.e. "tasty" food at prices that they feel offer value for money) *(53)*.

Peer pressure and social norms were identified as factors influencing students' food choice. A qualitative study among secondary school students in Wales reported an apparent consensus about popular foods, and the desire to conform to peer group norms *(50)*. Being interested in healthy eating potentially exposed children to a social risk, as reported in a study from the United Kingdom *(55)*. Food choices among secondary school students in Kolkata, India, were also reflective of peers' food choices, and peer pressure made students often feel "compelled" to consume nutrient-poor foods and carbonated beverages *(56)*.

A qualitative study of Iranian female students aged 12–15 years found that almost all considered friends and peers to be the most important social force influencing their snacking choices. Students reported that the snack choice of one member of a social group, regardless of whether the choice was healthy or unhealthy, often reinforced the choices of others *(48)*. Although students may "seem to be convinced that other children did not influence their fruit and vegetable intake", "indirect influence by peers" may still be detected *(46)*.

Values on health outcomes

In high-income countries, overweight and obesity are generally perceived negatively and as a serious health problem by the majority of adults and children *(57–65)*. In a study among schoolchildren in the United Kingdom, being overweight or obese was undesirable, but the undesirability was often due to the perceived damage to one's image and status, and being teased if overweight or obese, rather than any health consequences *(55)*. In some cultures, particularly in low- and middle-income countries, a large body size is often valued as being indicative of good health, well-being and wealth *(66–71)*. Negative views towards a thin (normal weight) figure and the preference for overweight in some African cultures have been linked to poverty and the presence of diseases. For example, a recent qualitative study from Zambia found that thinness or weight loss was valued negatively, and often associated with diseases such as HIV/AIDS *(72)*. Other studies from sub-Saharan Africa have reached similar conclusions *(67, 73–76)*. However, some studies have identified a change in values towards "Westernized" perceptions of an ideal body size, as reflected in normal weight and body mass index *(77, 78)*. Similar developments have been identified in the Pacific *(62, 79)*. Whereas overweight traditionally was associated with high socioeconomic status, authority and wealth among Pacific islanders *(80, 81)*, more recent studies have identified how attitudes to body weight and size have changed over time, with a more favourable view of less overweight figures *(62, 79)*. Economic development, globalization, and increased awareness of the association between overweight, obesity and diet-related NCDs are cited as reasons for the shift in values and preferences *(62, 79)*. Studies from the eastern Mediterranean region have found a similar development, with the adoption of "Western" values of "thinness [as] a sign of beauty and health" *(82)*; this is concurrent with increased concerns and dissatisfactions with body weight, especially among young people *(83, 84)*. Values about body weight status, undernutrition and obesity vary, mostly linked to body image. In general, diet-related NCDs are perceived negatively and as health problems across regions and subpopulations *(72, 74, 75, 85)*.

Factor 2: Resource implications

This section presents a narrative synthesis of literature identified to assess the resource implications of school food and nutrition policies. Relevant criteria for resource implications include the costs of the policy or intervention in the long and short terms to stakeholders (e.g. governments, schools, parents), the ratio of costs to benefits of the policy or intervention, and the economic impact of the policy or intervention on the national and/or global economy.

Literature was only identified for intervention group 1 (nutrition standards or rules), with most literature assessing the cost of updating or changing existing standards, and intervention group 5 (direct food provision). No data were identified on resource implications of restricting marketing of unhealthy FNABs in and around schools, nudging of healthy food behaviour in the school environment, or pricing policies to promote healthier alternatives.

Intervention group 1: Nutrition standards or rules that determine the quality of food served or sold in and around schools

Updates and changes to nutritional standards for school food

Several studies were identified that examined the cost of changing nutritional standards for school food *(86)*. In a recent consultation on draft updates to nutritional standards for school food, the Department of Education in Northern Ireland anticipated that updates to the standards would increase the cost of a school meal by about 0.05–0.07 pounds sterling per meal for food costs,[1] and that an additional £1.7–2.4 million per year would be required to implement the updated nutritional standards in all schools *(86)*. An earlier study presented costs to the government to update standards for the provision of school food in England. Over a period of six years (2005–2011), the government provided a total of £38 million to set up and run the School Food Trust, an organization with the objective of fostering change towards provision of healthier school food.[2] The author of the study estimated that it "has cost approximately £38 million/270 000 = £141 for each [student] new to taking a school lunch", which represented "a small cost in relation to a change in eating habits in keeping with government guidelines and with the potential to affect lifetime eating habits". Using figures for the number of school meals served per day, the author further estimated the cost for a child to have access to, and consume, a healthier school lunch (including the costs of setting up and running the School Food Trust over six years) to be £2.11 per child per year; this is approximately £0.01 per school lunch, assuming 190 school days per year. In the same period, the government provided subsidies to support the cost of ingredients, software and support,[3] amounting to about £0.14 per school lunch *(87)*. To meet the new standards for school meals under the United States Healthy, Hunger-Free Kids Act (HHFKA) of 2010, the Institute of Medicine estimated that a typical menu would cost about US$ 0.10 more per lunch than those previously offered *(88)*.

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[1] The current (2020) price charged for a school meal in Northern Ireland is £2.60 in primary school and £2.80 in post-primary school.

[2] The role of the School Food Trust was to increase school lunch take-up, encourage and facilitate adherence to the school food standards, and play supporting roles relating to specific stakeholder groups (e.g. clarifying the standards for caterers and parents, developing menus for school caterers, advising on monitoring and compliance, developing software for caterers to use to promote their services and menus). The School Food Trust was established to work with schools, caterers, local authorities, pupils, parents and other stakeholders to identify the way in which school food had changed and why.

[3] This includes software for nutrient analysis relating to menu development and monitoring of compliance with standards, professional support to achieve and monitor compliance with standards, and small pieces of equipment (but not major kitchen refurbishments).

A study from France assessed the food-related costs of meals adhering to new compulsory standards for primary schools. The study found that fulfilling the frequency criteria (i.e. serving frequencies of nutritionally defined dishes in a series of 20 consecutive meals) increased the cost, whereas fulfilling the portion sizes criteria (smaller protein dishes and larger side dishes) decreased it. Series of meals that fully met the standards (i.e. both frequency and portion sizes criteria) cost less (€0.10 per meal) than series that did not meet them. Thus, the authors concluded that meeting the French standards for school meals would not increase the food cost of meals *(89)*.

A United States study reported on the annual revenues and expenses of the school food service environment related to the three-year 'HEALTHY intervention' trial in middle schools, which had a nutrition component consisting of changes to meal plans. The study found that, over the three-year period, none of the revenue and expense values were statistically significantly different between the schools receiving the HEALTHY intervention and those that did not *(90)*. Another intervention study in the United States evaluated the cost of a three-year intervention in middle schools that allowed only bottled water in vending machines, allowed only milk and fruit on à la carte menus, and offered a seasonal fruit and vegetable bar. The study found that each intervention school spent 49% more on produce per student than control schools during the 2008–2009 and 2009–2010 school years (spending about US$ 2500 more per school per year). The intervention schools together lost approximately US$ 24 000 annually in gross school meal sales due to lost à la carte sales and a US$ 9000 annual loss in vending sales *(91)*.

Policies requiring certain foods to be served

A study conducted in United States elementary schools estimated that getting one additional student to eat one serving of fruits and vegetables for one day would cost US$ 1.72. This did not represent the cost of one serving of fruits and vegetables (which, based on school records, cost on average about US$ 0.20), but the cost including the "extra servings", as the policy required that one serving of fruits and vegetables be placed on each student's tray *(92)*.

Level of food preparation (scratch cooking)

In preparation for the requirements under the HHFKA, a United States study examined the difference in cost of preparing healthy school meals according to level of "scratch cooking" (i.e. using raw ingredients versus fully processed ingredients) in elementary schools. The study found no association between total costs and level of scratch cooking. Meals prepared the most from scratch had lower food costs, higher labour costs and similar total costs compared with meals with no scratch cooking. The study also found that nutrient content was not consistently associated with the level of scratch cooking, but that scratch cooking provided for a greater variety of types of meals prepared *(93)*.

Implementation interventions

A study conducted in New South Wales, Australia, determined the cost and cost-effectiveness of three interventions of varying intensity of support to improve implementation by schools of the NSW Healthy School Canteen Strategy *(94)*. The cost of the intervention increased with increasing intensity. Results indicate that the "medium" and "high intensity" interventions were potentially cost-effective strategies to support schools to improve implementation of the strategy (measured by auditing menu compliance), suggesting that a certain investment is required to achieve an intended public health benefit of policies for school food availability *(94)*.

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Intervention group 5: Direct food provision to students in schools

Resource implications for direct food provision to students in schools may include the cost of producing a meal (to the school, governments, organizations, donors or communities) and the price charged for a meal (to students or parents) if the meal is not provided for free. It may also include costs of implementing and maintaining food provision arrangements. The literature identified for this intervention group is highly diverse, and findings are not directly comparable. This section is also closely linked to the section summarizing findings for intervention group 1.

The cost of providing food to children in schools varied greatly, and depended on the scale and scope of the school feeding programme. Costs depended on many factors, including geographical area, type of school (e.g. pre-primary, primary, secondary, public, private) *(95)*, economies of scale *(96, 97)*, the type of food provided *(98–101)*, and whether the schools were in an urban or rural environment *(96, 102)*. Commodity costs are typically the largest contributor to cost, but programme support, logistics and transportation are also major drivers of total cost *(100, 101, 103, 104)*. Among programmes that were able to provide a breakdown of expenditures, 72% of costs went towards food; 11% towards handling, storage and transportation; 7% towards one-time fixed costs (such as kitchen construction); and 10% towards other expenses *(105)*.

Costs ranged widely, from about US$ 20 to US$ 1500 per child per year, and were highly dependent on the type of food provided *(86, 87, 95-97, 99–121)*. For example, provision of fortified biscuits or fruit is less expensive, whereas take-home rations are the most expensive *(100, 101, 122)*. In most cases, however, costs refer to meals provided at school. In 2020, the WFP estimated that the average cost of providing school feeding programmes to the children most in need is US$ 64 per child per year *(118)*. According to a recent GCNF report, the average amount spent per child was US$ 91 per year. This value was US$ 40, US$ 44, US$ 124 and US$ 242 per year in low-income, lower-middle-income, upper-middle-income and high-income countries, respectively *(105)*. In addition to the ongoing costs of a school feeding programme, there may be additional one-off costs to establish or upgrade kitchen and dining facilities *(116, 123)*. Some studies reported that higher levels of participation led to lower costs as a result of a lower labour cost per meal *(124)* and economies of scale (e.g. buying in bulk, negotiating contracts with food suppliers) *(97)*. Another study mentioned that introducing more flexible scheduling of week plans, reducing the level of organic content and reducing portion sizes can also reduce costs significantly *(98)*. An audit report of the school meal programme in Trinidad and Tobago indicated that improvements in value for money could be achieved through directing resources aimed at curbing wastage of meals, which has been estimated to be at least $26 million per year *(125)*.

The source of funding also differed by context. School feeding programmes in lower-income countries tended to rely more on external funding (e.g. donor agencies), whereas middle- and higher-income countries were primarily funded through internal revenues (e.g. taxes) *(104, 118, 120, 126–128)*. However, a recent WFP report found that the percentage of funds from external donors decreased from 83% in 2013 to 71% in 2020 in low-income countries, while the share of domestic funding increased from 17% to 28% *(129)*. In countries that have recently scaled up national school feeding programmes (e.g. Bhutan, El Salvador, Kenya), costs were borne by the national budget rather than the education sector alone, as school feeding contributes to multiple sectors besides education (e.g. health and nutrition, social protection, agriculture, gender equality) *(118)*.

The cost of providing food at schools was divided between national governments, local authorities and parents. A report by the Welsh Government showed considerable variation in cost, funding and take-up across local authorities, which covered 42% of the total annual cost *(130)*. In the school nutrition programme in the Northern Territory in Australia, all children were provided with meals regardless of parental contribution, but, with fluctuating financial contributions provided by parents,

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there were limited resources to cover the funding gap *(102)*. A study of Latin American countries found that, in most programmes, parents and communities contribute crucial but unaccounted resources, including food commodities, financial contributions and voluntary labour *(120)*. In a recent GCNF report on school meal programmes, 92% of programmes reported receiving support from students' families (e.g. payment, in-kind donations, labour) *(105)*. Therefore, total investments are generally underestimated, since the figures are mainly reported at the national level and do not account for regional- and community-level contributions.

Whereas some school feeding programmes require parental contributions, others are provided to all students free of charge. Although higher participation may decrease the cost per meal *(97, 124)*, there may also be greater loss from "deadweight" cost – that is, the cost associated with providing free school meals for students whose parents would have paid for meals in the absence of the programme. The Free School Meals pilot in the United Kingdom found that the deadweight cost amounted to £3.8 million and £7.6 million in the two universal entitlement areas (from around one third to just under half of the total running costs), and £0.72 million in the extended entitlement area (just over one third of the total running costs) *(116)*.

In terms of cost–benefit ratios, the results were mixed and depended on the type of programme. However, one investment case model found that the cost–benefit ratio ranged from 1:3 to 1:8, meaning that the government could receive at least three dollars in economic returns for each dollar spent on school feeding programmes *(119)*. In one study of the economic gains of introducing school breakfast clubs, the ratio of benefits to costs was estimated as 4.38 (with economic gain achieved over the life course amounting to £897 000, compared with costs of the breakfast club of £205 000) *(87)*.

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Factor 3: Human rights, equity and equality

This section presents a narrative synthesis of literature identified as part of searches conducted for two criteria: universal human rights standards, and impact on (health) (in)equity and (health) (in)equality (including social and socioeconomic impact). The first criterion describes the international human rights standards relevant to school food and nutrition policies, describes how governments have used or referenced human rights in implementing school food and nutrition policies, and discusses how the literature has analysed school food and nutrition policies from a human rights perspective. The second criterion includes a synthesis of literature with relevant findings for the impact of implementing (or not implementing) school food and nutrition standards on (health) equity or (health) equality. Equity in this review is defined as a situation in which there are no unfair or avoidable differences in health among population groups irrespective of income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics. Equality in this review is defined as the absence of differences, variations and disparities in living conditions of individuals and groups.

Universal human rights standards

Human rights define the entitlements of all human beings and the corresponding obligations of governments as the primary duty bearers. Human rights have been negotiated by governments and agreed upon in human rights treaties, such as conventions and covenants, which are legally binding to states that are parties to them *(20, 131)*. This section first describes the international human rights standards relevant to school food and nutrition policies, then describes how governments have used or referenced human rights in implementing school food and nutrition policies, and finally synthesizes any literature that has analysed school food and nutrition policies from a human rights perspective.

Accordance with international and regional human rights standards

The right to health comprises both freedoms and entitlements. Freedoms include the right to control one's health. Entitlements include the right to a system of health protection and promotion that gives everyone an equal opportunity to enjoy the highest attainable level of health *(19)*. The right to health is well established in international treaties such as the Universal Declaration of Human Rights (UDHR); the International Covenant on Economic, Social and Cultural Rights (ICESCR); the Convention on the Rights of the Child (CRC); and major regional human rights agreements *(131–137)*. On a national level, many countries have recognized the right to health in their constitutions *(138, 139)*. The right to food is also recognized in several instruments under international law. In particular, the ICESCR and pursuant General Comments on the articles of the ICESCR provide a legal framework for a rights-based approach to optimal nutrition and health *(133, 140, 141)*.

Although no direct references to school food and nutrition policies were identified in the UDHR, ICESCR or CRC, the CRC states that "institutions, services and facilities responsible for the care or protection of children shall conform with the standards established by competent authorities, particularly in the areas of safety and health" (Article 3). Article 18 of the CRC states that "for the purpose of guaranteeing and promoting the rights set forth in the present Convention, States Parties

shall render appropriate assistance to parents and legal guardians in the performance of their child-rearing responsibilities and shall ensure the development of institutions, facilities and services for the care of children". Further, Article 27 specifies that "State Parties, in accordance with national conditions and within their means, shall take appropriate measures to assist parents and others responsible for the child to [...] provide material assistance and support programmes, particularly with regard to nutrition" *(132)*.

Both the Special Rapporteur on the right to food (2008–2014), and the Special Rapporteur on the right of everyone to the enjoyment of the highest attainable standard of physical and mental health ("the right to health"; 2008–2014) have recommended the implementation of school food and nutrition policies to realize the right to health and the right to food *(142–144)*. In 2014, the Special Rapporteur on the right to health called for governments to implement their obligations regarding children's right to health *(143)*. With a view to respect, protect and fulfil the right to health, the Special Rapporteur urged governments to "regulate the marketing of such foods [fast foods and drinks high in sugar and caffeine] and control their availability in schools", and ensure that "healthy food options [...] are available at institutions serving children" *(143)*. In accordance with their obligation to respect, protect and fulfil the right to adequate food for all, the Special Rapporteur on the right to food called on governments in both 2011 and 2014 to "use public procurement schemes for school-feeding programmes and for other public institutions" *(142, 144)*. In 2016, the Special Rapporteur on the right to food (2014–2020) described school food and nutrition policies as regulatory measures taken by governments: "to encourage increased consumption of healthy foods by children, some countries have implemented vegetable and fruit programmes at schools, imposed mandatory prohibitions on serving foods classified as unhealthy, and banned vending machines. Other initiatives include [...] prohibiting the sale of fast food within the immediate vicinity of schools and banning advertising and promotion of foods that do not meet certain nutrition standards" *(145)*.

General Comment 15 on Article 24 in the CRC on the right of the child to the enjoyment of the highest attainable standard of health also specifically mentions elements of school food and nutrition policies. For example, in accordance with paragraph 2c "to combat disease and malnutrition [...] through the provision of adequate nutritious foods and clean drinking-water", the Committee on the Rights of the Child wrote that "school feeding is desirable to ensure all pupils have access to a full meal every day, which can also enhance children's attention for learning and increase school enrolment" and recommends this to be "combined with nutrition and health education, including setting up school gardens". Further, to realize children's right to health, "States should also address obesity in children" and "children's exposure to 'fast foods' that are high in fat, sugar or salt, energy-dense and micronutrient-poor, and drinks containing high levels of caffeine or other potentially harmful substances should be limited. The marketing of these substances – especially when such marketing is focused on children – should be regulated and their availability in schools and other places controlled" *(146)*.

At a regional level, and with specific reference to the CRC, the Committee of Ministers at the Council of Europe adopted Resolution ResAP(2005)3 on healthy eating in schools in 2005. The resolution affirmed that "access to safe and healthy food is a fundamental human right" and recommended governments to "review the practices of food provision in schools to determine the extent to which these practices (or the absence of these practices) are compliant with, or are an integral part of, a health-promoting school approach" and to "consider the elaboration of national provisions and nutritional standards for the provision of food in schools". The resolution also recommended governments to consider the development of national and regional measures such as "start-up financial support and practical tools" to "support schools in the adoption and implementation of policies for healthy eating". In the appendix to Resolution ResAP(2005)3, the Committee of Ministers detailed the issues that national provisions could address, including developing nutritional standards;

promoting the consumption of fruit and vegetables; ensuring the provision of healthy alternatives for drinks; reducing the consumption of products high in sugars, salt and fats; actively managing the eating environment, including not only the dining room but vending machines and other food and drink outlets; developing policies concerning in-school marketing of food and beverages; and establishing pricing policies *(147)*.

Policies with a rights component

Some countries in Latin America (Bolivia, Brazil, Honduras and Paraguay) have laws driven by a rights-based approach to adequate food and education, to ensure that quality school feeding reaches its intended beneficiaries *(148)*. School feeding in Brazil has been a universal right of students enrolled in public primary schools since it was ensured by the Constitution in 1988 *(95)*. In 2009, adoption of the School Feeding Law expanded this to all students enrolled in basic education from the age of six months (including high schools, philanthropic schools, community schools, special education, and youth and adult education) *(95)*.

In Europe, countries have taken action on school food and nutrition policies through a human rights lens. A review that explored the foundation of a rights-based view of food at school from a European perspective found a "large number of provisions that can be invoked in support of measures at school which can contribute to ensuring healthier eating". The authors reported that some countries in Europe, such as Sweden, Finland and Estonia, have international rights provisions translated into national law that "makes children's right to free school food a legal right". The authors argued that the role of schools as a "protected place" (although most often from labour) can be seen as extending into protecting children from "unhealthy eating practices" *(149)*. In Wales, the Appetite for Life programme defines the strategic direction and actions required to improve the nutritional standards of food and drink provided in schools in Wales, and uses as its basis the CRC[1] *(150)*.

The Mid-day Meal Scheme (MDM Scheme) in India is referred to as "contribut[ing] [to the] right to food and also to the right to education" *(151)*. A study from India analysed the MDM Scheme from a rights perspective. The authors described the right to receive a midday meal in the school setting as a social right (as opposed to a civil or a political right). However, because social rights "have their origins in multilayered institutional settings", they found it difficult to pin down the causes of failures to respect these rights *(152)*. Parents, through School Management Committees, and teachers often exercised authority in representing the rights of children. School Management Committees (primarily parents) were aware of the rights of children, but channels to claim the rights are either not available or are very costly. Strongly unionized teachers were hugely empowered and often disregarded rights of students. There was a tendency to treat the MDM Scheme as "feed the poor" rather than a right. Students were increasingly aware of their rights in higher classes, but hierarchical relations did not provide space to claim them. Additionally, because reverence for one's elders is considered a virtue in the teacher–student relationship, students who assert their rights (to a meal of certain quantity and/or quality) are considered disobedient *(152)*.

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[1] It was not possible to obtain the original Appetite for Life Action Plan published by the Welsh Assembly Government in 2007. The information provided here is therefore from a secondary source, as referenced.

Impact on health (in)equity and health (in)equality

Intervention group 1: Nutrition standards or rules that determine the quality of food served or sold in and around schools

Most of the identified studies suggest that varying degrees of inequality remained after implementation of school nutrition standards and policies.

A study from England explored the impact of the 2008 nutritional standards for primary school lunches on socioeconomic inequalities. The findings suggested that the least deprived students were consuming more nutrient-dense foods from both school lunches and home-packed lunches than the most deprived students. Although some changes to the school lunch programme appear to have benefited children equally, and have led to a narrowing of socioeconomic inequality, the authors concluded that "important socio-economic inequalities in dietary intake remain" *(153)*.

After implementation of the Ontario School Food and Beverage Policy, food prices increased in some schools *(46, 154)*. In one study, interviews with students revealed how students compared themselves with others in terms of how often they could purchase food during school hours. The study found a link between what students could afford to eat at school and their self-image, and not having enough money to purchase food during school hours created a sense of stigma *(46)*. Another study noted that, although the cost of healthy food for sale was a concern across all participating schools, it was more pronounced in schools where a larger percentage of the school population was considered low income *(154)*. Both community- and school-level respondents reportedly observed the stigma that students experienced as a result of not having enough food and/or not having money to purchase food at school *(154)*.

"Substantial inequity in dietary environments across schools" despite "regulatory efforts to improve school food environments" were reported in Quebec. Less healthful schools (as categorized based on the cafeteria menu, whether healthy foods were for sale in school, and the number of fast food outlets and convenience stores in a 750-metre radius from school) were located in more deprived neighbourhoods and were associated with greater child adiposity *(155)*.

A study from the United States found disparities in acquisition of financial resources across participating schools of different socioeconomic and sociodemographic status. Schools located in low-income areas, in areas with a larger share of minority populations, and outside the metropolitan areas were disadvantaged in terms of funding to support healthier built-in nutrition environments (e.g. purchasing food procurement equipment such as combination ovens/steamers). Obtaining funds was associated with a reduction in the probability of serving fried foods. The study also found that the odds of obtaining funds increased almost proportionally with the enrolment size of schools *(156)*.

Before implementation of the Texas Public School Nutrition Policy, students with low socioeconomic status (SES) reported higher intakes of vitamin C, calcium, vegetables and milk, and lower intakes of fat as a percentage of total energy, sugar-sweetened beverages (SSBs) and candy than middle-SES school students. Following implementation of the policy, middle-SES students consumed more protein and milk and fewer SSBs than low-SES students. The authors explained these results by changes in the source of lunch foods before and after policy implementation (i.e. through the United States National School Lunch Program – NSLP, snack bar and vending machines). For example, following implementation, middle-SES students consumed more nutrients and vegetables from the NSLP and fewer from the snack bar and vending machines. Full-pay reimbursable lunch meals (through the NSLP) increased in the included schools by 143% following implementation; the authors suggested that this could be attributed to middle-SES students selecting the reimbursable meals when snack bar and vending machine selections were reduced. The authors concluded that,

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overall, low-SES students consumed more healthy lunches at school than middle-SES students *(157)*.

One study in the United States found that disparities were largely eliminated when new standards were implemented as part of the NSLP in 2012 (mandated by the HHFKA) *(158)*. Before implementation, the study found multiple differences in NSLP meals according to school characteristics, particularly student race/ethnicity. Students attending schools where the student body was predominantly Caucasian were more likely to have NSLP meals that were SSB-free and to be offered non-fat milks, fruits and vegetables, and whole grains daily. The authors reported that these disparities in the quality of NSLP nutrition for students across schools (before implementation of the new standards) likely resulted from a combination of variation between states in school meal requirements and variation between school districts in implementing the current United States Department of Agriculture (USDA) standards.

Intervention group 2: Marketing restrictions on unhealthy foods and non-alcoholic beverages in and around schools

A few United States studies have examined exposure to marketing of FNABs in and around schools according to SES. One study found higher exposure among low-SES schools *(159)*, and another study found evidence of an opposite association *(160)*. A third study, looking at policies restricting marketing of FNABs, found no difference in mean number of locations where marketing was banned according to SES *(161)*. Similar inconsistent findings have been identified for ethnicity *(159–163)*.

A systematic review of FNAB marketing in schools found that exposure was higher in secondary/high schools than middle/elementary schools, and among schools with lower SES than higher SES *(164)*.

A study on food and beverage marketing policies across school districts in the United States found differences in policies according to ethnicity, student expenditure and urban versus rural classification. For example, a higher percentage of districts whose student populations were minority non-Hispanic white and a higher percentage of districts with higher annual expenditures per student prohibited soft drink companies from advertising soft drinks in school buildings and on school grounds, compared with districts that had majority non-Hispanic white student populations and lower annual expenditures per student, respectively. A higher percentage of urban districts than suburban or rural districts prohibited soft drink companies from advertising on school grounds *(165)*. Similarly, another United States study found that the mean number of locations in which advertisements for candy, fast food or soft drinks were banned was higher in urban and suburban schools than in town and rural schools *(163)*.

Intervention group 5: Direct food provision to students in schools

Provision of food in schools seems to improve equity among students *(116, 166–175)* and reduce stigmatization *(176, 177)*.

In an evaluation of the Free School Meals pilot in the United Kingdom, the authors found that improvements in school attainment in the universal pilot areas tended to be strongest among students from less affluent families[1] and among those with lower prior attainment. Although the effects for students with different characteristics were not always significantly different from one another, the authors argued the findings provided some "suggestive evidence that the universal pilot may help to reduce educational inequalities". School staff in the qualitative case studies also

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[1] "Students from less affluent families" refers to both the students who were eligible for the free school meal under the criteria in effect before the implementation of the pilot and the students who were newly entitled under the extended entitlement criteria introduced in the pilot.

noted that the pilot had a "levelling effect" on the quality of lunches eaten by students from different backgrounds; the implication was that, although the quality of packed lunches varied considerably by socioeconomic background, all students taking school meals had access to a nutritious, balanced meal, thus reducing socioeconomic differences in the quality of food eaten at lunchtime *(116)*.

Students from economically and socially disadvantaged households, especially girls, have benefited the most from the MDM Scheme in India in terms of quantity and quality of food consumed *(166)*. Increased school enrolment and attendance were also attributed to the provision of school lunch *(166)*. Parents consider the scheme as an economic incentive for sending their children to school *(166)*. In addition, the MDM Scheme has provided employment opportunities, especially for women. The Supreme Court of India stated in 2001 that the scheme should focus on women, especially when appointing cooks and helpers. Consequently, many women, especially from disadvantaged groups (such as widows) have been employed *(107, 167)*.

In an analysis of inequity considerations for school food programmes in Canada, the interviewed participants (parent volunteers, teachers and principals) acknowledged that some families would not ask for support (subsidies or food provided at no cost) and may send their children to school with food or money to purchase lunch, to ensure that they do not appear different from other children. The authors concluded that "further illumination of programs may be needed to ensure that they do not contribute to the stigmatization and social exclusion of families experiencing food insecurity" *(178)*.

A study from Japan with 5th grade students examined differences in the association between household income and food and nutrient intake between days with and without school lunch. The study found that, on days without school lunch, students from homes with a lower household income level had a lower intake of fish/shellfish, green vegetables and sugar; a lower intake of protein and several micronutrients; and a higher energy intake from carbohydrates. On days with school lunch, the study found no difference in food group intake and nutrient intake according to household income level. The authors concluded that the school lunch programme may reduce diet disparities between students from households with different incomes *(168)*.

A few studies have looked at the effects of provision of free fruits and vegetables in schools. A study from Norway evaluated the effect of an intervention providing free fruit for one year to elementary school students. The study found an overall increase in fruit and vegetable consumption, and a decrease in consumption of unhealthy snacks among students with less-educated parents. The effects were not observed among students with more-educated parents *(172)*. A similar study reached the same conclusion: providing fruit for free reduced the consumption of unhealthy snacks among students with less-educated parents, but not among students with more-educated parents *(173)*. Another study evaluating the same intervention after one year of follow-up found no differential effects according to parental education level or household income of providing fruits and vegetables for free *(174)*. Referring to the intervention, a government report concluded that "a scheme that reaches all children and young people because it is free can help even out social inequalities in intake of fruit and vegetables" *(175)*. A study from the Netherlands also studied free fruit and vegetable provision. It found that, for fruit intake, students of non-"Western" ethnicity profited less from the intervention than students of Dutch ethnicity, whereas, for vegetables, the intervention appeared to be more effective among students of non-"Western" ethnicity *(171)*.

A United States study assessing diet quality in federal nutrition assistance programmes found that, among children who were eligible to receive lunch at no cost through the NSLP (i.e. from low-income households), the school lunches provided better nutritional value than lunches obtained elsewhere (i.e. brought from home, obtained from someone else, obtained from a vending machine, or bought outside school grounds but consumed on school premises) *(169)*. Furthermore, a survey

on adolescent students' frequency of fruit and vegetable intake in New Hampshire and Vermont public schools found that obtaining food at school was associated with higher intake of fruit and vegetables among students from low-income households than among students from high-income households. The authors concluded that school food mitigated income disparities in the study *(170)*.

A study examining the relationship between availability of the United States School Breakfast Program and household food security among elementary school students from low-income households found that access to school breakfast reduced the risk of marginal food insecurity (i.e. offset food-related concerns among at-risk families) but not the risk of food insecurity at the standard threshold *(179)*.

A qualitative study from Australia examined the impact of a breakfast programme using donated food[1] in a public primary school in New South Wales in an area of socioeconomic disadvantage. The study found that the programme created an "equitable, supportive environment beneficial for low income or food insecure families". Teachers reported reduced stigma associated with provision of free breakfast for all students at school (not just disadvantaged students) *(176)*.

A qualitative study from Greece evaluated an intervention providing food vouchers versus free daily meals aimed at reducing food insecurity and promoting healthy eating among students attending public schools in socioeconomically disadvantaged areas. Focus group interviews with parents, educators and school principals revealed that social stigmatization was minimized in the approach that provided free daily meals, through the participation of all students, compared with the food voucher intervention, where participants reported feelings of embarrassment and fear of stigmatization. The study also found that the meal distribution approach alleviated child food insecurity through the provision of the daily meal, while food vouchers helped manage household food insecurity (as vouchers were mainly used for purchasing food for family meals) *(177)*.

Policies with an equity and equality component

In 2007, the government of Norway set itself a goal of introducing a system of fruit and vegetables for all students in primary and lower secondary schools, with the stated objective of reducing social inequalities in health behaviour *(175)*.

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[1] The breakfast programme "Breaking Bread, Breaking Barriers" ran for two consecutive school terms and was designed to address two priority issues: poor breakfast consumption before school, and the large amounts of food waste generated in society in general. The programme was delivered by a not-for-profit organization, which collected donated food from supermarkets and small local businesses that would otherwise have been discarded.

Factor 4: Acceptability

This section presents a narrative synthesis of the literature identified to assess the acceptability of school food and nutrition policies to promote healthy diets. Literature was synthesized for each of the five intervention groups according to the following criteria: acceptability to governments and policy-makers, acceptability to the public (including parents), acceptability to students, acceptability to school-based stakeholders, acceptability to industry, and environmental acceptability. Findings from the synthesized literature were grouped into themes under each of the criteria, where possible. For the purpose of this review, "acceptability" was interpreted as support for a policy, expression of a need for a policy or for strengthening existing measures, or preference for such a policy compared with other measures.

The majority of studies that assessed acceptability of school food and nutrition policies to promote healthy diets were conducted in high-income countries (Australia, Canada, the United Kingdom and the United States). Studies found wide-ranging support for policies to restrict unhealthy food and beverages sold or offered in and around schools, and/or to ensure that healthy options are available. A few studies found that support increased over time.

Intervention group 1: Nutrition standards or rules that determine the quality of food served or sold in and around schools

General acceptability for intervention group 1

The results of public consultations and surveys on proposed updates to nutrition standards in schools were mostly favourable, reflecting the acceptability of proposed updates. In England, the overall response to the consultation on revised standards for school food in 2014 was positive, with respondents[1] "generally pleased to see that the revised standards appeared simpler to implement" *(180)*. A case study from Mexico reported wide public support for proposed school food regulations during the country's public hearing, with two thirds of comments in favour[2] *(181)*. Evaluations of the Western Australian Healthy Food and Drink Policy found that, despite some high-publicity opposition to the policy, major stakeholders were highly supportive of the policy and its aim of improving children's diets *(182, 183)*.

Results were more mixed in the United States. One study analysed public comments received on the USDA's 2013 proposed nutrition standards on competitive foods in schools. "Competitive foods" are defined as foods sold at the same time as NSLP foods are available, thus competing with participation in school meal programmes. For a randomly selected sample of all comments received (which included comments from individuals, schools, school food services, the food industry, government and nutrition professionals), the authors coded comments for explicit support for, or opposition to, the proposed rule. One quarter of comments contained explicit support, while 18% of comments opposed the proposed rule *(184)*. Fifty-seven per cent did not express explicit support or opposition, but rather discussed concerns or included suggestions for change. Also in the United

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[1] Respondents to the consultation were identified as representatives from the main teacher unions, national organizations or charities working in school food; parents; local authorities; catering managers; food manufacturers and suppliers; governors; and schoolteachers.

[2] In 2010, the Government of Mexico developed its *General guidelines on the sale and distribution of prepared and processed food and beverages in schools that make up the national educational system*, which were made more stringent in 2014. The guidelines, which are mandatory, prohibit ultra-processed food products from being sold in schools from Monday to Thursday. On Fridays, only ultra-processed products that comply with certain nutritional criteria are permitted.

States, a content analysis of national print, television and public radio news coverage on the HHFKA identified both a supportive and an opposing narrative based on a number of themes. The overall supportive narrative argued that, although the HHFKA is making important, needed and positive strides in changing the types, quality and preparation of foods served at schools, more work will be needed to ensure that the policy can fully reach its potential to improve children's nutrition and reduce health disparities. The opposing narrative argued that the policy contributes to food waste, overburdens schools and districts struggling to meet the requirements, and is another example of the federal government compromising local control and parental autonomy *(167)*.

Northern Ireland has published a consultation document on draft updates to the nutritional standards on school food, seeking comments on a number of proposals aiming to ensure that all food provided in grant-aided schools is aligned with government guidance on healthy eating *(86)*. Analysis and outcomes of the consultation were not yet available at time of this review.

A survey among public school principals in British Columbia, Canada, found that elementary schools had greater support than middle or high schools from parents, staff, students and the larger community for enacting stricter school nutritional guidelines *(185)*.

Acceptability to governments and policy-makers

Only two publications were identified that assessed acceptability among government stakeholders. A content analysis of national print, television and public radio news coverage on the HHFKA in the United States found that some government representatives opposed the policy, arguing that the federal government encroached upon local and parental authority by imposing regulations on the foods that schools serve *(186)*. In Latvia, a qualitative study examined stakeholder positions on the food and drink environment in schools in 2004, before the Latvian Government banned certain foods and drinks from schools in 2006. The study found that "government was considered supportive but only moderately influential, mainly due to a lack of leadership in nutrition policy" *(187)*.

Acceptability to the public (including parents)

A qualitative systematic review on the role of primary schools in preventing childhood obesity in high-income countries identified conflicting opinions among parents on whether or not schools should impose restrictive measures on less healthy foods (served, sold or brought from home) *(188)*. Many other studies found that the majority supported establishing standards for foods and beverages in schools. One study found that a key supporting factor for wellness policies was a concern for children's health *(189)*. Some parents welcomed the idea of food rules because it allowed them to use the school's rule to reinforce their own views *(188, 190)*.

In Australia, strong support was identified among parents for the Western Australian Healthy Food and Drink Policy *(183)*, and the majority of parents (76%) with children at private schools in Australia agreed that the foods sold in the canteen should meet the National Healthy School Canteens guidelines *(191)*. Other surveys in Australia reported that the majority of participants supported banning sales of foods high in salt, fat and sugar *(192)*, and of SSBs in schools *(193, 194)*. In one survey, the majority of participants agreed that foods and beverages should be healthier and vending machines with confectionery should be banned, and just over a third of participants agreed that "governments should pass regulations to prevent schools selling unhealthy foods and drinks" *(195)*. In Dutch primary schools, most parents supported the school food policies in place in their child's school, which detailed which foods and beverages could be brought to school, and served and sold at school *(196)*.

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Two studies from India examined the perspectives of teachers and parents on current school food environments and policies in private English-speaking secondary schools, and found that the majority of participants recommended that school canteens should increase the availability and accessibility of healthy foods, while reducing the availability of unhealthy foods *(56, 197)*. For example, 83% agreed that a "written canteen policy is essential to improve school food", and 82% agreed that a school policy should restrict the availability of unhealthy foods and beverages *(197)*.

In Canada, the majority of surveyed parents (79%) supported establishing nutrition standards for school cafeterias; only 3% opposed them *(198)*. A study from British Columbia found that principal-reported parent support for nutrition policies increased over time (2007–2008 to 2011–2012) in both elementary and middle/high schools *(199)*. A study in the United States also found that satisfaction among parents improved after the addition of healthier options and substitution of healthier ingredients at high school sports concession stands *(200)*.

A qualitative study from Latvia found that high school directors, primary school directors and parent groups contributed to decisions about the food and drink environment in schools by campaigning actively for the removal of soft drinks. The study found that these three groups were the most influential and supportive stakeholders of this initiative out of larger groups of interviewed stakeholders, including government and its agencies, local governments, nongovernmental organizations, industry, and academic and research institutions. After the study was conducted, the Latvian Government banned certain foods and drinks from schools, and the authors of the study concluded that this "surprisingly strong movement of teachers and parents" helped pave the way for the government ban *(187)*.

Studies from the United States showed that the majority of respondents were supportive of school nutrition policies restricting the availability and sales of less healthy foods and beverages in vending machines and cafeterias *(201, 202)*; increasing the availability of fruits, vegetables and low-fat milk *(203–205)*; and using public funds to do so *(204)*.

Those who opposed nutrition standards had concerns that regulating the types of foods allowed in schools and limiting menu options led to children being less satisfied *(183)*, not eating at school *(188, 190)*, or having to bring food from home if unhealthy foods were not adequately replaced by other options *(206)*. Furthermore, some parents felt that regulation of foods and beverages available violated their rights *(190)*, that the underlying problem of children's poor dietary habits was not the responsibility of the school, and that schools were overstepping their boundaries *(205, 206)*. Another study in the United States found that, although parents were in favour of some parts of the HHFKA, the requirement to reduce sodium was unpopular because it made school food "unappealing and bland" *(203)*.

In addition to standards pertaining to the foods and beverages allowed in schools, a few studies mentioned public and parental perceptions of policies that restrict the sale of fast food near schools (i.e. exclusion zones). A citizens jury conducted in South Australia reported support for "regulation of physical activity and nutrition in schools, incl. zoning of fast food outlets around schools" *(207)*, and another survey found that the majority (63%) supported exclusion zones for fast food outlets near schools, mainly to "discourage people from buying unhealthy products" *(208)*. Opposition to exclusion zones was most commonly based on respondents' beliefs that education would be a more appropriate means of improving population nutrition *(208)*. A survey in New Zealand on support for 15 different measures to reduce overweight and obesity found that a proposed measure of "not allowing fast food outlets within 1 kilometre of schools" ranked third lowest out of the 15 proposed measures *(209)*. Although participants proposed decreasing access to unhealthy foods by limiting fast food outlets near schools as an intervention to address adolescent obesity in one study (conducted in two middle schools in California) *(210)*, a survey of adults in Los Angeles county

found that only 44% agreed that "there should be a law prohibiting fast food restaurants within a quarter-mile of schools" and only 37% agreed that "there should be a law prohibiting convenience stores within a quarter-mile of schools" *(211)*.

Sociodemographic variations in acceptability of the intervention

Some surveys reported variation in acceptability of interventions by different sociodemographic categories. In general, women were more likely than men to support policies that restrict the availability of unhealthy foods and beverages in and around schools *(193, 201, 208, 211)*, although two studies found no difference in support for a school food policy by gender *(192, 202)*. Higher levels of education were associated with support for nutrition standards, and restrictions on unhealthy foods and beverages in schools *(193, 201, 212, 213)*. The association between age and support for various nutrition policies was mixed. Whereas older age groups favoured prohibiting convenience stores near schools *(211)* and restricting sales of unhealthy foods and beverages in schools *(195)*, younger age groups were more likely to favour banning SSB sales at schools *(193)*. No difference was found between age groups for the statement "all schools should have school food policies which limit the kinds of foods that can be served at school" *(195)*. With regard to parental status (being a parent or not), one study found no difference in support for school food policies by parental status *(202)*, while another study found that respondents with children residing in the household were more likely to favour policies allowing only the sale of healthy foods and drinks in school vending machines and cafeterias *(201)*. Additionally, one survey found that Caucasians (compared with non-Caucasians) and people with higher household incomes (compared with lower household incomes) reported the lowest level of support for prohibiting fast food restaurants and convenience stores near schools *(211)*. Political orientation was also found to influence support for prohibiting schools from selling SSBs *(212)*.

Association between acceptability of the intervention and views on the food environment and perceived determinants of nutritional status

Two studies from the United States and three from Australia were identified that assessed the association between acceptability of the intervention and views on the food environment and perceived determinants of nutritional status. Participants with favourable attitudes towards soda companies were less likely to support prohibiting schools from selling SSBs in school *(212)*. Respondents who perceived obesity to be a result of a "toxic food environment" (with emphasis on the broader societal responsibility for the lack of availability of healthy foods at affordable prices) were more likely to support policies that "prov[ide] funding to public schools to make fresh fruit, vegetables, and low-fat milk available for free at school lunches", and "eliminat[e] fast-food and soft-drink concessions from our public schools and to use federal tax dollars to compensate the schools for the revenues they now make on these concessions" *(204)*.

The Australian studies found that participants who agreed with the statements "SSB every day causes health problems in adults" and "SSB every day causes health problems in children" were more likely than those not agreeing with the statements to favour bans of sales of SSBs in schools *(193)*. Opposition to exclusion zones was most commonly based on respondents' beliefs that education would be a more appropriate means of improving population nutrition *(208)*. The belief that the policy ignored parents' rights to choose their children's food was more likely among parents residing in metropolitan areas than among those in rural areas *(183)*.

Acceptability of school food and nutrition policies compared with other interventions to promote healthy diets

School nutrition policies were generally viewed more favourably than some other interventions to promote healthy diets. For example, support among a nationally representative sample of adults in the United States for policies to reduce SSB consumption was highest for calorie labelling of SSBs (65%), followed by prohibiting schools from selling SSBs on school property (62%), prohibiting marketing of SSBs on children's programmes (50%) and SSB taxes (22%) *(212)*. Adults also reported being more in favour of regulating the availability and sale of foods and beverages in school vending machines and cafeterias than restricting marketing to children or increasing taxes on unhealthy foods *(201)*. Similar results were found in a study from Turkey, in which support was highest for school nutrition policies, marketing and labelling policies, and subsidies on healthy foods, and lowest for taxes on junk food and SSBs *(213)*. A survey from Canada also assessed support for different nutrition policies and regulations, and found that the majority of participants supported nutrition standards for school cafeterias (79%) and breakfast or lunch programmes in schools (80%) *(198)*.

In contrast, a 2011 public opinion survey in the European Union that examined support for various policy measures to address childhood overweight and obesity found that enhancing school meals with the aim of improving children's diets was the preferred choice of only 10% of the participants. Hungary and the United Kingdom stood out, with support considerably higher than the European Union average: 26% and 24%, respectively, chose enhancing school meals as the preferred choice. Support for enhancing school meals was lower (preferred choice of 8%) when the purpose was to reduce childhood obesity. For the goal of reducing obesity, the study found that the most supported policy measures were more physical activity in schools and more health education in school. The authors concluded that "except in the [United Kingdom] and Hungary, support for school-based interventions did not include school meals" *(214)*.

Zoning restrictions near schools typically received less support than labelling policies, but more support than taxes on unhealthy foods and beverages *(198, 208, 209)*. In New Zealand, the proposed measure of "not allowing fast food outlets within 1 kilometre of schools" received third lowest support of 15 different measures to reduce overweight and obesity, and ranked lower than measures such as food labelling, reducing the price of fresh fruits and vegetables, and restricting the marketing of unhealthy foods, but received greater support than a 20% tax on foods high in sugars or fat *(209)*. A survey from Canada assessed support for different nutrition policies and regulations, and found higher levels of support for various labelling policies compared with taxes, zoning restrictions around schools and various restrictions on marketing. "Restrict[ing] the number of fast food restaurants near schools" and "restrict[ing] the number of convenience stores near schools" received support from 38% and 25%, respectively *(198)*. Similarly, a survey in South Australia found highest support for front-of-pack labelling, followed by exclusion zones for fast food outlets near schools, and lowest support for taxes on unhealthy foods and SSBs *(208)*. The opposite was found in one United States survey, where restricting unhealthy food and beverage advertising and a tax on SSBs "as a way to discourage kids and others from drinking too many of them" received higher levels of support than prohibiting fast food restaurants and convenience stores near schools *(211)*.

Acceptability to students

Overall, the acceptability of nutrition standards and restricting the sale of unhealthy foods and beverages in schools was lower among students than among parents and the public. Students were generally supportive of efforts to provide healthier foods *(41, 42, 49, 51, 215–218)*, with primary students more positive than secondary students *(215)*. Some studies found that acceptability increased over time: students were not happy with the new policies at first but grew to appreciate the

healthier choices and eventually liked the new lunches *(199, 205, 219)*. In a few cases, the majority of students believed that unhealthy options should be taken out completely to promote healthy eating *(51)* and that only healthy foods should be served or sold *(42)*.

Efforts to promote healthy eating were more acceptable to students than policies that restrict or ban unhealthy options *(216, 220)*. Many students agreed that policies such as banning the sale of soft drinks in schools *(221)* or mandating daily provision of fruit and vegetables *(39)* would be effective and encourage healthier eating behaviours.

Many students raised principled objections, such as the importance of having personal choice and freedom, and that the government does not have the right to impose such policies *(39, 41, 49, 51)*. Another common negative response was that school food standards and restrictions would limit their options and not align with their food preferences *(49, 50, 215)*. If the available options were too limited and did not meet their preferences, many students indicated that they would buy food from shops outside school or bring it from home *(215, 222, 223)*. In one study in the United Kingdom, students suggested that the black market for certain products (e.g. cookies, energy drinks, chocolate bars) was an active response to the new legislation and school policies *(222)*. Another criticism was the high price of healthy foods and the few remaining "nice" options *(222)*. The surveyed students wanted the freedom to choose from a range of appealing and affordable foods and beverages *(49)*.

Association between acceptability of the intervention and views on the food environment and perceived determinants of nutritional status

A study examined the impact and acceptability of two district-level school nutrition policies in Los Angeles – banning sales of soft drinks and foods of limited nutritional value or junk foods through vending machines, and direct sales to all students during the school day[1] – among students in grade 12 in two high schools. It found that students who perceived that the policies led them to consume fewer of the banned items both at school and outside of school were more likely to support ("agree with") the policies *(224)*. The study also found that more female students than male students supported ("agreed with") the policies.

Acceptability to school-based stakeholders[2]

Overall, most studies found that school-based stakeholders were supportive of establishing nutrition standards in schools *(44, 182, 183, 187, 191, 197, 203, 218, 225–234)*, and some reported an increase in support over time. In a study examining school-level changes associated with implementation of the Guidelines for food and beverage sales in British Columbia schools, principal-reported staff support for nutrition policies increased over time (2007–2008 to 2011–2012) in both elementary and middle/high schools. However, support among principals decreased in elementary schools, and no changes occurred in middle/high schools *(199)*. After implementation of the Healthy Food and Drink Policy in Western Australia, stakeholders were highly supportive of the policy *(226, 227)*, and supportive of potential expansions to a new school food policy *(227, 228)*. Many principals agreed that the policy allowed them to introduce changes they already wanted to make *(183)*, and, a few years after its implementation, their largely positive expectations were met *(182)*. A few studies from low- and middle-income countries were identified as well. Most respondents from private,

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[1] The Los Angeles Unified School District (LAUSD) adopted the Healthy Beverage Resolution in August 2002, which includes standards for the types of beverages schools can sell and when they can sell them. The resolution came into effect in January 2004. In October 2003, the LAUSD Board of Education passed the Obesity Prevention Motion, which includes standards for foods sold à la carte, in stores, in vending machines and at fundraising activities. The resolution came into effect in July 2004.

[2] School-based stakeholders include principals, teachers, food service directors, canteen managers and parents/citizens committees/associations (in Western Australia, parents and citizens associations/committees are typically tasked with managing school canteens in public schools).

English-speaking secondary schools in India agreed that a written canteen policy is essential to improve school food, and that a school policy should restrict the availability of unhealthy foods and beverages. Two of the school principals opposing a written policy feared that such a policy "might not be suitable for their environment". Similar to other stakeholder groups, school-based stakeholders were more supportive of establishing standards, restricting unhealthy foods and providing healthy food options, but less supportive of outright bans on unhealthy foods *(235)*.

Studies from the Netherlands and Latvia found that school-based stakeholders were supportive of even stricter policies. In the Netherlands, school food professionals were supportive of stricter policies on school food, and highly supportive of a scenario involving 100% healthy food in school canteens and vending machines *(44)*. In Latvia, high school directors, primary school directors and parent groups contributed to decisions about the food and drink environment in schools by campaigning actively for the removal of soft drinks. The study found that these three groups were the most influential and supportive stakeholders of this initiative. After the study was conducted, the Latvian Government banned certain foods and drinks from schools, and the authors of the study concluded that this "surprisingly strong movement of teachers and parents" helped pave the way for the government ban *(187)*.

Despite their general support, school-based stakeholders raised many concerns. For example, when the Healthy Food and Drink Policy in Western Australia was first introduced, around 2000 complaints were received, which largely originated from parents, canteen workers and school staff. These focused on concerns about the removal of some of children's favourite foods from the menu, the cost implications of replacing high-margin processed foods with more labour-intensive healthy options and the implications of these two factors for the viability of school canteens *(182, 183)*. In a study on the Ontario School Food and Beverage Policy (P/PM 150), some respondents[1] indicated that the policy guidelines were too restrictive, and that secondary students should be given the option to make food-related choices on their own and in moderation *(154)*. School stakeholders from rural elementary schools in the United States were positive towards some parts of the standards mandated by the HHFKA, particularly the required increases in availability of fruits and vegetables, but the requirement to reduce sodium was unpopular because it made school food "unappealing and bland" *(203)*. School staff in England worried that parents might oppose the standards and provide children with packed lunches or money to buy snacks outside school, rather than encouraging them to buy school meals *(41)*. Additionally, some teachers voiced concerns about the standardized portion sizes for every student, reporting that some students went hungry and others threw away food because they were served more than they could eat *(203)*. Some teachers also complained that the policy did not allow them to reward students with low-nutrition snacks or to rely on these foods for fundraising, but many teachers were reportedly adjusting to the new policy by finding new tokens or treats *(205)*.

Studies revealed that school staff and food service directors from rural areas tended to view nutrition standards more negatively than those from urban areas *(236, 237)*. Principals, and parents and citizens associations from rural and remote schools in Queensland, Australia, were less likely to report positive attitudes towards the implementation of the Smart Choices programme than urban school principals *(236)*. This could be due to greater implementation challenges in more remote areas, where the availability of healthy foods is limited and costs may be higher. In the United States, a study on the implementation of the HHFKA in rural school districts found that food service directors differed in their opinions of the policy, but that "negative attitudes prevailed" and implementation was perceived as challenging and burdensome *(237)*.

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[1] Participants in the study included secondary school principals, vice-principals and teachers, and community-level participants (from a local public health unit and community agencies with mandates supporting school nutrition).

Once again, stakeholders questioned the school's role and responsibility in promoting a healthy diet *(41, 154, 205)*. In a qualitative study conducted in England before implementation of the school food standards in 2007, some staff were extremely pessimistic about the likely success of the reforms unless parents were equally involved in supporting schools' efforts to improve children's nutrition and promoting healthy eating at home *(41)*. They voiced frustration that schools had to assume ever-increasing responsibility for health matters that should be the responsibility of parents and that, by targeting the school environment for its interventions, the government was absolving parents of their duty. In the United States, some respondents felt strongly that responsibility for school nutrition was at the school level, while others felt that, regardless of what schools are doing to promote healthy eating in schools, primary responsibility needs to lie with parents *(154)*. Similarly, participants in a Canadian study thought that parents should play a more important role in the feeding of their children. Some argued that, although poor nutrition was a significant issue, schools were not responsible for these problems, and parents should teach their children healthful eating behaviours *(205)*. Furthermore, principals of elementary schools in Prince Edward Island, Canada, expressed frustration with the burden placed on schools to promote healthy eating while "outside agencies" (e.g. convenience stores, fast food outlets) continued to sell unhealthy foods to children *(238)*.

Some school staff and food service directors noted the need for a comprehensive and well-coordinated approach, and effective monitoring. All participating food service directors in a United States study felt that the standards (mandated by the HHFKA) in isolation were insufficient to make a meaningful impact on students' health, stating that efforts must expand beyond the cafeteria and the school food environment *(232)*. After implementation of the new school food standards in England, staff from schools in which a coordinated approach was taken – including creating working partnerships (e.g. with Healthy Schools Coordinators) – reported positive experiences and feedback *(230)*. However, negative views prevailed among staff in schools with a "health-related policy vacuum", who regarded the new standards as evidence of the "nanny state encroaching on school management". Also in England, staff from secondary academies[1] thought that standards were a good idea, but many questioned their effectiveness if they were not compulsory and no one was monitoring them either internally (e.g. the caterer) or externally *(229)*.

Acceptability was highly variable among food service directors, canteen managers, cooks and caterers. Canteen managers were the least likely to agree that it was difficult to implement the Healthy Food and Drink Policy in Western Australia *(183)*. In the United Kingdom, the vast majority of school cooks (90%) and caterers (80%) thought that the revised standards were easier to understand than the current standards, and 80% of school cooks and caterers thought that they would provide more flexibility *(239)*. In a study conducted in primary schools in northern England following the introduction of the Universal Infant Free School Meals scheme, catering managers reported that the standards and guidelines were acceptable, but their preference was to give students a meal they would consume *(39)*. In the United States, food service directors and community health coalition members agreed (79% and 89%, respectively) that schools should meet federal nutrition standards (mandated by the HHFKA) to receive funding; however, only 38% of school food service directors and 40% of community health coalition members believed that implementation of the HHFKA by schools was realistic *(233)*. Some school-based stakeholders responded to the mandatory directive in British Columbia with feelings of aversion to being told what to do. This drove them to either ignore the guidelines, continue with business as usual, or find ways to circumvent the guidelines *(240)*.

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[1]   Academies are schools in England that are independent of control by local authorities and directly funded by the central government (Department for Education). Academies were previously, and at the time of the referenced report, exempt from the compulsory school food standards introduced in 2006. Currently, academies are expected to comply with the requirements of the School Food Regulations 2014; this is an explicit requirement in funding agreements with the Department for Education.

Acceptability to industry

Acceptability to industry was lower than acceptability to other stakeholder groups. A qualitative study from Latvia reported that the food and drink industries were "less supportive" of removing soft drinks in schools *(187)*. Industry also opposed the development of school food regulations[1] by the Ministry of Health in Mexico; this was seen in comments received during the public consultation, and during hearings and negotiations between industry and the Ministry of Health and the Ministry of Education *(181)*. In the United States, a content analysis of national print, television and public radio news coverage focusing on federal school foods legislation (the HHFKA) revealed opposition by food and beverage industry representatives, who argued, for example, that students were not accepting the new, healthier foods *(186)*. Also in the United States, a case study on the HHFKA reported decades-long industry opposition to "getting unhealthy food out of school[s]", but concluded that, "after years of work, even the beverage industry and many food companies came around to support a robust national school food policy" *(241)*.

A qualitative study from the Philippines found examples of the food industry compromising policy processes on provision of healthy school food and marketing restrictions, claiming that these policies had low acceptability *(242)*.

Environmental acceptability

Greenhouse gas emissions

A modelling study found that the adoption of new mandatory food-based standards for school meals in primary schools in England would increase total greenhouse gas emissions associated with primary school meals by 22 million kg of CO_2 per year *(243)*.

Waste

All studies identified that addressed waste were conducted in the United States. Most identified increased plate waste as a result of revised school food policies. One study measured food consumption and waste in middle schools in an urban, low-income school district before and after the updated nutrition standards of the NSLP (mandated by the HHFKA) and concluded that the updated nutrition standards appeared to have lowered plate waste in school cafeterias. Specifically, the study found that students consumed more fruit, threw away less of the main meal and vegetables, and consumed the same amount of milk *(244)*. In contrast, a study conducted in elementary schools found that a policy requiring that fruits and vegetables be placed on each student's tray (compared with not requiring it) led to an extra 0.7 serving of fruits and vegetables being thrown away per lunch served, even though the number of students who ate a serving of fruits or vegetables increased (from 20% to 28%) *(92)*. Many food service directors from school districts throughout the United States perceived that the fruit and vegetable requirement (i.e. that students must take a fruit and a vegetable) in the revised school meal standards mandated by the HHFKA led to initial increases in plate waste *(232)*.

Fruit and vegetable waste in Los Angeles middle schools was considered substantial after a new district-level school food and nutrition policy was introduced in 2011. However, because of the study's cross-sectional design, the authors did not compare findings after the changes with waste data before the changes *(245)*. In another study, plate waste before and after changes to the nutrition standards for the NSLP was assessed in three elementary schools of varying socioeconomic status

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[1] In 2010, the Government of Mexico developed its General guidelines on the sale and distribution of prepared and processed food and beverages in schools that make up the national educational system, which were made more stringent in 2014. The guidelines are mandatory and prohibit ultra-processed food products from being sold in schools from Monday to Thursday. On Fridays, only ultra-processed products that comply with certain nutritional criteria are permitted.

in Texas. The study found that the average percentage plate waste increased from 52% before to 58% after the changes in the standards, indicating, according to the authors, that high amounts of plate waste were a problem both before and after the implementation of the new standards *(246)*. One study estimated the cost of food waste and found that more than US$ 400 000 worth of food (26% of the total food budget) was discarded by the middle school students annually at lunch in the schools *(247)*.

Intervention group 2: Marketing restrictions on unhealthy foods and non-alcoholic beverages in and around schools

Acceptability to governments and policy-makers

Several government policies, strategies and guidelines were identified that mentioned restrictions on marketing, sponsorship, advertising, or promotion of unhealthy foods and beverages in schools *(248–258)*. The existence of these policies suggests acceptability to governments and policy-makers.

Acceptability to the public (including parents)

An analysis of two national public opinion surveys conducted in the United States found that the lowest level of support among parents was for policies allowing school boards to raise funds by selling advertising space on school grounds and buses *(202)*. The majority (78%) of "lay people" surveyed on their views on school food policies in Australia agreed that "food companies should not be allowed to market high-energy and high-fat products at school", but only 30% agreed that sponsorship of school activities by food companies should be banned *(195)*.

Sociodemographic variations in acceptability of the intervention

A positive association was found between age of Australian "lay people" surveyed on school policies and agreement that "food companies should not be allowed to market high-energy and high-fat products at school"; however, there was no variation by age in agreement that sponsorship of school activities by food companies should be banned *(195)*. Women were more likely than men, and non-tertiary-educated respondents were more likely than tertiary-educated respondents to agree that "food companies should not be allowed to market high-energy and high-fat products at school" *(195)*.

Association between acceptability of the intervention and views on the food environment and perceived determinants of nutritional status

In the analysis of two national public opinion surveys in the United States, attributing greater responsibility for childhood obesity to parents was associated with less support for allowing more food marketing on school grounds and buses. No difference by parental status or gender was observed *(202)*.

Acceptability to school-based stakeholders[1]

In general, school-based stakeholders appeared to support banning marketing of unhealthy foods in schools. These included school administrators in Maine *(259)*, and kindergarten and school teachers of a Native American Indian reservation school in the United States *(225)*. The majority (83%) of school board members in the United States supported limiting and monitoring food and soda advertisements in school, but they were less supportive (52%) of banning food and soda advertisements in school *(235)*.

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[1] School-based stakeholders include principals, teachers, food service directors, canteen managers and parents/citizens committees/associations.

A study on food marketing in Irish schools found that only 7% of surveyed schools (in 2005) had a policy on commercial sponsorship, but school staff would welcome receiving guidance and support in developing such policies *(260)*. Half of the school staff agreed or strongly agreed that they have moral reservations about the commercial sponsorship of school activities. About half agreed or strongly agreed that the teaching staff are generally opposed to the commercial sponsorship of school activities and the promotion of company images on school premises (47%), that sponsorship should be restricted in schools (53%), and that they believed themselves to be reasonably competent to negotiate sponsorship deals with for-profit organizations (57%). Fewer teaching staff reported that they would like their school to receive more commercial sponsorship (27%) or thought that there should be more sponsorship activities (20%) *(260)*.

When asked about how marketing should be restricted, the majority agreed or strongly agreed that there should be a voluntary school policy (83%), that there should be a self-regulatory code by industry (57%), that there should be a clear code of practice in relation to provision and content of vending machines in schools (92%), and that there should be a national code of practice in relation to industry sponsorship and funding activities in schools and local communities (87%). Almost half (48%) agreed or strongly agreed that there should be a legislative approach to change *(260)*.

Responses varied by type of respondent. For example, principals and vice-principals were the most positive about having a clear code of practice and voluntary school policies on industry sponsorship and funding of school activities, and they were more negative about legislative change than teachers. Interestingly, they were most likely to report that they felt they would be competent to negotiate sponsorship deals *(260)*.

Acceptability to industry

A qualitative study from the Philippines (with policy-makers and stakeholders involved in school food policy-making and implementation) found examples of the food industry compromising policy processes on provision of healthy school food and marketing restrictions, claiming that these policies had low acceptability *(242)*.

Intervention group 3: Nudging interventions promoting healthy food behaviour in the school environment

Acceptability to students

Only a few studies were identified on acceptability to students of nudging interventions in a school context to promote healthy eating. The scarce evidence base in this area is reflected in a systematic review from 2016, which concluded that a large knowledge gap exists in adolescents' attitudes towards nudging interventions (on vegetable consumption) *(261)*. The same research group subsequently conducted a study to explore attitudes towards using nudging in schools to promote healthy choices among Danish adolescents *(262)*. The study found that students considered it acceptable for the school to attempt to intervene in their health-related behaviour, but essentially saw it as neither the school's obligation nor responsibility. Students were generally most supportive of less intrusive interventions, such as posters, using celebrities to inform them of the health benefits of eating vegetables, changing names of healthy dishes to make them more appealing, and having canteen staff probe for more vegetables when serving lunch. They were more neutral towards automatically being given a green salad at lunch, and scare campaigns (e.g. showing examples of diseases with low vegetable intake as a risk factor). Students were less supportive of the school encouraging them to sign up for commitments (e.g. eating six fruits and vegetables per day), the canteen informing them about how many vegetables they eat compared with their peers, and posters showing that vegetable intake was associated with happiness and popularity, while intake of unhealthy food was associated with loneliness and sadness *(262)*.

A United States study examined the impact of providing point-of-purchase calorie information at a rural middle school in Oregon, and opionions about this intervention. The study found that students held positive attitudes towards the intervention. The majority of the students interviewed wanted nutrition information to guide their food decisions and facilitate healthier eating *(263)*.

In a qualitative study in New South Wales, Australia, students (aged 12–17 years) suggested that healthy options should be more attractively presented to encourage healthy eating *(51)*.

Students in Denmark participating in a fruit and vegetable programme, which provided free fruit and vegetables and a supportive, pleasant eating environment, appreciated the programme and that it was for everyone. Some pupils noted that it became a habit to eat fruit and vegetables in class, and that they affected each other's eating habits. Girls, in particular, highlighted the 'coziness' of sharing the fruit and vegetables, and being allowed to chat with each other while eating. Some girls perceived the implementation of the fruit and vegetable programme as getting an extra break, making schoolwork in class less boring *(264)*.

Acceptability to school-based stakeholders[1]

School staff participating in the Crunch&Sip programme to increase fruit, vegetable and water intake among primary school students in Western Australia were supportive and had a positive attitude about the programme in general *(265)*. A key element of the programme was to allocate time during class for consumption of fruit and vegetables. Most staff members (77%) agreed that it was appropriate for schools to implement fruit and vegetable breaks during class time, and less than 10% disagreed with the implementation of such breaks *(265)*. Staff members reported that most foods consumed during Crunch&Sip breaks were varieties of fruit, and they indicated a high level of willingness to comply with a greater vegetable focus for Crunch&Sip to address this imbalance *(265)*. School principals were generally supportive of fruit and vegetable breaks *(266)*.

School nutrition services staff were supportive of a multi-component nudging intervention that included cafeteria decorations, creative names, social norming taste tests and a flavour station. Extension support and school-level system factors were important in acceptability of the intervention to the staff and their opinion about whether it was feasible *(267)*. School-level system factors were school-specific facilitators and barriers, including time, cafeteria space, school staff culture and attitudes.

Intervention group 4: Pricing policies to promote healthier alternatives

Acceptability to the public (including parents)

Two studies from Australia were identified that assessed suggestions and support of lay people *(195)* and parents *(190)* on a number of school-based interventions, including pricing policies. Among lay people, more support was found for government-subsidized healthy school meals (41%), compared with subsidized school meals in general (33%). Parents suggested several initiatives they thought could make it easier both at home and at school for their older children to access and consume healthier foods, including reducing the costs of healthier fast food alternatives.

A United States survey examined support for childhood obesity intervention strategies among a nationally representative sample of adults. It found that just under half of the participants supported increasing the cost of less healthy foods and drinks in school vending machines and school cafeterias. Participants with at least some college education (compared with no college education) were more

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[1] School-based stakeholders include principals, teachers, food service directors, canteen managers and parents/citizens committees/associations (in Western Australia, parents and citizens associations/committees are typically tasked with managing school canteens in public schools).

in favour of increasing the cost of less healthy foods and drinks in school vending machines and school cafeterias *(201)*.

Another survey from the United States examined different policies aimed at curbing obesity. Respondents were asked whether they would support a policy if it meant having to pay an additional US$ 50 per year in taxes. The study found that 68% supported "prov[iding] funding to public schools to make fresh fruit, vegetables, and low-fat milk available for free at school lunches", and 54% supported "eliminat[ing] fast-food and soft-drink concessions from our public schools and to use federal tax dollars to compensate the schools for the revenues they now make on these concessions" *(204)*. Respondents who perceived obesity to be a result of a "toxic food environment" (with emphasis on the broader societal responsibility for the lack of availability of healthy foods at affordable prices) were more likely to support the two school nutrition policies addressed in the survey *(204)*.

Acceptability to students

In a qualitative study with students (aged 12–17 years) attending schools in New South Wales, Australia, students were highly consistent in their belief that healthy food at the canteen was too expensive. Students suggested that healthy options should be more affordable *(51)*.

Acceptability to school-based stakeholders[1]

Most teachers (74%) were supportive of potentially expanding Western Australia's Healthy Food and Drink Policy to include the element "foods to be priced according to their healthiness, with the healthiest foods being the most affordable". Sixty-seven percent of principals, and parent and citizen committee presidents supported this element, compared with just under half of canteen managers *(228)*.

Almost 40% of school board members interviewed in the United States supported "manipulating vending machine prices so that unhealthy foods cost more and healthy foods cost less" *(235)*.

Intervention group 5: Direct food provision to students in schools

General acceptability for intervention group 5

Provision of food at schools was generally well accepted by stakeholder groups. A survey among Swiss school stakeholders, adolescents and parents showed strong support for the schools' role in providing healthy food at attractive prices *(268)*. In an evaluation of a Free School Meals trial for primary school students in Scotland, teachers, local authority staff and catering staff were overwhelmingly positive about the provision of free school meals for primary students *(97)*. Likewise, an intervention in Greece that provided free daily meals to reduce food insecurity and promote healthy eating was well accepted among the interviewed parents, educators and school principals *(177)*. In New South Wales, Australia, a breakfast programme that used donated food[2] was "enthusiastically received by children, teachers and parents" *(176)*. The Breakfast in the Classroom

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[1] School-based stakeholders include principals, teachers, food service directors, canteen managers and parents/citizens committees/associations (in Western Australia, parents and citizens associations/committees are typically tasked with managing school canteens in public schools).

[2] The breakfast programme "Breaking Bread, Breaking Barriers" ran for two consecutive school terms and was designed to address two priority issues: poor breakfast consumption before school, and the large amounts of food waste generated in society in general. The programme was delivered by a not-for-profit organization, which collected donated food from supermarkets and small local businesses that would otherwise have been discarded.

(BIC) model[1] of the School Breakfast Program in the United States received support from a wide range of stakeholders, including teachers, food service personnel and principals *(269)*.

Acceptability to governments and policy-makers

A case study from the Republic of Korea reported on the expansion of the free school meal programme, making it universal to all students in compulsory education rather than only to students from low-SES families or families in small communities of rural areas. The study reported inconsistent levels of support, which seemed to depend on political orientation. The expansion of the programme was discussed before a regional election and was found to influence election results. The public was eventually asked to vote on the matter. A majority of the citizens of Seoul who voted supported the expansion, indicating that the public favoured a universal free meals programme rather than a selective free meals programme *(270)*.

Acceptability to the public (including parents)

Evidence on the acceptability to the public of direct food provision was mixed. The level of support depended greatly on the details of the school feeding programme, ranging from high level of support *(177, 198, 204, 269–272)* to limited or less support *(38, 195, 215)*. For example, in a survey among lay people in Australia, only 10% agreed that "schools should provide breakfast, lunch and tea", 9% agreed that "schools should serve breakfast, lunch and dinner", and 28% agreed that "schools should provide breakfast for children" *(195)*. Provision of school meals was viewed more favourably than other interventions such as restricting fast food restaurants and convenience stores near schools *(198)*.

Acceptability depended on the perceived quality and quantity of the food provided *(38, 215)*. Healthy food options were mostly supported (e.g. provision of fruit at breaks; availability of fruit, vegetables and low-fat milk for free at school lunches) *(122, 204)*. In England, some parents thought that school lunches were too healthy, whereas others thought they were not healthy enough *(215)*. Parents reported lack of choices for their children, too many unfamiliar foods (particularly for "fussy eaters"), and concern that their children would go without a meal if they did not like what was offered, reflecting parents' priority to ensure that their children did not go hungry. Some parents suggested that the free school meal allowance was insufficient to enable secondary school pupils to purchase an appropriately sized meal, and subsidized the cost as a consequence *(215)*. A study among parents of middle school students in rural areas of the United States found that parents disagreed with the school policy dictating how much food and energy their children should consume at lunch. Parents reported that their children were hungry as a result of small portion sizes and dislike of food items served at the school lunch; they felt that limiting food intake at school was wrong because early adolescence is a stage of rapid growth, requiring their children to "be fed adequately" *(38)*.

Regarding water provision at schools, there was overwhelming support (96% of participants aged over 17 years) for access to required water in schools throughout the whole school day in the United States *(273)*. Likewise, almost all parents and teachers (99%) from a private, English-speaking secondary school in India supported the provision of safe drinking-water on school premises *(197)*.

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[1] The BIC model made breakfast available for free to all students in the classroom at the start of the school day (not just students already eligible for participation in the School Breakfast Program), thereby mitigating major barriers related to timing and stigma.

Acceptability to students

Acceptability to students of direct food provision was variable, and often influenced by food preferences *(269)* and whether students had the ability to choose from a variety of options *(39, 54, 222)*. In Brazil, acceptance of school food was generally high, particularly for lunch *(271, 274)*.

Most students participating in a Danish study on the provision of fruits and vegetables appreciated that abundant and varied fruits and vegetables were available at their school *(264)*. A United States study on installation of salad bars in urban elementary schools found that more than half of the students agreed or strongly agreed that they liked the salad bar and the types of fruits and vegetables offered (61%), and most liked the ability to choose their own fruits and vegetables from the salad bars (85%) *(54)*. Students generally supported the BIC model[1] programme and preferred the BIC model over the traditional School Breakfast Program model, but their decision about whether to participate in BIC or eat breakfast at home was primarily driven by food preferences *(269)*.

Some complaints about school food related to portion size and limited options. Secondary school students in England complained of small portion sizes and going home hungry *(215)*. In another study on the perceptions of students (aged 7–10 years) of school meal provision in England, students perceived school meal choices to be repetitive, and were dissatisfied with having the same options all the time. A clear preference for a greater variety of choice was seen *(39)*. Overall, participating students expressed contrasting views about meal choice: they wanted more control over their menu choices, but some older students also perceived that removing choice by mandating that students have vegetables/salad and fruit daily would encourage healthier dietary behaviours *(39)*. Student dissatisfaction with school food provision and restrictions that were too prohibitive were also recurring themes in a study among secondary students in England *(222)*.

Water provision

A few studies were identified that assessed perceptions and views around the availability of safe drinking-water in schools and acceptability of the provision of drinking-water. For example, a study in English secondary schools examined the perceptions of students, teachers and catering staff towards changes in school food provision and found that, although water fountains were available, students were not satisfied with current provision of water, citing lack of hygiene *(223)*. In a similar study, students viewed their existing water provision as poor and wanted sufficient supplies of cooled, filtered water in schools *(275)*. In the United States, middle school students were dissatisfied with drinking-water options at school, and described the water fountains as dirty and the bottled water as expensive *(210)*.

Non-adherence to school feeding (non-consumption)

A study in Brazil assessed non-adherence to school feeding (morning and afternoon snacks, and lunch). It defined adherence as consumption of each meal four or five days per week, and non-adherence as consumption of each meal up to three days per week. Adherence to lunch was highest (95%), followed by afternoon snacks (78%); adherence to morning snacks was lower (44%) *(274)*. Prevalence of non-adherence was higher among students who did not accept meals *(274)*. Another study conducted among students in Brazil also found low adherence to the school feeding programme *(271)*.

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[1] The study reported that the BIC delivery model of the School Breakfast Program (SBP) was developed to address the gap between eligibility and participation in the SBP, an issue particularly observed in schools with high proportions of students from low-income households. The BIC model made breakfast available for free to all students in the classroom at the start of the school day (not just students already eligible for participation in the SBP), thereby mitigating major barriers related to timing and stigma.

Acceptability to school-based stakeholders[1]

Evaluation of the Free School Meals pilot in England found that schools expressed strong support and enthusiasm for the pilot, and generally approved of its values and policy aims, as well as its capacity to benefit pupils and families. Positive reflections of the pilot were made in spite of any difficulties experienced during its set-up and delivery *(276)*. Among teaching and catering staff in English secondary schools, there was "overwhelming consensus" that providing pupils with "good" food was vital, acknowledging that for some students a school meal may be the only hot meal they receive that day *(223)*. Head teachers' perceptions of having to implement the Universal Infant Free School Meals scheme in England were generally more positive than those of catering staff, as reported in a study on primary schools' preparation for implementation of the programme *(39)*.

Results from the Hot School Meals Pilot Project in Ireland showed that provision of hot meals to primary school children was highly rated by parents, teachers and principals in terms of quality, choice, portion sizes, dietary requirements and nutrition, with principals being most likely to give "excellent" ratings. More than two thirds of teachers and principals rated the meals as better quality than previously provided to the children *(272)*.

A study from India examined the perspectives of teachers and parents about current school food environments and policies in private English-speaking secondary schools. The study found that almost all respondents (99%) supported the provision of safe drinking-water on school premises *(197)*.

Environmental acceptability

Greenhouse gas emissions

A linear programming study found that up to 40% reductions in greenhouse gas emissions could be achieved with "only small changes" to the Swedish school food supply (fully subsidized lunches served daily in primary schools to 1.3 million students aged 6–15 years) while maintaining nutritional quality and costs *(277)*.

Waste

Evaluation of a free school meals trial for primary school students in Scotland in 2007–2008 found that waste was similar to pre-trial levels *(97)*. According to teachers and principals, the Hot School Meals Pilot Project in Ireland increased food waste *(272)*. In Italy, 15% of food delivered to schools was thrown away. Reasons included satiety at lunch from foods and beverages consumed during morning break, menu composition, the "rigidity of the procurement specifications" setting a fixed quantity for each product, and limited flexibility in adjusting the different food preparations *(278)*. After installation of salad bars in urban elementary schools in the United States, the percentage of fruit waste increased, but the overall volume of fruits and vegetables that students discarded decreased because of smaller portions *(54)*. A United States study examined plate waste before and after changes to the nutrition standards for the NSLP and found that the average percentage plate waste increased from 52% to 58% after the changes in the standards, indicating that food waste was a problem both before and after implementation of the new standards *(246)*. Finally, a qualitative study from a public primary school in a disadvantaged area of New South Wales, Australia, examined the impact of a breakfast programme using donated food.[2] The study found that the programme saved 14.4 tonnes of food from landfill through conversion into 44 000 meals *(176)*.

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[1] School-based stakeholders include principals, teachers, food service directors, canteen managers and parents/citizens committees/associations.

[2] The breakfast programme "Breaking Bread, Breaking Barriers" ran for two consecutive school terms and was designed to address two priority issues: poor breakfast consumption before school, and the large amounts of food waste generated in society in general. The programme was delivered by a not-for-profit organization, which collected donated food from supermarkets and small local businesses that would otherwise have been discarded.

Factor 5: Feasibility

This section presents a narrative synthesis of the literature identified to assess the feasibility of school food and nutrition policies to promote healthy diets. Literature was synthesized for each of the five intervention groups and according to the following criteria: compliance; elements that hinder or support development and implementation; elements that hinder or support monitoring, evaluation and enforcement; and impacts on health systems, food systems and the policy environment. For the purpose of this review, "feasibility" was not assessed as a clear-cut "yes" or "no", but instead was treated as a continuum – barriers to, and facilitators of, development, implementation, monitoring, evaluation and enforcement of school food and nutrition policies can make the policy action more or less feasible to implement. This section takes the form of a thematic analysis, where barriers and facilitators are grouped in themes identified and emerging from the literature.

Intervention group 1: Nutrition standards or rules that determine the quality of food served or sold in and around schools

One factor found to facilitate implementation was general awareness of the problem of childhood obesity and an appreciation among parents for efforts within the school to enhance children's health *(182)*.

Compliance

Numerous studies were identified that reported on levels of compliance with implemented guidelines or standards, including objective audits *(191, 279–286)*; self-reports or self-assessments *(236, 238, 287–291)*; direct observations, menu audits and inventory surveys of school data *(230, 292–302)*; and systematic reviews *(303)*. Some studies reported changes in compliance levels over time *(284, 286, 297, 304)* or noted discrepancies between the methods used to measure compliance *(280, 304)*. Other studies have examined the extent to which local-level policies or guidelines comply with higher-level (i.e. federal or national) policies or guidelines *(289, 305, 306)*. It is not the purpose of this review to summarize and present compliance levels. Instead, compliance is discussed from a feasibility perspective, such as barriers to compliance, or specific factors associated with varying compliance levels *(287, 307)*. Some of these factors are also closely linked to themes discussed under "Elements that hinder or support development and implementation" and "Elements that hinder or support monitoring, evaluation and enforcement" (e.g. lack of awareness of the policy, lack of effective monitoring).

The level of compliance can be seen as an indicator of the feasibility of implementation of a policy. The authors of a study examining compliance with a statewide regulation on competitive foods concluded that the level of compliance one year after implementation "demonstrated the feasibility of schools making substantial changes in response to requirements" *(297)*.

Levels of compliance with nutrition standards varied. For example, studies assessing compliance in Australia found that small schools, private schools and rural schools had higher odds of having "red" (unhealthy) items on the menu in New South Wales than other types of schools *(304)*. Another study from New South Wales supported these findings and reported that public schools were significantly more likely to have menus compliant with the Healthy School Canteen Strategy than private schools *(308)*. Partial compliance with the New South Wales guideline was also reported to reflect perceived

student demand and cultural practices, lack of community and parental support, and the need for profit *(279)*. Requirements for halal products were considered a challenge to complying with guidelines, due to perceived pressure from parents to sell "red" products (halal sausage rolls and pies), as reported by caterers *(279)*. Primary school canteens were more likely than secondary school canteens to meet requirements of the Western Australian Healthy Food and Drink Policy *(280)*. In Queensland, secondary schools reported more challenges than primary schools in implementing the Smart Choices policy in tuckshops *(236)*. Compliance with the Victorian School Canteens and School Food Services Policy did not vary by school type, although there was some evidence that public schools and primary schools tended to implement the policy more successfully; this may be because public schools are required to comply with the policy, whereas it is optional for private schools *(281)*.

A United States study examining compliance with state-mandated nutrition standards for beverages (SB 965) in a representative sample of public high schools in California found variability in adherence to the standards according to sociodemographic characteristics of schools. Schools with a larger non-Caucasian student population and schools located in more densely populated urban areas had higher levels of adherence. The authors explained that low-income school districts across California, many of which are located in densely populated urban areas and serve a large proportion of students from ethnic minorities, have benefited from several public and private funding sources to support improvements to the school food and beverage environment. The proportion of students eligible for subsidized meals (a proxy for economic status) and school size were not associated with adherence to the standards *(285)*. The study also found that schools had higher adherence to beverage standards (SB 965) than to food standards (SB 12). Possible explanations for the difference in adherence are the way in which the standards are written and the resources needed to comply with them: the SB 965 beverage standards specify types of beverages that can be sold, whereas the SB 12 food standards are nutrient based and set specific nutrient limits for foods *(285)*. Compliance may also vary depending on the scope of the policy. For example, a project in the United States aimed at improving the healthiness of snacks and beverages available in vending machines and à la carte programmes found that healthy changes were more easily achieved for vending machines than for à la carte programmes *(217)*. Lack of compliance was identified for policies that were "often not strongly worded" in a study in New Zealand licensed childcare centres *(309)*.

A qualitative study from England on perceptions of preschool centre staff and parents of preschool children of healthy eating within preschool settings identified an apparent difficulty, or intentional lack of compliance, with preschool health policies (such as permitting energy-dense snacks and foods) *(310)*.

Poor monitoring and enforcement were also reported as a reason for low compliance. A United States study examining enforcement of school nutrition policies related to competitive foods found a troubling number of respondents, most often school food service directors, who stated that a "policy exists but is not always enforced". According to the authors, the findings suggested that, even in schools with policies in place, weak enforcement allowed competitive foods to be largely unregulated *(311)*. Discrepancy in reporting levels of compliance was found in a United States study that examined the extent, nature and level of enforcement of school nutrition policies related to competitive foods. Principals were more likely than school food service directors to indicate that an existing policy was being enforced. For example, one "notable area of disagreement" was a policy on setting nutritional standards for à la carte foods. Almost 40% of principals reported that this policy being enforced, compared with 15% of school food service directors *(311)*. In a study conducted in Australia, metropolitan principals were significantly more likely than regional schools to claim full compliance (66% versus 52%) *(287)*.

Compliance measures in policies may help strengthen competitive food laws by providing state agencies with an enforcement mechanism *(312)*. A nationwide United States study on compliance mechanisms in state-level school policies on competitive foods found that 18 states' laws addressed compliance, including one or more of the following: financial and/or programmatic incentives (five states), contract provisions (11 states) and monetary penalties for noncompliance (seven states). Five states' laws contained a combination of approaches *(312)*.

Elements that hinder or support development and implementation

Expert panel to make recommendations to governments or working groups

A case study on the implementation and evaluation of school food standards in the United Kingdom found that a common element in implementation was an expert multidisciplinary panel to make recommendations to government. This helps to ensure buy-in across a wide range of stakeholders by reducing initial resistance to the introduction of standards among those who are directly affected by them (e.g. caterers, pupils, parents, wholesalers), and helping stakeholders to see that their interests have been represented in discussion *(313)*. Similarly, a study from Canada found that a strong policy working group was an enabling entity in the policy development process. The working group bridged the gap between what was practical and possible in schools, and what was appropriate according to nutrition recommendations *(314)*. The working group's perception of the importance of developing school nutrition policies was influenced by credible information on the issue of children's health and nutrition (e.g. the prevalence of overweight children) *(314)*.

Higher-level policies or mandates

A study conducted in private English-speaking secondary schools in India found that parents and teachers perceived that the lack of a government mandate for school food policies acted as a barrier to school-based nutrition promotion (such as increasing the availability and accessibility of healthy foods while reducing the availability of unhealthy foods) *(315)*. In Grenada, a comprehensive, government-approved policy on school nutrition was identified as a policy gap *(316)* and subsequently developed *(317)*.

The existence of higher-level policies typically had a positive impact on school- and local-level policies *(189, 318)*, but the higher-level policies were not always consistently adapted *(319)*. Information for this element came exclusively from the United States. A case study on best practices for implementing the Smart Snacks in Schools policy found that implementers of the policy leaned on state law and district policy as sources of power to legitimize and reinforce their initiatives. The authors argued that "given that school districts tend to follow state standards", the findings indicate that leadership from the state level has strong potential for helping food service directors implement the policy *(320)*. A study using a nationally representative sample of public elementary schools found that the existence of district policies and state laws[1] was associated with a higher prevalence of policies relating to fundraising at the school level, including overall restrictions, and specific restrictions on fundraising involving candy or SSBs. However, the study also reported that many schools that were subject to district policies and state laws did not have school-level policies in place – a finding prompting the authors of the study to highlight the need for further attention to factors hindering policy implementation in schools *(321)*. Another study using a nationally representative sample of public elementary schools assessed policies restricting sugary foods during classroom parties at school (e.g. birthday and holiday celebrations). It found that the existence of such policies at the

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[1] For example, the Child Nutrition and WIC Reauthorization Act of 2004 mandated that school districts participating in federal child nutrition programmes (the School Breakfast Programme and the NSLP) had to adopt and implement a wellness policy by the first day of the 2006–2007 school year. Also, the HHFKA mandated refinement of district policies.

district and state levels, although most often framed as recommendations rather than requirements, was associated with a higher prevalence of policies at the school level restricting sugary foods during classroom parties. For example, schools with a district policy and state law were 2.5 times more likely to restrict sweet items at parties than were schools with no corresponding district policy and state law. School-level limits on sugar content were more common where district policy and state law addressed specific nutritional aspects of foods and beverages served in classroom parties *(322)*. If district-level policies included ambiguous or weak language ("indicating low comprehensiveness and strength"), school-level policies often adopted a similar template, resulting in vaguely written policies *(323)*.

A study in middle and high schools in Washington state found increases in the percentage of schools reporting the presence of certain nutrition policies and practices following the 2005 statewide school physical activity and nutrition mandate *(324)*. The policies and practices involved restricted access to competitive foods, and availability of fruits and vegetables at school events. Most school food service managers in rural, low-income elementary schools in Colorado attached more importance to the Colorado Department of Education's recommendations – about menu planning, nutrition analysis, reducing fat and salt content, and portion control – than to local policies, and none believed the local wellness policies influenced their lunchroom practice with regard to the nutritional content of meals *(325)*. A study examined the degree to which the use of third-party policy templates[1] in Virginia either improved or reduced the quality of school wellness policies (the development and implementation of which were mandated by the Child Nutrition and WIC Reauthorization Act of 2004). The study found that locally developed policies were "stronger and more comprehensive" than template-based policies; for example, locally developed policies were more likely to meet federal standards for USDA child nutrition programmes and school meals *(326)*.

School infrastructure and facilities

A case study from Norway examined barriers to implementation of the national guidelines for healthy school meals in three secondary schools. All the interviewed principals, project leaders and teachers mentioned structural conditions as a key factor for implementation. They reported that the physical demand for canteens, which was difficult for schools to meet, was a challenge. The schools lacked an area for the canteens' basic functions of production, sales and eating areas, and principals and staff perceived the lack of these practical facilities as an important barrier to offering healthy school meals *(327)*.

The capacity of schools to implement new policies by expanding the canteen infrastructure was a key concern for staff following the announcement of food- and nutrient-based standards for schools in England *(41)*. Canadian parents and students indicated that the lack of school kitchen facilities was a major barrier to implementation of school nutrition policies. With no cafeterias in the studied schools, food was either prepared in staff rooms or spare classrooms, or ordered from local vendors or fast food restaurants *(206)*. Similarly, principals from elementary schools in Prince Edward Island identified the absence of a cafeteria as a barrier to policy implementation because they did not have equipment or staff to prepare healthy choices *(238)*.

In British Columbia, survey respondents reported that lack of food preparation infrastructure and, in rural areas, lack of private vendor options restricted implementation of the guidelines. Whereas all urban and some rural secondary schools reported having a cafeteria with ample food service infrastructure, most elementary schools across all districts lacked food preparation and food storage facilities *(240)*. "Limited storage space" was reported by almost half of school food providers as a

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[1] Local educational agencies are responsible for writing, adopting, implementing and evaluating school wellness policies. State school board associations provide model wellness policy templates for local school boards to adopt and refine to comply with the federal mandate.

barrier to implementing best practices (i.e. serving healthy meals and snacks, including beverages) in a United States study conducted in licensed early childcare education centres *(328)*.

Financial issues

Commonly cited financial issues relating to implementation of food and nutrition standards (mainly from studies in high-income countries) were general financial concerns *(184, 237, 329, 330)*, lack of financial resources *(41, 325, 331–334)*, the perceived higher cost of healthy foods *(46, 154, 218, 314, 328, 335)* and (mostly unfounded) arguments that policy implementation would result in reduced revenue or profits *(154, 218, 242, 330, 331, 336)*. A study conducted in secondary academies[1] in England found that decision-making around food was influenced by a wide range of factors, including finances (the need to run a sustainable business), and that balancing priorities was an overall challenge *(229)*.

A United States case study analysed the policy formation processes for five state-level regulations for competitive school foods introduced in 2009–2010. The study found that bill cost was a major barrier to "achieving strong, health-promoting policy change" in the school food environment; nearly half of all changes to regulations were made in response to a direct financial concern, including perceived and actual costs of implementation or fear of lost revenue. Supporters of stronger competitive food policies often agreed to changes that weakened a regulation to neutralize opposition and achieve stakeholder buy-in *(330)*.

Continued availability of unhealthy food sold around schools was perceived as an additional barrier. The need for school food service providers to make a profit and the proximity of other food outlets to the school were often cited as interrelated barriers to implementing healthy options in schools *(41, 191, 230, 279, 331, 332)*. Two studies in secondary schools in Ontario found that the Ontario School Food and Beverage Policy (P/PM 150) led to increases in the price of compliant foods sold in schools, which led some students to purchase food off-campus where it was less costly, such as fast food outlets or grocery stores *(46, 154)*. In Mexico, the sale of ultra-processed food on the periphery of school grounds made food vendors inside schools hesitant to adjust their own offerings for fear of losing business *(331)*.

Multiple studies indicated fundraising and sponsorship as barriers to implementing healthy food policies, as many schools had previously relied on sales of unhealthy foods to bring in additional funds *(189, 205, 331, 337)*. Schools in England reported making substantial profits from vending confectionery, carbonated soft drinks and savoury snacks. This potential loss of funds was a key concern before the implementation of new standards for foods in schools *(41)*. Another challenge, in Mexico, was related to sponsorship of school equipment (e.g. refrigerators) in return for business, which made schools hesitant to stop selling food and beverages from those companies, impeding implementation of the regulation *(331)*. A study from the Philippines (with policy-makers and stakeholders involved in school food policy-making and implementation) found that the need to fund a school feeding programme for undernourished children conflicted with enacting tighter restrictions on the sale of processed packaged foods because the programme received 35% of all profits generated from canteens *(242)*.

In contrast to many of the findings above, a few studies found that revenue increased as a result of new school food standards. A study before and after implementation of competitive food and beverage legislation (SB 12 and SB 965) in California found that average participation in breakfast

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1   Academies are schools in England that are independent of control by local authorities and directly funded by the central government (Department for Education). Academies were previously, and at the time of the referenced report, exempt from having to follow the compulsory school food standards introduced in 2006. Currently, academies are expected to comply with the requirements of the School Food Regulations 2014; this is an explicit requirement in funding agreements with the Department for Education.

and lunch increased, resulting in an increase in average meal revenue, from US$ 0.70 to US$ 0.86 per student per day *(338)*. Increased participation in programmes was also linked to increased revenue in a study in San Francisco *(339)* and in New York City *(340)*. The New York City study found that increased participation levels in the meals programme increased revenue, and allowed negotiation of better contracts with food manufacturers; this was important for implementing changes within a "tight budget" *(340)*. A study in the United States examined the difference in cost of preparing healthy school meals according to the level of scratch cooking (i.e. using raw ingredients versus fully processed ingredients) and found no association between total costs and level of scratch cooking *(93)*.

Initial fears of bankruptcy resulting from the new Western Australian Healthy Food and Drink Policy were found to be misplaced, and canteens functioned as normal *(182)*. Authors of a study in England also noted that loss of economic viability was "perceived" rather than "experienced" *(230)*. A systematic review from the United States found that financial concerns that changes in nutrition standards in schools would lead to a loss in total revenue were unfounded, explaining that "available data suggest that most schools do not experience any overall losses of revenue" *(341)*. This was supported by a study on the annual revenues and expenses of the school food service environment related to the HEALTHY intervention,[1] which concluded that the intervention had no adverse effect on food service finances *(90)*. Another United States study found that changes in the types and proportions of beverages offered throughout a full school year to encourage students to make more healthful choices did not result in "substantial loss of profits" *(342)*. Furthermore, after changes to concessions stands at high school sports events (e.g. adding new healthier options), revenue per game remained unchanged *(200)*.

A case study on the implementation and evaluation of school food standards in the United Kingdom found that core funding from government to support the development, testing, introduction, maintenance and impact evaluation of standards was considered essential if the standards were to be effective. Piecemeal approaches tend to lead to patchy implementation and less effective change *(313)*. A key concern expressed in a study conducted in England in late 2006 was that current government funding was insufficient to meet the costs of providing a high-quality catering service *(41)*.

Assured availability of financial resources was identified as an enabler to policy implementation in a study among principals of elementary schools in Prince Edward Island. Participants also recommended increasing funding for schools so that they would be less dependent on food-related fundraising initiatives, which sometimes involved noncompliant foods (e.g. bake sales, hot dog sales), and suggested a monetary incentive programme to reward policy compliance *(238)*. Not linking a proposed policy to a formal funding strategy may be problematic, as noted by authors of a study in Canada where cafeteria and other school food sales are revenue driven *(46, 154)* – this also led to tensions within the school community[2] between providing nutritious food and maintaining school revenues.

Disparities in acquisition of financial resources were found between schools with different socioeconomic and sociodemographic characteristics that participated in a study on funding for school nutrition programmes in Mississippi. Schools located in low-income areas and in areas with a larger share of minority populations, and schools outside the metropolitan areas were disadvantaged in terms of funding to support healthier built-in nutrition environments (i.e. purchasing food procurement equipment such as combination ovens/steamers). Obtaining funds was associated

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[1] The HEALTHY intervention was a three-year randomized, cluster-designed trial conducted in 42 middle schools in 2006–2009, with a nutrition component consisting of changes to meal plans.
[2] Community-level actors (from a local public health unit and community agencies with mandates supporting school nutrition), secondary-school principals, vice-principals and teachers

with a reduction in the probability of serving fried foods. The study also found that the odds of obtaining funds increased almost proportionally with the enrolment size of schools *(156)*.

Awareness and understanding of policy details

Lack of awareness of a policy or its details was a common concern and a barrier to implementation *(196, 230, 291, 335, 343, 344)*. For example, a survey conducted in government-funded primary and secondary schools in England found that 83% of teachers and senior managers were aware of the current school food and nutritional standards, but could not explain them *(343)*. Confusion about the classification of permitted and restricted foods, and how they were supposed to be prepared was a commonly cited challenge *(196, 279)*. As well, standards were not considered practical to enforce or were considered conflicting *(223)*. One systematic review of grey literature on standards for school breakfast programmes in Canada reported inconsistent nutrition-related recommendations *(345)*.

Understanding also varied by school type: principals from secondary schools implementing the Queensland Smart Choices programme were more likely than those from primary schools (85% and 77%), and those from urban schools were more likely than those from rural schools (83% and 75%), to report their understanding of Smart Choices as either good or excellent *(236)*.

Revision of standards may result in greater clarity among stakeholders. For example, the United Kingdom Department for Education pilot tested the revised standards of 2014 with 35 schools and 24 caterers across England. Most school cooks and caterers thought the revised standards were easier to understand and provided more flexibility than the current (pre-2014) standards *(180)*.

In some studies, awareness levels were reported to increase over time. In a United States study examining nationwide awareness and implementation of nutritional guidelines for competitive beverages and foods in public elementary schools, awareness of the beverage guidelines increased from 35% to 52% among school administrators from 2006–2007 to 2009–2010, and awareness of the food guidelines increased from 29% to 40%. Awareness of the guidelines was associated with the existence of other guidelines and policies. For example, existence of state nutrition guidelines and school or district-level wellness policies increased the likelihood of school administrators being aware of the guidelines. The study also found that administrators from schools with a majority of Black students were less likely to be aware of the beverage guidelines *(346)*.

Effective communication, information, guidance and training

A study from the Philippines found that requests from politicians for stronger evidence and information acted as a barrier to adopting comprehensive healthy school food provision. Interviewees reported that policy-makers who had drawn attention to the contribution of food provision and marketing to unhealthy eating habits were faced with requests from politicians for specific types of evidence, including national data – for example, on the linkage between sugar consumption and poor health *(242)*.

The same study found that a lack of guidance on implementing an existing policy on the provision of healthy food in schools acted as a barrier to policy effectiveness. Most implementing actors (local government education divisions, local government health departments, schools, principals and teachers) reported that they had been trying to interpret the policy without adequate tools, training or support to guide them *(242)*. The importance of in-service training, technical assistance and ongoing support to improve policy implementation was identified in a number of studies *(217, 344)*, including among food service providers and canteen staff *(41, 182)*.

School board members in the United States also reported a need for training and skills to better prepare them to advocate for school nutrition policies. Most board members (56%) felt inadequately prepared to develop sound nutrition policies, and 51% did not feel adequately

prepared to provide community leadership in communicating and supporting nutrition policies at their school. Finally, when asked if they believed themselves adequately prepared to monitor, review and revise nutrition policies to ensure effectiveness, 53% said "no" *(235)*. A United States study examined implementation of the Child and Adult Care Food Program (CACFP) standards in licensed childcare centres in California. Although centres did not report insufficient training as a barrier to implementing the CACFP standards, interviewed CACFP stakeholders ("child care experts") reported that training and technical assistance were the most critical elements for successful implementation; providers needed to be trained not only on what the standards were, but on how to implement them *(290)*. A case study on the implementation and evaluation of school food standards in the United Kingdom found that a common requirement for implementation was guidance, both written and as advice or support. This is an essential element to support caterers in making changes, and helping pupils, parents and other stakeholders understand the need for, and the nature of, the changes *(313)*. For both metropolitan and regional schools in Australia, factors that could make it easier for schools to comply with the policy included educating parents, the school community and the broader community about the importance of healthy eating, to engender greater support for the policy and encourage associated nutrition-related behaviours (e.g. parents packing healthy lunchboxes). Principals from regional areas were particularly interested in access to additional resources to distribute to key stakeholders (especially parents) to ensure that they are aware of the specific requirements of the policy *(226)*.

An assessment of local wellness policies across Pennsylvania school districts found that virtually all districts (498 out of 499) included nutrition guidelines for competitive foods in their local wellness policies, and thus met the relevant requirement for establishing local wellness policies. Training opportunities, promotional efforts, and availability of resources to aid in policy development, coupled with state-level collection and review of local wellness policies, may account for this result. Several Pennsylvania-based organizations and associations offer training on establishment of local wellness policies and/or provide information on local wellness policy requirements in newsletters and mailings, and the Pennsylvania Department of Education held a mandatory training session for all NSLP sponsors on the Child Nutrition and WIC Reauthorization Act of 2004 *(318)*. An assessment of wellness policies among rural, low-income elementary schools in Colorado concluded that "nutrition trainings hosted by the Colorado Department of Education appear to be a promising strategy for schools to implement evidence-based practices in the lunchroom" *(325)*. Providing training and technical assistance to directors, faculty and staff on nutrition policies and practices in early childcare centres (serving racially and ethnically diverse, low-income children aged 2–5 years) in Florida resulted in more early childcare centres adopting more rigorous nutrition policies. The programme included guidance on the importance of establishing written nutrition policies that complied with CACFP standards, and assistance in overcoming barriers to policy implementation *(347)*.

A United States study with district school food service directors in public schools found that respondents with a food-related credential (registered dietitian, licensed dietitian, School Nutrition Association certificate, certified dietary manager, certified food protection professional, culinary certificate) were more likely to report having implemented comprehensive food-related policies. The authors concluded that their findings support the value of credentialing school food service directors to improve school food practices through the implementation of school food policies *(333)*.

A study from England found that, although initiatives such as the Healthy Schools Programme and internal school policies were influential, motivation to adopt healthier vending was mainly due to the new standards, effectively communicated by the School Food Trust *(230)*. Effective communication strategies that ensured that key stakeholders were informed throughout the

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policy implementation phase was also reported as being important for smooth and "relatively uncontentious" implementation by Australian principals *(182)*.

Having clear guidance on roles and responsibilities of implementing school food and nutrition policies was also an important consideration for feasibility. A case study on Mexico's school food regulation[1] described how the roles and responsibilities of the authorities in charge of implementation were not clearly stated. This led to broad absence of training, monitoring and dissemination of materials to inform the school community of the regulation, and thus acted as a barrier to effective implementation of the regulation *(331)*. Another example examined facilitating factors and barriers to implementation of school wellness policies in two rural school districts in New Mexico. Even though both districts had adopted written wellness policies, interviews revealed a lack of specific policy knowledge among superintendents, principals, wellness coordinators and advisory council representatives, with little shared understanding of who was responsible for carrying out and enforcing school health and wellness policies *(344)*. A qualitative systematic review on the role of primary schools in preventing childhood obesity in high-income countries identified a "responsibility conflict" in schools, with unclear boundaries about who has responsibility for ensuring that students eat a healthy diet (i.e. parents, schools or governments) *(188)*. A survey on nutrition policy implementation in schools in British Columbia found that schools with a formal group that was responsible for school nutrition were more likely to have nutrition policies in place than schools without a formal group responsible for school nutrition *(348)*.

A study on implementation of a school food and nutrition policy in Nova Scotia, Canada, found that cafeteria employees generally preferred autonomy (being in charge of the cafeteria without being told what to do), but also identified the need for support from others, particularly related to their budgets and resources *(334)*. Another study in Nova Scotia found that schools with above-average perceived adequacy and capacity for policy implementation[2] had greater odds of adhering to a lunch policy *(307)*.

Staffing concerns and competing priorities

Lack of time and/or human resources was identified as a barrier to the development and implementation of school nutrition policies in a number of studies – for example, in Brazil *(349)*, Canada *(206, 240, 314, 335)* and the United States *(189, 328, 329)*. A case study from Norway examined barriers to implementation of the national guidelines for healthy school meals in three secondary schools. The study reported that, at all the included school canteens, student participation (supervised by teachers) was needed for food production, sales and cleaning, because no one was employed to run the canteens. Some of the principals and project leaders, and all teachers in the study perceived that there was a conflict of goals between their regular work and the implementation of the national guidelines for school meals. They considered implementing the guidelines as time-consuming and thus taking up time at the expense of teaching subjects *(327)*. Several informants in a study conducted in the Philippines reported that principals were often overwhelmed by the number of tasks that they were responsible for, compromising their ability to govern school food policies *(242)*.

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[1] In 2010, the Government of Mexico developed its *General guidelines on the sale and distribution of prepared and processed food and beverages in schools that make up the national educational system*, which were made more stringent in 2014. The guidelines are mandatory and prohibit ultra-processed food products from being sold in schools from Monday to Thursday. On Fridays, only ultra-processed products that comply with certain nutritional criteria are permitted.

[2] The perceived adequacy of facilities or equipment and capacity of staff to support policy implementation represented a composite measure based on two dimensions that were self-reported by the study's survey participants (principals or "appropriate designate[s] with experience in school food service"). The perceived adequacy and capacity constructs were derived from questions related to staffing, facilities and equipment available for food preparation when compared with other schools.

In a study on implementation of a school food and nutrition policy in Nova Scotia, Canada, participants[1] discussed challenges around cafeterias operating as for-profit businesses, and teachers and principals having workloads that meant that supporting a healthy food environment was perceived to be in direct conflict with other priorities *(334)*. A study in Welsh primary schools on implementation barriers in transforming school meal policy to practice included multiple, competing interests at the organizational level of service delivery, and tensions between practicalities and policy objectives *(150)*.

One study in England identified a "practical and ethical dilemma" with implementation of school nutrition standards *(39)*. Catering staff aimed to ensure that "no child would ever go hungry". If they could not persuade students to take a satisfactory quantity of the main meal, the student might be offered more bread, salad, potatoes, chips or dessert "to make up for it", or an entirely different option – that is, they would sometimes have to serve some of the "fussier eaters" a meal even if it was not of adequate nutritional value. Some catering managers therefore occasionally faced a practical and ethical dilemma between providing healthy, nutritious meals and ensuring that no child would go hungry. Catering managers also mentioned that students who asked for more food would always be given more. The age and physical size of students could influence how much they were served, as "larger students" were considered to need larger portion sizes *(39)*. Similarly, a qualitative study in Welsh primary schools reported that catering managers did not consider it acceptable to risk having children go hungry because they did not want the food that was available at lunchtime. This could influence the food that staff offered the child; when the child could not be persuaded to take an adequate meal, the priority would switch from serving a balanced meal to ensuring that the child did not go hungry *(150)*.

Leadership roles and involvement of school stakeholders

Studies from Canada found that principals are key policy enablers and play a strong leadership role in developing and implementing school policy *(231, 314, 334)*. A study from the Philippines found that the motivation and capacity of principals to promote the existing policy on food provision and sales in the school setting were viewed as crucial for sustaining implementation *(242)*.

The role of school food service directors in Pennsylvania in developing and enforcing local school wellness policies was examined. The study was conducted after the Child Nutrition and WIC Reauthorization Act of 2004 was passed, but before local school wellness policies were required. The majority of directors reported that they foresaw themselves playing a lead role in wellness policy development. Concerns expressed about this role included limited knowledge about policy-writing, a perceived lack of authority in their districts, and a desire not to be viewed as "food police" *(337)*. The presence of one or more district-level champions, or advocates, who were explicitly committed to improving students' food environments and choices in school was identified as a facilitating factor in implementation of school wellness policies in two rural school districts in New Mexico *(344)*. Community involvement was a facilitator in the development and implementation of school food and nutrition policies and standards, as reported in a United States survey across secondary schools in 28 states *(350)*. The role of the wider school community was explicitly identified by all the canteen managers as an important factor influencing the implementation of the New South Wales (Australia) school food strategy – for example, addressing the issue of competition for profits with local stores, which led canteens to sell a larger variety of unhealthy foods *(279)*.

A case study on the implementation and evaluation of school food standards in the United Kingdom found that differences between countries included the existence of functioning partnerships.

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[1] Interviews with teachers, staff working within the provincial public health system (which is responsible for implementation of the food and nutrition policy within the school system), parents, school cafeteria staff, and external stakeholders involved in food distribution or resource provision in schools

There were variations in the extent to which all stakeholders were engaged in the decision-making processes around the development, introduction and monitoring of standards. Anecdotal evidence suggests that the more widespread the engagement, the more effectively are standards implemented and followed *(313)*. However, eliciting buy-in from others in the school environment, especially administrators, and a perceived slow response by food manufacturers and processors to provide healthful food options can be a barrier to development and implementation *(337)*. In Latvia, high school directors, primary school directors and parent groups actively campaigned for the removal of soft drinks, and this helped pave the way for the government ban on certain foods and drinks from schools *(187)*.

A number of key stakeholders were identified as integral to the success of the Ontario School Food and Beverage Policy (P/PM 150), including teachers, vice-principals, principals, school healthy action teams, government representatives (both policy-makers and funders), parents, students, cafeteria service providers, and members of the school council. The culture of the school nutrition environment appeared to be largely dependent on the buy-in of key school-level personnel, and teacher support was identified as a vital component of successful implementation at the school level *(154)*.

A United States study examined the extent, nature and level of enforcement of school nutrition policies related to competitive foods in Pennsylvania public high schools. The study found differences between school food service directors' and principals' reporting of policies: principals more often reported both policy existence and enforcement. In many cases, school food service directors indicated that they were "not sure" about the existence of a specific policy, which points to the need for "inclusion of school food service personnel on the policy-making teams, establishment of and communication about policy enforcement responsibilities, and marketing of school nutrition policies to make the entire school community aware of the existence and importance of the policies" *(311)*. School food service personnel were also identified as key stakeholders in the successful implementation of guidelines in Maine public high schools *(351)*.

In a study from Ontario, school staff members were not often consulted on discussions related to healthy eating in their schools. The authors noted that this may have contributed to a lack of support for healthy eating, and argued that future work is needed to include staff in such discussions to further build buy-in for healthy eating in schools and to help encourage the uptake of P/PM 150 standards *(352)*. Similarly, in a study with middle school principals and food service directors on implementation of the Texas Public School Nutrition Policy, several respondents felt that more people should have been involved in policy development. Food service directors, in particular, felt that their expertise was ignored *(205)*.

A study conducted in Minnesota middle and high schools examined the impact of wellness councils on the existence of local wellness policies, and their association with the availability of foods and beverages in school vending machines. Of the included schools, 53% had district-only wellness councils, 38% had school and district councils, and 9% had no council. A similar proportion of district and school councils (74% and 71%, respectively) had policies that addressed food and beverages sold in school vending machines, but only 25% of schools with no wellness council had such policies. The study also found that not having a wellness council was associated with greater availability of low-nutrient, energy-dense foods and beverages in school vending machines. The authors concluded that wellness councils with broad representation of stakeholders likely contribute to improved policy implementation *(353)*. Another study by the same research team (also conducted in Minnesota schools, but over a two-year period) found similar results, and concluded that wellness councils with "a structure that includes both a district and school council may be a sustainable and useful structure for developing and disseminating food policy that results in healthy food practice at the school level" *(354)*.

Role of parents

Several principals in a study on the Western Australian Healthy Food and Drink Policy noted that they had "wanted to introduce the kinds of changes required by the policy for some time" but believed that it was "not possible due to an expected backlash from parents, students and canteen managers". After the new policy was put in place, they felt it gave them the legitimacy and authority to make important changes that would otherwise have been too difficult to instigate at school level *(182)*. Complaints about changes originated from a small number of parents and children, and were quickly resolved once it became clear to the complainants that the policy was permanent and non-negotiable *(182)*.

Factors that could make it easier for schools to comply with a school nutrition policy include educating parents, the school community and the broader community about the importance of healthy eating, to engender greater support for the policy and encourage associated nutrition-related behaviours (e.g. parents packing healthy lunchboxes). Principals from regional areas were particularly interested in access to additional resources to distribute to key stakeholders (especially parents) to ensure that they are aware of the specific requirements of the policy *(226)*.

Parents sometimes act as a barrier to policy implementation by resisting changes, but their support and engagement can also be a facilitating factor for implementation, as shown in a Canadian study *(206)*. Parental support was identified as an important facilitating factor and vital for successful implementation; parental support included parents acting as nutrition policy advocates, participating in healthy eating initiatives, and promoting the policy within the school community *(238, 344)*. In contrast, parents' resistance to change was the most frequently cited barrier to adopting the *Alberta nutrition guidelines for children and youth* in schools *(335)*. Another study in Alberta found that parents' "strong concern about eliminating choices" and "students' freedom to choose what to buy and eat" in school posed barriers to adoption and implementation *(231)*.

A United States survey across secondary schools in 28 states found that family involvement was a facilitator in the development and implementation of school food and nutrition policies and standards *(350)*. Similarly, a study in the largest school district in the United States (in New York City) found that including parents in the transition process of changes to school food was critical. Their support was essential to success, and helped overcome industry opposition to the initiative *(340)*.

As mentioned above, high school directors, primary school directors and parent groups in Latvia contributed to decisions about the food and drink environment in schools by campaigning actively for the removal of soft drinks. They were the most influential and supportive stakeholders of this initiative, which resulted in a government ban on certain foods and drinks in schools *(187)*.

Perceptions of preschool centre staff and parents on healthy eating within preschool settings were assessed in a study from England. The study found that parents and staff had their own preconceived ideas about what it meant to be "healthy" *(310)*. In the United States, parental perceptions of the nutritional quality of meals served at school (through the NSLP) were associated with whether students ate lunch at school. The finding suggests that keeping parents informed about changes in school meals is critical to successful implementation of nutritional guidelines, and key to sustained participation in school meal programmes *(355)*.

Role of students

The level of schooling produced different challenges in implementing the Healthy School Canteen Strategy in Australia. For example, secondary schools in New South Wales experienced problems that were not experienced by primary schools, such as student autonomy and student demand

(279). Secondary schools in Queensland also reported more challenges with implementing Smart Choices in tuckshops, and were more likely to report less satisfaction with the range of healthy products available (and decreased profit); this may be explained by the more established food preferences of older children *(236)*. A United States policy analysis of changes to the school food environment in New York City found that involving students was important to ensure that new foods (adhering to updated nutritional standards) on the citywide school menu appealed to students *(340)*. The capacity of schools to constrain students wanting to leave the premises to buy food was high among the worries of staff *(41)*.

"The choice dilemma" – that is, the dilemma between aligning menus with existing choice preferences to protect school meal uptake and restricting unhealthy options to promote healthy eating – was considered a barrier to implementing healthy eating policies in Wales *(150)*.

Perceptions about compulsory policies

In secondary academies[1] in England, school staff reportedly queried the effectiveness of standards if they were not compulsory, and no one was monitoring them either internally or externally *(229)*. On the other hand, some of the implementers of the school food and nutrition guidelines in public schools in British Columbia reportedly responded to the mandatory directive with feelings of aversion to being told what to do. This drove them to either ignore the guidelines, continue with business as usual or find ways to circumvent the guidelines[2] – all enabled because of the absence of official enforcement measures (see also "Elements that hinder or support monitoring, evaluation and enforcement") *(240)*.

Interference and pressure from industry

A study from the Philippines (with policy-makers and stakeholders involved in school food policy-making and implementation) reported that external actors, particularly from large food companies, were compromising policy processes and agenda-setting, and that food companies used existing relationships with schools to promote their brands and compromise the establishment of a stronger food policy agenda *(242)*. The study also reported that interviewees in the health and education arms of government anticipated vigorous opposition from the food industry to any efforts to reduce marketing or restrict the sale of unhealthy foods in and outside of schools, and that this would have a strong influence on political commitment to this agenda. Informants cited examples of food companies "deliberately obstructing the public health agenda by coercing policymakers and engaging in political advocacy against health legislation", and policy-makers at both national and local government levels reported being "directly approached by food industry executives and pressured to lift policy initiatives aimed at improving food in schools" *(242)*.

Case studies and reviews from Chile and Mexico have reported how the role and pressure of industry have acted as barriers to the development and implementation of new or more stringent policies or regulations restricting sales of unhealthy foods and beverages in schools *(181, 331, 356–358)*. For example, two studies from Mexico reported that industry representatives have offered financial support to schools, impeding implementation of an already existing regulation *(331, 356)*.

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[1] Academies are schools in England that are independent of control by local authorities and directly funded by the central government (Department for Education). Academies were previously, and at the time of the referenced report, exempt from having to follow the compulsory school food standards introduced in 2006. Currently, academies are expected to comply with the requirements of the School Food Regulations 2014; this is an explicit requirement in funding agreements with the Department for Education.

[2] Examples included continuing to sell popular items for fundraisers that did not meet the guidelines, but selling them to parents rather than students; selling items to students that technically complied with the nutrient criteria due to their size but where students often bought more than one item (e.g. a slice of pizza); and selling an item for a fundraiser that complied with an accompanying "free" item that did not comply (e.g. milk with a free cookie).

Multi-strategy interventions to improve implementation

Interventions that include elements such as leadership, consensus processes, education and training, resources, audit and feedback, and ongoing support in the form of text messages and emails improved implementation of school nutrition policies *(308, 359)*, but one intervention that included supportive elements did not *(360)*. The number of primary and middle schools reporting that they had policies or guidelines in place on regulating competitive foods in the school environment in Philadelphia increased following a health promotion campaign[1] *(361)*.

Elements that hinder or support monitoring, evaluation and enforcement

Teachers in Dutch primary schools reported difficulties in enforcing the food policy and noted unclearly defined food rules as one reason *(196)*. A general lack of accountability information in the policies, including how the policy is monitored and consequences of noncompliance, was reported to be associated with lack of implementation in a review of 13 school nutrition policies in Australia, at both national and state levels *(362)*. Information about the consequences of not following school food standards was also considered important if they were to be taken seriously *(313)*. A review of key issues in monitoring and evaluating school nutrition policies in Canada found that assessing implementation of, or adherence to, nutrition policies that include nutrition standards "presents a considerable challenge". Reasons included the varying nature of food services within provinces and school districts, the "increasing complexity of the food supply", and resources, both human and financial, required to conduct audits (for monitoring and evaluation) *(363)*.

In the Philippines, study participants noted that a lack of adequate monitoring and enforcement was a key factor impairing the effectiveness of the existing policy on food provision and sales in the school setting. This related to a lack of human and financial resources at the national, subnational and local government levels; a lack of clarity around the criteria to use for monitoring; a lack of appropriate sanctions for violations; and an absence of tools to aid assessment, reporting and enforcement *(242)*. Ambiguity in policy wording allowed a wide interpretation of the foods eligible to be provided in schools, which also led to difficulties in effective monitoring and enforcement *(242)*. Lack of specific policy knowledge among those responsible for carrying out and enforcing school health and wellness policies was also noted as a barrier *(344)*.

Adherence to a formal review process for canteens was reported as a factor relevant to compliance with the Healthy School Canteen Strategy in New South Wales, Australia *(279)*. In Northern Ireland, draft updates to nutritional standards for school food included a proposal for monitoring and evaluation: that independent arrangements should ensure that the updated standards are "being implemented equally in all grant-aided schools" and should "highlight examples of good practice as well as barriers to implementation" *(86)*.

A case study in the United Kingdom found that the Schools (Health Promotion and Nutrition) (Scotland) Act 2007 placed a burden on local authorities to undertake internal monitoring and evaluation to demonstrate compliance with the Act. This was complemented by external evaluation through Education Scotland's inspection activities. In a proportion of inspections, a Health and Nutrition Inspector evaluated and reported on a school's progress in implementing specific duties, including those in the Act related to school meals, and compliance with nutrition regulations *(313)*. The case study showed that most, but not all, of the drivers to evaluate policy implementation have come from departments of education rather than departments of health or welfare. While this may be because the intervention is taking place in schools, there has been a notable lack of integration of assessment in relation to health, educational and social outcomes. Evaluations have therefore

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[1] The Philadelphia Campaign for Healthier Schools was implemented in 170 public schools, of which 117 were schools with students up to grade 8.

tended to be piecemeal and often not easily compared between countries in the United Kingdom. Policy evaluations might have yielded more insights and been more cost-effective if they had been better coordinated across government departments and between countries, to capture more fully the impact of introducing school food standards on children's health, education and well-being *(313)*.

A study on the Brazilian school food environment reported that, despite a ministerial ordinance establishing guidelines for what can be sold on public and private school premises, "there is no mechanism put in place to monitor and supervise the commerce" *(364)*.

A United States study examined the perceptions and concerns of school food service directors in development and enforcement of local school wellness policies in Pennsylvania. The study was conducted after the Child Nutrition and WIC Reauthorization Act of 2004 was passed, but before local school wellness policies were required to be in place. School food service directors expressed concern about policy enforcement because of the time commitment required and the need for administrators to assume this responsibility *(337)*.

Governmental guidelines on monitoring

Some government departments and policy organizations (e.g. in the United Kingdom) have published guidelines on compliance and monitoring to support the process *(365)*.

Impacts on health systems, food systems and the policy environment

Reformulating food for schools has been shown to be feasible and could trigger more reformulation at scale. Schools that have successfully reformulated food products could serve as an example. A United States study found that legislation in Massachusetts on school competitive food and beverage standards (similar to the national Smart Snacks in Schools policy) led to reformulation of competitive foods sold in middle and high schools across the state. Nearly 15% of the reformulated foods were look-alike products that could not be purchased at supermarkets *(366)*. An online experiment with students and parents found that smart snacks[1] were "virtually indistinguishable" from less nutritious versions widely sold outside schools. This could undermine efforts of the Smart Snacks policy, if not implemented at scale *(367)*.

A study in the United States examined the perspectives of food service directors from demographically varied school districts nationwide on the revised school meal standards mandated by the HHFKA. The participating food service directors reported that the new standards' most notable impact on students was an enhanced awareness of nutrition and health; the nutritional profile of school meals now aligned with the nutrition education curriculum, which the students were aware of *(232)*. However, the short timeframe for implementation of the standards' sodium targets was challenging; food service directors noted the difficulty in accommodating students' preferences when the sodium levels in other food environments were not changing *(232)*. This underscores the importance of ensuring broader implementation of school food standards.

Access to unhealthy food around schools acted as a barrier to implementation of school food and nutrition standards in a number of studies *(46, 154, 327, 331, 335)*, highlighting the importance of considering broader policies that include the food environment within and outside schools. For example, a study from England noted that the school commercial environment was constrained in the choices it could offer its consumers, whereas nearby food outlets were not. Many interviewees argued that this disparity would compromise the success of the new standards if the availability of

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[1] The authors of the study explained, with reference to other studies, that, in response to the Smart Snacks policy, some snack food manufacturers reformulated their existing products to meet the Smart Snacks nutrition standards to enable continued sales in schools.

products was not similarly controlled outside the school gates *(230)*. Adopting a "whole-school" approach (embedded within the notion of the "health-promoting" school) appeared the most successful in implementing the new standards in England *(230)*.

A nationwide United States study examined the association between the existence of SSB sales taxes at the state level and the strength of state laws governing competitive beverages in schools. The study found that a higher disfavoured[1] SSB sales tax was generally associated with higher odds of having strong school beverage policies across all grade levels *(368)*. In Hungary, competing goals among different governmental agencies was identified as one of the "failures leading to the collapse" of a new government regulation to update the nutrition requirements of the public catering service, including school meals *(369)*.

Intervention group 2: Marketing restrictions on unhealthy foods and non-alcoholic beverages in and around schools

Some studies in the United States surveyed politicians, experts and researchers on perceived feasibility and impact of policies *(370, 371)*. For example, a study on increasing access to healthy foods and limiting unhealthy foods surveyed the opinion of national researchers and subject experts, policy experts, state-level advocates, programme administrators and food producers. "Prohibit[ing] the advertising of foods or beverages in school buildings or on school grounds except for those meeting nutritional standards" and "prohibit[ing] food and beverage advertising on school buses" were rated by the survey participants as having a low impact, but high political and implementation feasibility *(370)*. Another study asked experts to assess the likelihood that a policy item would "receive a favorable hearing from policy makers". "Banning advertising of unhealthy foods in schools and school venues" received a higher rating on impact than feasibility (i.e. low feasibility, high impact) *(371)*.

Compliance

Two studies were identified that examined compliance with state or district-wide policies restricting marketing of FNABs in schools *(259, 372)*. Noncompliant marketing of products was prevalent in the majority of schools in both studies.

Elements that hinder or support development and implementation

Resources

In Maine, administrators in nearly all surveyed schools reported wanting more resources to help implement the statewide policy *(259)*. Requested resources included information about the policy itself (e.g. what products are banned), technical assistance on how to better implement the policy, funding to implement the policy, cooperation by vendors (including the ability to change contracts), and a clear enforcement process and an assessment tool to help identify noncompliant marketing in schools *(259)*.

Role of government and policy-makers

A qualitative study from the Philippines found that requests from politicians for stronger evidence acted as a barrier to adopting comprehensive policies for healthy school food provision and marketing. Interviewees reported that policy-makers who had tried to bring attention to the contribution of food provision and marketing to unhealthy eating habits were faced with requests from politicians for specific types of evidence, including national data, on the linkage between sugar

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[1] To account for states that taxed SSBs at a higher rate than food, the authors created a measure of a disfavoured tax, meaning the difference between the SSB sales tax and the tax on food products generally. SSB sales taxes in the study ranged from 0% to 7.5%; three categories of disfavoured SSB tax were constructed (0%, >0–5%, >5%).

consumption and poor health *(242)*. There was also widespread concern among policy-makers that restrictions would interrupt the profitability and growth of food companies, and this acted as a barrier to adopting policies *(242)*.

Confusion about, or lack of awareness of, policy

A study from Maine found that administrators in the surveyed schools often did not know about the statewide ban, or were confused about the difference between the marketing ban and the state nutrition standard for foods that are sold *(259)*.

Funding

In Ireland, school staff from more than 300 schools reported that inadequate funding for essential school equipment was the primary reason they accepted commercial sponsorship *(260)*.

Interference and pressure from industry

A qualitative study from the Philippines (with policy-makers and stakeholders involved in school food policy-making and implementation) reported that external actors, particularly large food companies, compromised policy processes and agenda-setting. Food companies used existing relationships with schools to promote their brands and compromise the establishment of a stronger food policy agenda *(242)*. Policy-makers were concerned that existing engagements with large food companies to address resource shortages in the education sector[1] would be a barrier to imposing marketing restrictions at schools *(242)*. Interviewees in the health and education arms of government anticipated that the food industry would vigorously oppose any efforts to reduce marketing or restrict the sale of unhealthy foods in and outside of schools, and that industry would have a strong influence on political commitment to this agenda. Informants in the study cited examples of food companies "deliberately obstructing the public health agenda by coercing policymakers and engaging in political advocacy against health legislation". Policy-makers at both national and local government levels reported being "directly approached by food industry executives and pressured to lift policy initiatives aimed at improving food in schools" *(242)*.

State-level guidance

A United States study on food and beverage marketing policies found that state-level guidance was positively associated with school districts prohibiting advertisements for junk food or fast food restaurants on school property. The study also found that technical assistance from states was negatively associated with two district practices to restrict marketing of unhealthy foods and beverages, but positively associated with one practice to promote healthy options – namely, districts funding professional development on promoting healthy choices in the cafeteria. The authors hypothesized that districts may be better equipped to provide professional development on promoting healthier options because several initiatives exist to support the work, whereas fewer resources exist to help districts address marketing of unhealthy foods and beverages *(373)*.

Elements that hinder or support monitoring, evaluation and enforcement

A systematic review of FNAB marketing in schools identified many approaches and measures, which varied greatly, to examine school-based FNAB marketing practices. However, there was no "gold standard" *(164)*, making it challenging to compare or track changes in exposure levels and compliance over time.

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[1] The Philippines Department of Education has implemented the Adopt-a-School Programme, which aims to improve education quality and opportunities by engaging private partners to provide infrastructure, funding and other resources in exchange for tax incentives to address resource shortages in the education sector.

A study from the Philippines found that a lack of human and financial resources for implementation, monitoring and enforcement restricted the impact of an otherwise "relatively strong policy mechanism for healthy school food provision and marketing restrictions" *(242)*.

Impacts on health systems, food systems and the policy environment

A study in United States secondary schools found that the number of locations where a school banned advertising for unhealthy foods was positively associated with the prevalence of using price incentives, and marginally associated with the prevalence of attractive cafeteria displays to promote fruit and vegetable consumption. As well, the number of locations where schools banned advertising was directly related to the overall number of strategies implemented to promote healthy food and beverage choices *(161)*.

Intervention group 3: Nudging interventions promoting healthy food behaviour in the school environment

A process evaluation of the Smarter Lunchrooms Movement revealed implementation barriers. In both urban and rural schools in the United States, some providers questioned the intervention effectiveness of interventions and/or expressed negative attitudes related to the perceived ineffectiveness of their efforts. Barriers included following protocol and maintenance post-intervention *(374)*.

Elements that hinder or support development and implementation

Time constraints were identified as a main barrier to implementation of nudging interventions *(264–267)*. Time-consuming practicalities of fruit and vegetable programmes included cutting up fruit and vegetables (by teachers and pupils), restoring order after pupils ate fruit and vegetables in class, cleaning, and allocating time for eating fruit and vegetables *(264)*. Limited time in the curriculum was also reported *(265, 266)*.

Lack of support and anticipated resistance from parents, students and school staff was another commonly cited barrier to implementation. Other barriers were lack of resources (including funding, fruit and vegetable supply, and educational materials); lack of teacher confidence, knowledge or training; mess in class from preparation of fruit and vegetables; lack of available space; or disruption to classroom routine from fruit and vegetable breaks *(265–267, 374)*. According to many teachers, the programme required more teacher control than initially expected *(264)*. A process evaluation of the Smarter Lunchrooms Movement revealed implementation barriers, including limited buy-in from food providers that had no say in project participation or implementation *(374)*.

The odds of having adopted a fruit and vegetables break to a "recommended level" were greater among small schools, rural schools and schools from lower SES areas *(266)*. The odds were also greater for schools that informed parents that such programmes were occurring and those that had teachers trained in programme implementation *(266)*.

One study, conducted in English secondary schools, found that implementation of a placement intervention (i.e. placing fruit in front of cakes and cookies, and positioning drinks according to sugar content, with water at eye level) did not seem to cause many difficulties for the staff *(223)*.

Intervention group 4: Pricing policies to promote healthier alternatives

Impacts on health systems, food systems and the policy environment

A study in United States secondary schools found that the number of locations where a school banned advertising for unhealthy foods was positively associated with the prevalence of price

incentives, and marginally associated with the prevalence of attractive cafeteria displays to promote fruit and vegetable consumption. The number of locations where schools banned advertising was also directly related to the overall number of strategies implemented to promote healthy food and beverage choices *(161)*.

Intervention group 5: Direct food provision to students in schools

Elements that hinder or support development and implementation

The vast number of direct food provision interventions implemented globally in schools speaks to the feasibility of these interventions. One study explicitly asked health and nutrition policy experts about the feasibility[1] and impact of different policies to address childhood obesity. The study found that the provision of free or subsidized fruits and vegetables at school lunch was highly rated in terms of both feasibility and impact *(371)*. Another study found a free school meals trial to be "relatively straightforward", with no unexpected impacts, and roll-out by other local authorities should not be problematic *(97)*. Feasibility increased over time once schools settled into efficient routines *(276)*.

Political will

An analysis by the WFP, the Partnership for Child Development and the World Bank found that the main preconditions for a successful transition from externally supported programmes to sustainable national school feeding programmes were having political champions and local leadership to generate political will. It was also considered important to mainstream school feeding into national policies and plans (especially education sector plans), identify national sources of financing, have transition agreements with donors and partners, and expand national implementation capacity *(375, 376)*. In India, the financial resources and the political will of the panchayats[2] was a key factor in determining whether the school meal programme was implemented, as well as the quality and administration of the programme *(106)*.

Lack of awareness of the policy

A United States study on the provision of free drinking-water in food service areas in Californian public schools (as required by state legislation) found that lack of knowledge of the drinking-water requirements among school administrators was a barrier to implementation *(377)*.

School infrastructure and organizational aspects, including monitoring demand

A number of studies from India and the United Kingdom reported implementation challenges related to physical spaces in schools, such as the need for kitchen space or refurbishment, and equipment *(39, 167, 271)*; lack of sufficient dining space *(97, 167)*; and lack of storage facilities *(107, 167)*. In preparation for implementation of the Universal Infant Free School Meals scheme in England, smaller schools had to make only a few amendments, such as equipment updates, but larger schools had to undertake major kitchen refurbishments *(39)*. An evaluation of a free school meals trial for primary school students in Scotland found interrelated problems of dining area size and time available for lunch. School staff outlined several successful strategies that would be useful should free school meals be rolled out across other local authorities. These included making effective use of limited time and space by staggering the times students arrive at dining areas, setting tables in advance, operating different queuing systems or service areas, allowing slightly longer lunchtimes, and using alternative accommodation (especially for packed lunches) *(97)*.

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[1] To assess feasibility, participants were asked to assess the likelihood that a policy item would "receive a favorable hearing from policy makers".
[2] A panchayat loosely translates as a village council.

In operation since 1950, Grenada's school feeding programme has sustained despite a number of challenges, including transportation, poor condition of some kitchens, financial system, insufficient accountability, delays in timely replacement of equipment, schools with no cooking facilities and inadequate servicing of equipment *(317)*.

Other organizational challenges to implementing the Universal Infant Free School Meals scheme in England included excessively time-consuming funding applications, having to run trials in preparation, recruiting and training new catering support staff, increased working hours, and significant disruption to the kitchen with new installations *(39)*. A fruit and vegetable programme in Denmark reported challenges related to delivery of the produce, including food suppliers' timing of delivery, fruits and vegetables being difficult to order when out of season, inconvenient delivery sizes, and delivery to schools located far away *(264)*. However, most suppliers did not experience the delivery as time-consuming. Their participation and implementation of the programme were facilitated by prospects of publicity and branding; the opportunity to show goodwill to the cooperative owner, the school, pupils and parents; and the opportunity to support a good cause *(264)*.

An evaluation of the Free School Meals pilot in England reported that trialling new approaches to delivery until the right solution was found helped schools develop systems to manage the increased volume of school meals, which underpinned successful implementation and delivery of the pilot *(276)*. Schools found it difficult to accurately predict demand for particular meal options and order the appropriate quantities of food; this was addressed using a pre-order system for meal selection. Being able to monitor demand accurately through the School Information Management System and use of cashless systems was helpful in monitoring take-up, which underpinned successful implementation and delivery of the pilot *(276)*.

A coordinated programme to support the transformation of school food and implementation of the United Kingdom school food standards included setting up the School Food Trust to help implement the changes, and to establish a monitoring and research programme. Better coordination of the programme resulted in an increase in the take-up of school lunches, meaning that more pupils are having healthier food at lunchtime *(313)*.

Staffing concerns

Many studies identified staffing concerns as barriers to implementation. These included lack of trained staff (nutritionists, cooks, catering staff and teachers) *(107, 167, 271, 276, 378)*, high turnover *(276)* and increased workload *(97, 379)*. An impact evaluation on the MDM Scheme in India identified a shortage of officials and employees at state, district and "block" levels, and high staff vacancies existed with no recruitment taking place *(107)*. Another study on implementation of the MDM Scheme observed that, without effective supervision (a role often assigned to teachers), forceful students received more food (and some wasted food), while others were left half fed *(152)*. An evaluation of the Free School Meals pilot in England found that building sufficient staff resources and capacity (enabled by having the appropriate levels of staff with the right skills) was an important factor underpinning successful implementation and delivery of the pilot *(276)*. In Grenada, staffing issues and low, uneven salaries of cooks were identified as challenges to implementing the school feeding programme *(317)*.

In programmes that were implemented in classrooms, loss of instructional time was reported as a barrier to implementation *(264, 269, 379)*. A study that explored the experiences of implementers of the Ghana School Feeding Programme reported "prolonged time" spent serving, eating and cleaning up. This took time away from teaching and learning periods, which the authors interpreted

as "posing a threat to education quality" *(379)*. Factors that may hinder upscaling of a BIC model[1] of the United States School Breakfast Program include the loss of instructional time and general lack of accurate awareness across school staff groups of the nutritional standards that food items are required to meet *(269)*. Whereas time was considered a barrier among teachers implementing a fruit and vegetable provision programme in Denmark *(264)*, teachers in primary schools in Wales did not feel that distribution of fruit at break time created unreasonable extra work *(122)*.

Financial resources

Resource implications of interventions providing school food, summarized above, may be a barrier to implementation. Barriers related to funding include insufficient funds *(39, 152, 352)*, delays in receiving funds *(39, 107, 379)* and having to seek alternative sources *(107, 379)*. Cost was also a commonly cited barrier to programmes that provide free drinking-water in schools *(377)*.

In relation to implementation of the Universal Infant Free School Meals scheme in England, some concern was expressed by head teachers from primary schools about access to funding (including reports of delays in receiving funding) or insufficient funding *(39)*. A study on the MDM Scheme in India reported a general "improper flow of funds" from districts to schools, with significant delays of 3–4 months. The quality of meals suffered as a result in many schools. Sometimes the volunteer groups of women in charge of purchasing cooking ingredients and paying cooks/helpers were forced to find other solutions to keep the programme going – for example, by using their own monetary resources *(107)*. In another study on the MDM Scheme in India, teachers generally reported that funds for the programme were insufficient, which required them to compromise on the quality of food that was served *(152)*. A study on the Ghana School Feeding Programme reported that caterers were expected to pre-finance the feeding of the students and be reimbursed by government, but complaints were made of delays in reimbursement by several months. Neither of the caterers interviewed had the financial capacity to pre-finance and wait months for reimbursements, which meant that they had to source credit facilities from suppliers, and financial and other institutions. The authors noted that these funding challenges "raise sustainability concerns" to programme implementation *(379)*. A study from Ontario in elementary and secondary schools found that the availability of funds from government grants, external fundraising and student payments made it possible for some schools to offer regular free or subsidized breakfast, lunch or snack programmes. However, other schools that wished to have such programmes had limitations due to lack of funds *(352)*.

Specific funds that are earmarked for school feeding programmes helped to facilitated implementation *(106, 313)*. In the United Kingdom, a coordinated programme, including dedicated funding to support schools and caterers and keep the price of meals down, resulted in increased take-up of school lunches *(313)*. A study on the MDM Scheme in India found that the reluctance of the panchayats[2] to implement the programme stemmed from the lack of separate earmarked funds for the programme *(106)*.

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[1] The study reported that the BIC delivery model of the School Breakfast Program (SBP) was developed as a way to address the gap between eligibility and participation in the SBP, an issue particularly observed in schools with high proportions of students from low-income households. The BIC model made breakfast available for free to all students in the classroom at the start of the school day (not just students already eligible for participation in the SBP), thereby mitigating major barriers related to timing and stigma.

[2] A panchayat loosely translates as a village council.

A study from the United States examined the perspectives of stakeholders of a BIC model[1] of the School Breakfast Program. The study found that the increase in federal reimbursement funds due to the BIC model, which resulted in additional discretionary funds for the districts, was an important factor that could support upscaling of the BIC model. School staff members were also aware of the increase in funds, and cited this as a positive impact *(269)*.

Roles of stakeholders and partnerships

Effective communication and partnership between groups helped facilitate implementation. An evaluation found that effective communication and partnership between all parties involved in implementing and delivering the Free School Meals pilot (school staff, staff from local authorities, and senior school) in England underpinned successful implementation and delivery of the pilot *(276)*. Local authorities and catering services were the main source of information, support and guidance for schools throughout the pilot. They helped schools implement changes to the physical school structure, workforce and menus, and helped set up administrative systems *(276)*.

As described for the Brazilian school feeding programme, implementation of direct procurement for school feeding is a complex process that involves agencies, institutions and stakeholders from different sectors at all levels of government and civil society *(380)*. Civil society participation in the formulation of the school feeding legislation was found to be a strong and crucial factor for its approval in the National Congress in Brazil *(95)*.

An impact evaluation on the MDM Scheme in one state in India (Chhattisgarh) reported that a group of 8–10 women (mothers of students) were responsible for running the programme at school level. School Management Committees[2] (comprising members of the panchayats,[3] parents and senior teachers) played an important role in the implementation of the programme by organizing regular meetings to address any concerns or issues related to the programme and to purchase needed kitchen items. Women volunteer groups were responsible for taking care of the cost of food grains for cooking and the honorariums of cooks/helpers (with funds released by a district education officer). Teachers were generally relieved from day-to-day intricacies of running the programme (although it was also reported that some education staff for whom the scheme was not a priority were given tasks related to the scheme) *(107)*. Also in India (Kerala and West Bengal), a study observed varying roles and effectiveness of School Management Committees, which the authors attributed to "political salience in the appointment of the [committee] members" *(152)*. In contexts where School Management Committees were weak, school headmasters would "stage manage" service delivery for a day or two when inspection visits from higher levels took place – for example, ensuring that certain foods were on the menu, and that "orderliness prevailed" during food service.

Programmes where teachers and parents were expected to have a high level of involvement faced greater challenges to implementation. For example, a study from India found that teachers were responsible for the meal, including procuring ingredients and distributing the cooked meal to students, which disrupted the teaching process *(167)*. In Kerala and West Bengal, the MDM Scheme required a parent representative to be "present in the school before the meal is served and taste it to ensure that the food is good", but the authors did not find any parents performing this role because most households were economically poor, and depended on wages earned each day. The authors

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[1] The study reported that the BIC delivery model of the School Breakfast Program (SBP) was developed as a way to address the gap between eligibility and participation in the SBP, an issue particularly observed in schools with high proportions of students from low-income households. The BIC model made breakfast available for free to all students in the classroom at the start of the school day (not just students already eligible for participation in the SBP), thereby mitigating major barriers related to timing and stigma.

[2] Having School Management Committees was made mandatory in the 2009 Right to Education legislation for all schools receiving government grants.

[3] A panchayat loosely translates as a village council.

concluded that household poverty affected the ability of parents to negotiate for the welfare of their children *(152)*.

Issues related to uptake of free school meals

Multiple studies reported issues related to stigma for receiving free school meals, and described steps taken to reduce stigma and ensure anonymity, such as cashless systems *(210, 215, 276)*. Awareness of low uptakes in schools triggered school stakeholders to initiate activities to increase free school meal uptake, as reported in the United Kingdom. Not being aware of uptake levels led to assumptions that all students entitled to a free school meal would take it *(378)*. An evaluation of the Free School Meals pilot in England highlighted initiatives to encourage uptake, including introducing a pre-order system for meal selection, using a cashless payment system, maintaining a strict policy about the contents of packed lunches, involving students in decisions about the menu options, improving the dining experience, offering taster sessions to parents, promoting school meals by emphasizing the health and social benefits, and reducing the stigma attached to receiving free school meals *(276)*.

A study of factors influencing registration for free school meals and subsequent take-up in primary and secondary schools in England found that parents of primary school children did not regard stigma as an issue because students automatically received their meal without the need for a ticket or token; the potential for them to be identified as needing a free school meal was therefore negligible *(215)*. Parents with children in secondary schools preferred the cashless payment system because it did not identify students receiving free school meals. Some parents regarded this system as "crucial to ensure confidentiality and minimize the associated risk of stigma". The authors found that parents generally needed reassurance that their child would not be identified and anonymity would be maintained. Head teachers also saw the benefit of cashless systems since they did not discriminate between paying students and students receiving free school meals, and consequently had the potential to eliminate stigma. The study also found that no participants had witnessed or experienced bullying in school due to free school meal entitlement, but many participants were aware of this as a potential issue. For the vast majority of parents, claiming free school meals was not seen as a source of stigma or shame, with accounts including "temporary stop gap" or "normal part of life". The "normalization" of free school meal entitlement referred to by both parents and head teachers was likely a result of the homogeneity of the student population in terms of SES, with almost half of the students in school claiming free school meals *(215)*.

In the United States, key stakeholders (school district central administrators, local school staff, county government employees, and staff in community-based organizations) believed that the current ticket system used for the free or reduced-cost lunch programme should be changed to an electronic card system that would make participation in the school lunch programme anonymous, thereby reducing the associated stigma *(210)*.

Other barriers to free school meals included parents' perceptions *(39, 355)* and difficulties with the application process *(215, 276)*. A United States survey of parents of students attending schools with low-income and high-ethnic-minority populations found that that parental perception of the nutritional quality of meals served at school (through the NSLP) was associated with whether students ate lunch at school. According to the authors, the finding suggests that keeping parents informed about changes in school meals is critical to successful implementation of nutritional guidelines, and to sustained participation in school meal programmes *(355)*. Catering managers in England perceived that, if school meal uptake was not mandatory, some parents might still prefer packed lunches for their children, and they expressed concern over increased challenges from parents' demands *(39)*. A study in England found that barriers to uptake included the "bureaucratic claiming

process", and illiteracy, poor language skills and lack of confidence affecting some parents' ability to apply. The relationship between school staff and parents was highlighted as a facilitator *(215)*. Similarly, parents in a study evaluating the Free School Meals pilot in England reported difficulties understanding the eligibility criteria and application process. Parents' difficulties stemmed from literacy problems, language issues, and uncertainty about whether they met the new criteria and how to demonstrate eligibility. Some schools responded by providing one-to-one support and guidance to parents, but this resulted in a further drain on staff capacity *(276)*.

A United States study using nationwide data found that direct certification in the NSLP (a process conducted by the states and local educational agencies to certify eligible children for free meals without the need for household applications) led to an increase in students becoming certified for free meals[1] *(381)*.

Time was reported as a barrier to uptake – for example, the time it takes to be served *(116)* or the length of the queue in canteens *(52, 215)*. Limited opportunity for socializing with friends – as a result of queue length, segregated seating arrangements, rotation of seating and so on – was also considered a barrier to taking a school meal *(215)*. Students were also found to dislike canteens, and frequently characterized their school canteens and dining areas as "noisy", "crowded" and "dirty" *(222)*.

Meal choice was a potential barrier to complete take-up of school meals, even when these were provided free of charge to all students *(116)*. A major reason for non-uptake of a free school meals trial in Scotland was attributed to some children being "fussy eaters" *(97)*. Secondary school students more often than primary school students felt the school meal standards were too limiting in terms of food choice. However, not liking the food on the menu was mentioned as a reason for students in both primary and secondary school preferring packed lunches and, for secondary school students, why they would leave school to obtain other food *(215)*. Students also reported wanting to make culturally "safe" choices when choosing a free school meal. Muslim students commented that there were insufficient halal options and unclear signage, which undermined their confidence in the food because they could not be certain that they were eating culturally appropriate food *(215)*. Parents also reported lack of choices for their children, too many unfamiliar foods (particularly for "fussy eaters") and concern that their children would go without a meal if they did not like what was offered. Parents' priority was to ensure that their children did not go hungry. Some parents suggested that the free school meal allowance was insufficient to enable secondary school pupils to purchase an appropriately sized meal, and subsidized the cost as a consequence *(215)*. Secondary school students were reported to complain of small portion sizes and going home hungry *(215)*.

Elements that hinder or support monitoring, evaluation and enforcement[2]

A review of the status of monitoring and evaluation systems for school feeding programmes in sub-Saharan Africa explored how the systems could be strengthened. It found that monitoring and evaluation were often overlooked during scale-up of the programmes. The authors highlighted the scarcity of impact evaluations conducted, and the limitations of quasi-experimental evaluations undertaken by the WFP. For countries in the region with national school feeding programmes, and where monitoring and evaluation systems existed, the systems often operated under the ministry of education; other ministries were represented on technical steering groups supporting implementation. The review also found a general lack of dedicated budget lines at national levels;

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[1] The Child Nutrition and WIC Reauthorization Act of 2004 required local educational agencies to establish systems to directly certify children from households that receive Supplemental Nutrition Assistance Program (SNAP) benefits by school year 2008–2009.
[2] Only peer-reviewed publications and government reports are discussed in this section. It is acknowledged that reports from other organizations (e.g. WFP) would also provide insights here.

monitoring and evaluation systems were usually part of the administration, support or overhead costs for the full school feeding programme. Moreover, existing systems were not underpinned by national policies, plans or project documents in most countries. The review pointed to "a number of lost opportunities to improve programme responsiveness, efficiency and effectiveness". As well, the lack of investment in monitoring and evaluation systems had provided constraints in terms of "learning from the considerable experiences in-country and across the region, both in the programme and in the policy sphere" *(382)*.

Three studies from India reported on the monitoring system of the MDM Scheme, prescribed by the Department of School Education and Literacy under the Ministry of Human Resource Development. One of these was a case study, which referred to the monitoring system as "a comprehensive and elaborate" mechanism. The monitoring system included local-level monitoring with local representatives, and regular inspections by state government officers *(151)*. An impact evaluation from one state (Chhattisgarh) reported that the programme had an effective monitoring system, which was monitored at four different levels (district, block, community and school). For example, a district education officer was responsible for monitoring the scheme at district level, which included physically verifying the quality and quantity of food served to students, often visiting school grounds unannounced. Similarly, block development officers visited the school as part of monitoring mechanisms, and teachers were found to play a "crucial role" at school level. However, it was observed that no indicator-based monitoring of the scheme existed to measure its impact on the nutritional and health status of students. Periodic health check-ups were also not organized by the district authorities *(107)*. A study on the MDM Scheme in two states of India (Kerala and West Bengal) reported that teachers have "typically always resisted the job" of monitoring the programme, with the key argument that "teachers are meant to teach" *(152)*.

In Trinidad and Tobago, the Policy on School Nutrition calls for the provision of at least one nutritious meal daily to every child. The delivery of school meals is done through a special-purpose state enterprise, which falls under the authority of the Ministry of Education *(125)*. As such, the programme must be audited as stated in the Constitution and the Audit Act. Reports are prepared that examine the progress made, and provide valuable insights into programme delivery and possible shortcomings. The audit, for example, identified limited monitoring and evaluation of some of the programme objectives, and recommends the following actions to enable systematic progress in monitoring and evaluation of the programme: defining measurable targets relating to the key objectives; building a database to include statistics on recipients, students' grades and attendance, wastage, and local produce used; and making use of the information generated for reporting against set targets and taking appropriate action on a timely basis.

The Early Childhood Commission (ECC) of Jamaica was established by the Early Childhood Commission Act (2003) *(383)* to improve the quality of early childhood care, education and development. The commission conducts inspections of schools to assess implementation of school standards, as laid down in the Early Childhood Act of 2005 *(384)*. Inspection results are uploaded to the ECC website and publicly available.[1] Standards in the nutrition section include criteria on whether daily records of children's eating patterns are kept; whether menus are posted, or whether a nutrition plan is available and approved by the Ministry of Health that describes the provision of meals and snacks; and whether these meet the minimum components recommended for a balanced diet in the relevant age groups.

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[1] https://ecc.gov.jm/inspection-reports/

Impacts on health systems, food systems and the policy environment

Some evidence shows the impact of school feeding programmes extending to society *(107, 167)* and the home environment *(97)*. An evaluation of a free school meals trial for primary school students in Scotland found some evidence to suggest that the trial had a positive impact on the home environment of students. For example, parents talked about food with their children more often, and some parents noted that children were more confident in discussing their food preferences *(97)*. The MDM Scheme in India has provided employment opportunities, especially for women from disadvantaged groups (e.g. widows) because the Supreme Court of India stated that the main attention should be focused on women, especially while appointing cooks and helpers *(107, 167)*.

According to a report from 33 low- and middle-income countries, the requirement to follow nutrition guidelines and standards was a barrier to implementation *(148)*. Similar findings came from a study on implementing the National School Feeding Programme (PNAE) in Brazil *(271)*, underscoring the importance of a comprehensive and wholistic approach to improving the school food environment. Also in Brazil, the goal of Article 14 of 2009 (on family farming) was to support local economic development, but strong voices from the National Council for Food and Nutrition Security (CONSEA) working group contributed to the inclusion of specific nutrition standards for school meals in the implemented resolution *(385)*.

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Annex 1. Summary tables

To inform decisions on the strength of recommendations to be formulated on school food and nutrition policies to promote healthy diets, a summary table for each factor was prepared based on the identified literature for that factor. The summary tables were developed to closely align with the GRADE evidence to decision tables.

Summary table for Factor 1: Values

Children's perceptions, views and understanding of what constitutes healthy and unhealthy food, and implications of its consumption	Children generally had a good understanding of healthy food, although "feelings" and perceptions about implications of healthy eating seemed to vary. Healthy eating was most often linked to body image, and feeling fit and energized.
Values on (healthy) options available in and around schools, and factors influencing their choice	Students value options and the autonomy to choose the food they purchase and consume. Taste and appearance were important factors influencing choice (regardless of whether foods were healthy). Some studies identified peer pressure towards consuming unhealthy foods as an important factor influencing choice.
Values on health outcomes	There was no variability in values on diet-related NCDs in the identified studies. Diet-related NCDs were perceived as being negative. Values on body weight status varied by study population, but these variations were mainly based on values relating to body image and "aesthetics", rather than health.

Studies included: n = 49

Summary table for Factor 2: Resource implications

Intervention group 1: Nutrition standards or rules that determine the quality of food served or sold in and around schools	Resource implications varied in this intervention group, depending on the context. Whereas some studies found that costs were associated with ensuring that school meals served align with existing, new or updated standards, others found no difference.

Intervention group 5: Direct food provision to students in schools	The cost of providing food in schools to children varied greatly, and depended on the scale and scope of the school feeding programme. Commodity costs are typically the largest contributor to cost. Other main drivers of cost include transportation, logistics and programme support. Costs ranged widely, from about US$ 20 to US$ 1500 per child per year, depending on the type of food provision and location. The average cost of providing school feeding programmes to the children most in need is US$ 64 per child per year. Provision of fortified biscuits was the least expensive programme, and take-home rations were the most expensive. School feeding programmes in lower-income countries tend to rely more on external funding (i.e. donor agencies), whereas middle- and higher-income countries are primarily funded through internal revenues. In terms of cost–benefit ratios, the results were mixed and depended on the type of programme. However, one investment case model found that the cost–benefit ratio ranged from 1:3 to 1:8, meaning that the government could receive at least three dollars in economic returns for each dollar spent on school feeding programmes.

Studies included: n = 44

Summary table for Factor 3: Human rights, equity and equality

Accordance with international and regional human rights standards	General comments to the Convention on the Rights of the Child (CRC) state that the marketing of foods "high in fat, sugar or salt, energy-dense and micronutrient-poor [...] should be regulated and their availability in in schools and other places controlled". Special Rapporteurs on the right to food and on the right to health have recommended the implementation of school food and nutrition policies to realize the right to health and the right to food. At regional level, the Committee of Ministers at the Council of Europe adopted Resolution ResAP(2005)3 on healthy eating in schools in 2005, with specfiic reference to the CRC. Policies on school food and nutrition in some countries (e.g. Brazil, India) have been driven by a rights-based approach.
Impact on health (in) equity and health (in) equality	Generally, implementation of school food and nutrition policies (including on nutrition standards and direct food provision) were found to reduce inequities. However, depending on implementation and uptake of school-based interventions, they may be differentially effective across socioeconomic groups. They may also have other unintended consequences.

Studies included: n = 55

Summary table for Factor 4: Acceptability

Intervention group 1: Nutrition standards or rules that determine the quality of food served or sold in and around schools	**Acceptability to governments and policy-makers** Only two publications were identified that assessed acceptability among government stakeholders: a content analysis of media in the United States, which reported views against school food policies, and a study from Latvia reporting support for (but lack of leadership in) nutrition policy. **Acceptability to the public (including parents)** The majority of studies that assessed acceptability of this intervention group to parents were conducted in high-income countries. Most studies found wide-ranging support for policies to restrict unhealthy food and beverages sold or offered in schools and around schools, and/or to ensure that healthy options are available; a few studies found that support increases over time. Sociodemographic variations were found in acceptability: participants with higher levels of education and higher socioeconomic status were more likely to support policies, as were younger participants and women. **Acceptability to students** Acceptability to students appeared to be lower than acceptability to the public, including parents. Most students did not support all unhealthy options being restricted in schools, although there appeared to be an understanding that restricting unhealthy food and increasing availability of healthy options could improve eating behaviours. Generally, there appeared to be increased acceptability over time. **Acceptability to school-based stakeholders** Acceptance among school-based stakeholders varied. Although some teachers, principals and school caterers were supportive, others found school food and nutrition standards too restrictive and burdensome to implement. **Acceptability to industry** Industry was generally found not to be supportive of proposed school food standards. **Environmental acceptability** Identified studies reported an increase in food waste with new nutrition standards.
Intervention group 2: Marketing restrictions on unhealthy foods and non-alcoholic beverages in and around schools	**Acceptability to the public (including parents)** Only two studies were found: one from the United States showing low levels of support among parents for policies that allow school boards to raise funds by selling advertising space, and the other from Australia showing public support for restricting marketing, but not necessarily restricting sponsorship. **Acceptability to school-based stakeholders** School-based stakeholders generally accepted banning or limiting marketing in schools. **Acceptability to industry** One study was identified, from the Philippines, that showed industry compromising the policy process on marketing restrictions.

Intervention group 3: Nudging interventions promoting healthy food behaviour in the school environment	**Acceptability to students** Students were generally supportive of nudging interventions, such as changing names of healthy dishes to make them more appealing, providing point-of-purchase calorie information, and providing a supportive and pleasant environment in which to eat fruit and vegetables. **Acceptability to school-based stakeholders** School-based stakeholders were generally supportive of nudging interventions (fruit and vegetable breaks, cafeteria decorations, creative naming of foods), but (in one study) the extent of support depended on "school system factors" (e.g. time, cafeteria space to implement the intervention).
Intervention group 4: Pricing policies to promote healthier alternatives	**Acceptability to the public (including parents)** Only four studies were identified that reported the acceptability of pricing policies to the public, with some support for government subsidies of healthy school meals and use of government funding to public schools to make fruit, vegetables and low-fat milk available free at school lunches, and some support to increase the cost of less healthy food and drinks. **Acceptability to students** Results from one study found that students consistently believed that healthy options were too expensive and would like to see them being more affordable.

Intervention group 5: Direct food provision to students in schools	**Acceptability to governments and policy-makers** Acceptability among policy-makers varied greatly in the single study identified. **Acceptability to the public (including parents)** Most studies reported acceptability of this intervention group, although direct food provision was less acceptable if parents perceived choices or portion sizes to be too restrictive; parents (in studies in the United States and the United Kingdom) were concerned that children could go hungry. **Acceptability to students** Acceptability among students varied and depended on food choices and price (if food was not provided for free). Students were found to support the provision of fruit and vegetables and "breakfast in classrooms". **Acceptability to school-based stakeholders** School-based stakeholders, including teachers, principals and catering staff, were generally supportive of this intervention group (in a study that also reported difficulties in the "set-up and delivery phases"). **Environmental acceptability** Food waste resulting from food provision in schools was reported to be a concern in identified studies. One study from Australia, which used donated food for the breakfast programme, reportedly saved 14.4 tonnes of food waste (equivalent to 44 000 meals) during the two terms it was implemented.

Studies included: n = 116

Summary table for Factor 5: Feasibility

Intervention group 1: Nutrition standards or rules that determine the quality of food served or sold in and around schools	Overall implementation was considered feasible. Numerous examples of implementation of nutrition standards were identified. However, evidence was mainly from high-income countries, including Australia, Canada, the United Kingdom and the United States. Levels of compliance with school standards were reported to vary – for example, by type of school (e.g. public vs private, rural vs urban, primary vs secondary schools) and by type of standard (food vs beverage standard). A number of elements were identified that hinder or support development and implementation of standards. These included the availability of expert panels to help make recommendations to governments, having higher-level policies and a mandate from government, current school infrastructure and availability of facilities to implement new standards, feasibility related to financial issues, varying levels of awareness and understanding of policy details, effective communication, availability of training and guidance (e.g. guidance on clear delineation of roles and responsibilities), staffing concerns and competing priorities (e.g. among school stakeholders), leadership, and involvement of the school community. Most identified multi-strategy interventions improved implementation. Parents and students themselves were found to either hinder or support implementation and adaptation of nutrition standards. Interference or pressure from the food industry was also identified as a barrier.

Intervention group 2: Marketing restrictions on unhealthy foods and non-alcoholic beverages in and around schools	Marketing restrictions in schools were considered feasible. However, poor compliance was reported in two studies. A number of elements were identified that hinder or support development and implementation of marketing restrictions in schools, including lack of technical assistance and guidance, including on enforcement and assessment, to identify noncompliant marketing in schools. State-level guidance was considered a supporting factor. The request for local evidence from policy-makers was a perceived barrier, as was a concern that marketing restrictions would reduce revenue and growth among food companies. Inadequate funding for essential school equipment and reliance on commercial sponsorship were reported as barriers to implementation, as were interference in policy-making and pressure from industry.
Intervention group 3: Nudging interventions promoting healthy food behaviour in the school environment	Implementation of nudging interventions was considered feasible and, depending on the intervention, may be more or less time-consuming and demanding to implement. A placement intervention, for example, was considered very feasible, whereas an intervention that offered fruit and vegetable breaks reported more barriers. Time was considered a main barrier for implementation of nudging interventions that required teacher supervision and support. Other reported barriers (specific to fruit and vegetable breaks) included perceived lack of support by parents for a fruit and vegetable break; limited availability and high cost of fruits and vegetables; lack of support from school executives or teachers; lack of teacher confidence, knowledge or training in implementing a fruit and vegetable break programme; and disruption to classroom routines.
Intervention group 5: Direct food provision to students in schools	Overall, the vast number of direct school food provision interventions implemented globally, in low-, middle- and high-income countries, speaks to the intervention's feasibility. Feasibility was found to increase over time – for example, once schools settled into efficient routines. A number of elements were identified that hinder or support development and implementation of direct food provision interventions, including political will, local leadership, school infrastructure (i.e. equipment, sufficient space to prepare and store food, size of dining areas), ability to predict demand for school meals and programme coordination. Programme costs and staffing concerns were identified, such as insufficient staff (including trained and skilled nutritionists and cooks) and lack of supervision. School community involvement, and mechanisms for collaboration and engagement with a range of stakeholders were mentioned as facilitating factors (e.g. support from parents). Issues related to uptake of free school meals were identified, including stigmatization, but a number of effective initiatives to achieve greater uptake were proposed, such as pre-order systems for meal selection and cashless payments. Barriers to uptake among students included meal choices, portion sizes and queuing in canteens.

Studies included: n = 168

Annex 2. Description of policies

Australia

National Healthy School Canteens guidelines

Developed to assist canteen managers to select foods and drinks for sale in the school canteen that encourage and promote a healthy eating pattern.

[Intervention group 1]
References: (191, 386)

Western Australian Healthy Food and Drink Policy

In late 2006, the Western Australian Department of Education introduced the policy for implementation in 2007 in an effort to improve the food environment in government schools. There are five core areas of the policy:

→ A school-level healthy food and drink policy is developed.

→ Canteen menus must comprise a minimum of 60% "green" items (fruit, vegetables, wholegrain foods, lean meats and low-fat dairy products), no "red" items (foods high in fat, sugars and/or salt) and a maximum of 40% "amber" items (all other products), as determined by a traffic-light categorization system.

→ Canteen staff must undertake training in the traffic-light food categorization system and food safety/hygiene.

→ Foods and beverages classified as "red" are not used as classroom rewards or provided as part of school-run events and activities.

→ The school community is kept informed about the policy (e.g. through newsletters, school websites, colour-coded menus).

A national-level voluntary policy was introduced by the Australian Government Department of Health in 2010 that closely resembled the Western Australian policy. The national policy has since been adopted by several Australian states. Western Australia has retained its mandatory policy, which is largely consistent with the national policy, with some additional elements that make it more stringent. For example, Western Australia is the only jurisdiction to set specific targets for "green" (≥60%) and "amber" (≤40%) products, and to require school principals to report annually on compliance to the Western Australian Department of Education.

[Intervention group 1]
References: (182, 183, 226-228)

New South Wales Healthy School Canteen Strategy

Distributed to schools in term 2, 2004, with a target implementation date of term 1, 2005, and became a mandatory policy for both primary and secondary government schools in 2005. The main objective of the strategy is to limit the sale of energy-dense foods high in saturated fats, added sugars and added salt, and to promote the sale of nutrient-rich products.

[Intervention group 1]
References: (94, 279, 304, 308, 359, 360)

Healthy Food and Drink Supply Strategy for Queensland Schools

Strategy based on the New South Wales Training canteen menu planning guide, 2004, which was part of the New South Wales Healthy School Canteen Strategy. The strategy was developed by a partnership between the Australian Government Department of Education and Training, and Queensland Health, and implemented with the support of professional organizations and nongovernmental organizations. The strategy aims to ensure that all food and drinks supplied in schools reflect the Dietary guidelines for children and adolescents in Australia, and applies to all situations where food and drinks are supplied in the school environment (tuckshops, vending machines, school excursions, school camps, fundraising, classroom rewards, sports days, breakfast programmes, school events, class parties, sponsorship and advertising, and curriculum activities). Implementation became mandatory in all Queensland state schools on 1 January 2007. Mandatory implementation was not possible in non-state schools as they are not administered by the state government.

[Intervention group 1]
Reference: (387)

School Canteens and Other School Food Services Policy (Victoria)

The purpose of the policy is to ensure that school food services provide food and drinks that contribute to a supportive, healthy school environment. The policy applies to all foods and drinks provided within the school environment.

[Intervention group 1]
Reference: (281)

Crunch&Sip programme (New South Wales, Queensland, Western Australia)

First introduced by the Western Australian Department of Health as a statewide initiative in March 2005, and has since been extended to other states. Its primary objective is to increase consumption of fruits, vegetables and water by allocating time during class for their consumption.

[Intervention group 3]
References: (265, 388, 389)

Brazil

Brazilian National School Feeding Programme

Abbreviation/alternative title: PNAE

Started in 1954 as a targeted food aid programme designed to fight undernutrition and low levels of education. Over the years, PNAE regulations have evolved. The current objectives of the programme include meeting the nutritional needs of students while at school; contributing to the growth, development and educational achievement of students; and supporting the formation of healthy dietary habits. Since 2009, PNAE has also promoted family farming, requiring that at least 30% of the total financial resources allocated by the federal government to the states and municipalities for school feeding must be used in the purchase of products directly from this sector.

School feeding in Brazil is a universal right of students enrolled in public basic education and a duty of the state granted by the constitution. As such, PNAE regulates and guarantees school feeding as a right for schoolchildren. Provision of food includes breakfast, lunch and/or snacks, with a mechanism to determine the number of meals offered and serving time.

Integrated into PNAE is the regulation of sale and marketing of food within and outside school premises. PNAE is managed by the National Fund for the Development of Education, a body under the Ministry of Education.

[Intervention groups 1 and 5]
References: (95, 148, 271, 274, 349, 364, 380, 385)

Canada

Food and Nutrition Policy for Nova Scotia Public Schools

Mandatory provincial policy that provides standards for foods and beverages served and sold in schools. It includes directives for school eating practices such as pricing, programming and advertising, as well as guidelines that encourage schools to foster community partnerships and support local food products. The policy focuses on three major categories of food and beverages: maximum, moderate and minimum nutrition. To adhere to the policy, schools must ensure that the majority of food and beverage choices served or sold at school are in the category of maximum nutrition. Items of moderate nutrition may be served or sold no more than twice per week, or make up no more than 30% of choices. Items of minimum nutrition can be served or sold no more than twice per month, and only during special school events and occasions (not through regular school lunch options).

[Intervention group 1]
References: (178, 288, 294, 307, 334, 390)

Guidelines for food and beverage sales in British Columbia schools

Released in 2005 by the provincial Ministry of Health and Education, and revised in 2007 to align with Canada's Food Guide, and again in 2010 and 2013. The guidelines define the minimum nutrition standard that schools are required to apply to all food and beverages sold to students (including in vending machines, cafeterias and snack bars, and as part of fundraising activities or at special events). The guidelines are mandated for all public schools.

[Intervention group 1]
References: (185, 199, 240, 348, 391)

Ontario School Food and Beverage Policy

Abbreviation/alternative title: Policy/Program Memorandum No. 150 (P/PM 150)

The policy was announced in January 2010 and took effect in September 2011. The policy includes nutrition standards for food and beverages sold in schools. It applies in all venues on school property, such as cafeterias, vending machines and tuckshops; through all programmes, including catered lunch programmes; and at all events on school property, including bake sales and sport events. The nutrition standards do not apply to lunches or snacks that are brought from home. Schools are allowed up to 10 "special-event" days throughout the year, when they are exempt from the standards. Although special-event days give them greater flexibility with food and beverages, schools are encouraged to offer healthy options.

[Intervention group 1]
References: (46, 154, 295, 352, 392)

Alberta nutrition guidelines for children and youth

Abbreviation/alternative title: ANGCY

Released by the government of Alberta in June 2008. The goal of the guidelines is "to equip facilities and organizations with the tools they need to provide children and youth with healthful food choices in child- care settings, schools, in recreation centers, at special events, and in the community at large". The guidelines include a food rating system for food selection (choose most often, choose sometimes, or choose least often) and suggestions for provision of healthful foods, access to a safe eating environment, creation of healthful food environments, and ways to have a positive influence on food provided by parents and guardians. The adoption of the guidelines by schools is voluntary, and is not supported by any government-initiated policies on guideline adoption and implementation.

[Intervention group 1]
References: (231, 283, 335, 393)

Ghana

Ghana School Feeding Programme

Abbreviation/alternative title: GSFP

National programme to provide children in public kindergartens and primary schools in the poorest areas with one hot, nutritious meal every school day, using locally grown foodstuffs. Introduced in 2005, based on the New Partnership for African Development (NEPAD) Home-Grown School Feeding initiative.

[Intervention group 5]
References: (99, 379)

India

Mid-day Meal (MDM) Scheme

Abbreviation/alternative title: National Programme of Nutritional Support to Primary Education

National food provision programme launched in 1995 that aims to improve nutritional levels while enhancing enrolment, retention and attendance among students in primary and upper primary school.[1] Originally, the programme provided free food grains to schoolchildren in government and government-assisted primary schools. In 2001, the Supreme Court of India mandated the government to make necessary arrangements for ensuring the serving of cooked meals (as opposed to dry rations) consisting of at least 300 calories and 8–12 grams of protein each day of school for a minimum of 200 days. The scheme is covered by the National Food Security Act 2013.

[Intervention group 5]
References: (106–108, 151, 152, 166, 167)

Netherlands

Healthy School Canteen Programme

Environmental intervention designed to create a healthy food environment and promote healthy food choices in secondary schools and schools for vocational training in the Netherlands. Entails a multicomponent strategy involving all parties: students, teachers, parents, school boards, canteen

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[1]   Primary education represents five years of schooling, and upper primary six to eight years of schooling.

employees, municipal health services and caterers. The programme consists of a four-step roadmap for school working groups: (1) an inventory (what is the current state of affairs regarding cafeteria offerings, curriculum and policy?), (2) an action plan (setting goals and corresponding actions), (3) an implementation phase (implementing the action plan), and (4) an evaluation (what has been achieved?). While completing these four steps, the school is guided towards a healthy school canteen at its own tempo. The Healthy School Canteen Programme motivates schools to change the offerings in the school cafeteria. It encourages them to embed knowledge of healthy nutrition in the curriculum and to develop healthy school food policies. Ultimately, the Dutch Government would like to see all school canteens in the Netherlands become healthy school canteens. Therefore, the Ministry of Public Health, Welfare and Sports has assigned the Netherlands Nutrition Centre with responsibility for assisting schools to make their canteens healthier.

[Intervention group 1]
References: (44, 49)

United Kingdom

Universal Infant Free School Meals scheme

As of September 2014, every student in reception, year 1 and year 2 in state-funded schools has been entitled to a free school meal. To provide the meals, the government gives funding to schools maintained by local authorities, academies, free schools and alternative provision settings, including pupil referral units (establishments that provide education for children who are not able to attend a mainstream school).

[Intervention group 5]
References: (39, 123, 243, 394)

School food standards/regulations (England)

Initially, The Education (Nutritional Standards and Requirements for School Food) (England) Regulations, devised in 2007 to ensure optimal nutrition for children during the school day. The standards set out specific food-based and nutrient-based standards with which all schools maintained by local authorities and academies set up before 2010 must comply.

In 2014, the standards were revised (currently titled The Requirements for School Food Regulations); the revised standards came into force on 1 January 2015. Exceptions to the regulations are foods provided at parties or celebrations to mark religious or cultural occasions; at fundraising events; as rewards for achievement, good behaviour or effort; for use in teaching food preparation and cookery skills, including where the food prepared is served to students as part of a school lunch; and on an occasional basis by parents or students.

[Intervention group 1]
References: (41, 87, 111–115, 153, 180, 222, 230, 243, 313, 378, 394)

School Fruit and Vegetable Scheme (England)

Scheme administered by the Department of Health, stipulating that children 4–6 years of age in state-funded infant, primary and special schools in England are eligible to receive a free piece of fruit or vegetable every school day outside of their school lunch. There is no statutory requirement for schools to participate in the scheme.

[Intervention group 5]
Reference: (394)

Nutritional Standards for School Lunches, and Nutritional Standards for Other Food and Drinks in Schools (Northern Ireland)

Compulsory standards developed in 2007 to ensure that all food provided in grant-aided schools reflects government guidance on healthy eating. In April 2008, the standards were extended to include all food and drink in school, such as breakfast clubs, tuckshops and vending machines. This extension not is compulsory in certain circumstances, but the Department of Education recommends that all grant-aided schools adhere to the standards.

The standards were initially articulated in the "Balance of Good Health" visual, which became known as the Eatwell Plate. The Eatwell Plate was updated to reflect up-to-date research and government guidance on healthy eating, and is now known as the Eatwell Guide. The Eatwell Guide is a policy tool, produced by Public Health England in association with the Welsh Government, Food Standards Scotland and the Food Standards Agency in Northern Ireland, used to define government recommendations on eating healthily and achieving a balanced diet.

[Intervention group 1]
Reference: (86)

Free School Meals pilot (England)

A two-year programme operating in three local authorities (Wolverhampton, Newham and Durham) between autumn 2009 and summer 2011. The pilot aimed to improve the health and educational outcomes for children by ensuring that they eat at least one balanced healthy meal each school day (regardless of family income). The pilot was jointly funded by the Department for Education and the Department of Health. Two different approaches to extending provision of free school meals were tested as part of the pilot. In the local authorities piloting a "universal" offer (Newham and Durham), all primary school children were offered a free school meal. In the contrasting "extended" eligibility area (Wolverhampton), entitlement to free school meals was extended to cover pupils in primary and secondary schools whose families were on Working Tax Credit and whose annual income did not exceed £16 040. This threshold rose to £16 190 in 2010–2011.

[Intervention group 5]
References: (116, 276)

Free school meals mandated by the Education Act 1996 (England)

The Education Act 1996 requires maintained schools and academies (including free schools) to provide free school meals to disadvantaged students aged 5–16 years.

[Intervention group 5]
References: (111–115, 215, 378, 395)

United States

Child and Adult Care Food Program

Abbreviation/alternative title: CACFP

Provides reimbursement for foods served in childcare and adult care settings that follow set nutrition standards. All non-profit childcare facilities are eligible to participate. For-profit facilities are eligible to participate if at least 25% of children come from low-income families. The CACFP reimburses participating facilities at free, reduced-price or paid rates, targeting benefits to children who are at risk of food insecurity and poor diet. Some states require all licensed childcare centres to comply with the CACFP nutrition standards. In 2017, the USDA implemented new regulations to align the

CACFP nutrition standards with the Dietary Guidelines for Americans. Drawing on the Institute of Medicine recommendations, updates to the CACFP standards set limits on juice and added sugar, included more whole grains, introduced fruit and vegetables as separate meal components, and eliminated on-site deep frying as a meal preparation method. Through licensing regulations in many states, these stricter nutrition standards also apply to programmes not participating in the CACFP.

Mandated by the HHFKA, these first major revisions to the CACFP standards came into effect in October 2017.

[Intervention group 1]
References: (290, 291, 296, 302)

School Breakfast Program

Abbreviation/alternative title: SBP

Founded by the Child Nutrition Act of 1966, funded by the federal government and administered locally by school districts. Offers all students in participating schools an opportunity to eat a free or low-cost breakfast before or during each school day.

[Intervention group 5]
References: (96, 179, 269)

School Wellness Policy

Initially required by the Child Nutrition and WIC Reauthorization Act of 2004, with requirements expanded by the HHFKA (see further information on school wellness policies under these headings).

[Intervention group 1]
References: (189, 289, 305, 306, 318, 319, 324, 326, 337, 344, 353, 354, 396)

Smart Snacks in School

In 2013, the USDA established nutrition standards for competitive foods and beverages sold in schools; competitive foods are defined as foods sold at the same time as NSLP foods are available, thus competing with participation in school meal programmes. Products that meet these standards were designated as "smart snacks". Smart Snacks in School refers to the national nutrition standards for foods and beverages sold outside the federal reimbursable school meal programmes during the school day. As of the 2014–2015 school year, all competitive foods and beverages sold during the school day must meet or exceed Smart Snacks in School nutrition standards, which include limits on fat, sugar, sodium and calorie content. These standards are the minimum requirement for schools, but states and local education agencies can continue to implement stronger nutrition standards for all competitive foods in schools.

[Intervention group 1]
References: (320, 366, 367, 397, 398)

Child Nutrition and Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) Reauthorization Act of 2004

Abbreviation/alternative title: Public Law 108–265

Requires school districts that participate in federal child nutrition programmes, including the NSLP, the School Breakfast Program and the Special Milk Program, to establish a local school wellness policy to address childhood obesity by the first day of the 2006–2007 school year. Local wellness policies are to include:

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- goals for nutrition education, physical activity and other school-based wellness activities;

- nutrition guidelines for all foods available on the school campus during the school day (including competitive foods and beverages, defined as foods sold at the same time NSLP foods are available);

- assurance that guidelines for reimbursable school meals are not less restrictive than UDSA regulations;

- a plan for measuring implementation;

- involvement by parents, students, school food authorities, school boards, school administrators and the public in development of the policy.

School districts are responsible for developing the nutrition guidelines for competitive foods and beverages.

The Child Nutrition and WIC Reauthorization Act of 2004 also requires local educational agencies to establish systems to directly certify children from households that receive Supplemental Nutrition Assistance Program benefits by school year 2008–2009.

[Intervention group 1]
References: (189, 289, 305, 306, 318, 319, 324, 326, 337, 344, 353, 354)

Healthy, Hunger-Free Kids Act of 2010

Abbreviation/alternative title: HHFKA

Required the USDA to update the nutrition standards of the NSLP. New policies were implemented in the 2012–2013 school year. They required that all children are served (not just offered) a fruit and/or vegetable with each meal (the "serve model"). They also set guidelines on variety and quantity of fruits and vegetables served.

The HFFKA gives the USDA authority to regulate school wellness policies, which include nutritional standards for foods advertised in schools. Brand marketing programmes, which encourage students to purchase a company's products in exchange for money or rewards, are not explicitly prohibited.

[Intervention group 1]
References: (93, 158, 186, 203, 219, 232, 233, 237, 241, 244, 246, 332, 396, 398)

National School Lunch Program

Abbreviation/alternative title: NSLP

Established in 1946. Provides subsidized or free meals. Updated standards for meals provided and sold through the NSLP (mandated by the HHFKA) took effect at the beginning of the 2012–2013 school year.

[Intervention group 5]
References: (158, 219, 244, 399, 400)

World Health Organization

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