



## Examining the New Zealand school food environment: what needs to change?

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### Abstract

Habitual dietary intakes and nutrition behaviours developed during childhood and adolescence pave the way for similar behaviours to manifest in adulthood. Childhood obesity rates have now reached a point where one in six children globally are classified as overweight or obese. Schools have the unique ability to reach almost all children during key developmental stages, making them an ideal setting for influencing children's nutrition behaviours. Evidence suggests the school food environment is not always conducive to healthy food choices and may be obesogenic. The aim of this narrative review is to explore factors that influence the healthy food and drink environment in and around schools in New Zealand. The review focused on evidence from New Zealand and Australia given the close resemblance in education systems and school food guidance. Using the Analysis Grid for Environments Linked to Obesity (ANGELO) framework, the school food environment was categorised into the following domains: economic, political, physical and socio-cultural factors. Findings suggest that food policies are not utilised within schools, and guidelines to improve the school food environment are not well implemented. Canteen profit models, lack of staff support and resources, and higher availability of low-cost unhealthy foods are among barriers that hinder implementation. This review highlights recommendations from existing evidence, including canteen pricing strategies, restriction of unhealthy foods and using peer modelling in a time-scarce curriculum to improve the school food environment. Key areas for improvement, opportunities to enhance policy implementation and untapped avenues to improve the food and nutrition behaviours of children are highlighted.

**Keywords:** School food policy: Canteen: Food availability: Childhood nutrition: Health promotion: Barriers: Nutrition education

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Childhood obesity, unhealthy diets and physical inactivity have strong linkages with the development of non-communicable diseases, and are associated with higher economic burden on the health care sector<sup>(1)</sup>. In New Zealand, one in three children aged between 2 and 14 years are classified as overweight or obese compared with one in six globally<sup>(2,3)</sup>. Ethnic disparities also exist within New Zealand, with Māori and Pacific children more likely to be overweight and obese compared with non-Māori and non-Pacific children<sup>(2)</sup>. There is a complex relationship between childhood obesity, health, and educational outcomes, particularly when accounting for the non-BMI-related factors, such as physical activity and nutrition, and the food environment<sup>(4-6)</sup>. Dietary habits established during childhood and adolescence are known to influence behaviours in adulthood and may impact health later in life, making it an issue that warrants policy action<sup>(7,8)</sup>. Intervention approaches that exclusively target individual-level determinants such as knowledge, beliefs and habits have little or no impact long term<sup>(9,10)</sup>. However, in combination with environmental-change components these individual approaches have greater effectiveness in improving health behaviours<sup>(10,11)</sup>.

The school food environment provides an opportunity for public health interventions to improve the health of children<sup>(12)</sup>. In New Zealand, school enrolment is compulsory for children aged between 6 and 16 years<sup>(13)</sup>. As a result, primary and

secondary schools have the ability to reach almost all children and young people during the first two decades of their lives, making them an ideal setting for influencing children's nutrition and physical activity behaviours<sup>(14)</sup>. The school food environment refers to all spaces in and around schools where food is made available and consumed, and represents an effective setting to influence children's food choices<sup>(15)</sup>. In New Zealand, food is usually brought from home and/or bought at school. From data collected in the 2002 New Zealand National Children's Nutrition Survey, more than half of all students (58%) bought some or most of their food and drink from the school canteen<sup>(16)</sup>. School food provision varies, with some schools providing in-house catering to their canteens, some outsourcing to external catering companies and food providers, and some having a combination of both. Previous mandated legislation sought to improve the food environment within schools; however, the requirements for 'only healthy food options to be sold on school premises' was removed following a change in government in 2009<sup>(17,18)</sup>. Since then, the onus has been put onto the schools' Board of Trustees to mandate healthy food and drinks within schools<sup>(17,18)</sup>. Prior to the introduction of the Healthy Food and Drink Guidance for Schools in 2020, schools had been using the Food and Beverage Classification System to help them to make decisions about which foods to provide within

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schools. It is the schools' responsibility to decide on the types of food sold within a school canteen or provided to students and manage the cost of this; however, the evidence suggests that the majority of schools still provide unhealthy food options at cheap prices<sup>(14,19)</sup>.

The Healthy Food Environment Policy Index (Food-EPI)<sup>(12)</sup> assessed the New Zealand Government's level of implementation of policies and infrastructure support for improving the healthiness of food environments against international best practice in 2020. It showed that there had been no change in the level of implementation of policies in schools to promote healthy food choices or restriction of unhealthy food promotion to children in school settings since recommendations were made in 2014 by an expert panel<sup>(20)</sup>. Children consume up to a third of their daily food intake at schools<sup>(21)</sup>, and data suggest that children consume more snack foods and sugar on school days<sup>(22)</sup>. Schools have the opportunity to create healthy food environments for children, yet an analysis of New Zealand primary schools found high sales of unhealthy foods, lack of adequate facilities for preparing healthy food and lack of school management to support the provision of healthy foods<sup>(14)</sup>.

The aim of this narrative review is to explore the factors that influence the healthy food and drink environment in and around schools in New Zealand. For the purpose of this review, the food environment will refer to the economic, political, physical, and socio-cultural contexts that influence children's food choices<sup>(23–25)</sup>. The *economic* context refers to financial factors such as food cost and affordability; *political* context refers to the rules and regulations such as school food policies; *physical* context refers to the availability of foods and facilities; and *socio-cultural* context refers to the attitudes and perceptions, with particular focus on children, parents, teachers and school principals. This framework will be used to ensure broad scoping of the current evidence.

### Search strategy

The review strategy included a literature search using several online databases including Web of Science, Research Gate, PubMed and New Zealand-specific journals relevant to public health nutrition and children's nutrition. Search terms included derivatives of key phrases such as 'school food environments', 'school food policies', 'food availability in schools' and/or search terms related to the subsections within the four domains. 'New Zealand' or 'NZ' was added to purposely find publications relevant to the scope of this paper. There were no filters for date applied in the search criteria. All publications up to September 2021 were considered for inclusion. Papers assessed for inclusion in this review were selected on the basis of relevance by title and abstract. All study designs (observational/experimental) and grey literature (government/institutional reports and guidelines) were considered for inclusion in this review owing to the limited available evidence in New Zealand regarding the school food environment. References were also suggested by other researchers in the same field or obtained from references of relevant articles. New Zealand literature related to food environments in and around primary and secondary schools was prioritised

followed by Australian literature owing to their close resemblance to New Zealand school food guidelines and food provision systems, and then broader international literature with particular attention to systematic reviews to gain a wider understanding of available publications.

## The school food environment: what do we know?

### Economic environment

**Deprivation and food insecurity.** More than 80% of children in New Zealand source most of the food they consume at school from home, yet children have little control over these foods<sup>(21,26)</sup>. The ability to have a sufficient quantity and variety of food is influenced by both the available income of the household and the cost of food<sup>(27)</sup>. An analysis of median household income and expenditures in New Zealand found approximately 23.4–52.4% of net income for families on low incomes and benefits were needed to purchase a healthy 'basic' diet<sup>(27)</sup>. Similar results were modelled for Māori and Pacific diets where 15.2–43.9% of household income (ranging from median household income of \$1733 NZD to sole income support of \$636 NZD per week) would be required to purchase a healthy diet with the inclusion of culturally important foods<sup>(28)</sup>.

More than a third of children living in the most-deprived neighbourhoods experience moderate-to-severe food insecurity<sup>(29)</sup>. Food insecurity can be defined as the lack of access to sufficient, safe and nutritious foods to lead a healthy and productive life, and is an indicator of socio-economic distress and hardship<sup>(29)</sup>. Food insecurity is disproportionately more prevalent among Māori and Pacific children and is related to larger households and lower income<sup>(30)</sup>. Household deprivation also plays a significant role in the nutrition behaviours of children<sup>(29,31)</sup>. Evidence suggests that household food insecurity may lead to the selection of relatively cheap and unhealthy foods, and may also decrease an individual's motivation to eat healthily<sup>(11)</sup>. In New Zealand, 20% of children aged 0–15 years live in households that report that food 'ran out often' or 'sometimes', making it difficult to consume nutritionally balanced diets<sup>(30)</sup>. Children living in the most deprived neighbourhoods are more likely to consume sugar-sweetened beverages and takeaways, and are significantly less likely to meet the recommended fruit and vegetable intake and have breakfast every day<sup>(2)</sup>.

Food insecurity is not a new or novel issue with regard to the health of children. Barriers to children's fruit and vegetable consumption were noted by key stakeholders (government/regulatory sectors, produce industry, retail and public health/nutrition promotion sectors) in New Zealand, which included negative perceptions of price, living in low-income households and poverty, and having a low food budget<sup>(32)</sup>. The cost of food and perceived value for money have also been noted as significant barriers to children's healthy eating behaviours by New Zealand school principals and general practitioners<sup>(33)</sup>. Despite the known food insecurity issue, children's hunger has often been portrayed as a failure within the family and stigmatised accordingly in New Zealand<sup>(34)</sup>. As a result, many children living with food insecurity may be kept at home on school



days when they are not able to have breakfast or lunch to avoid the attention to hardship and associated stigma<sup>(34)</sup>.

**Costs within schools.** Outsourcing of canteens and the need for schools to return a profit through canteens and fundraising events may be a major obstacle to providing children with healthy food and drink. Canteen use in New Zealand schools has been associated with frequent consumption of high-sugar and high-fat foods, as well as increased likelihood of consuming sugar-sweetened beverages and meat pies/sausage rolls<sup>(16)</sup>. This is consistent with findings in Australia where children purchasing food from a school canteen tended to consume more energy from fast food, packaged snacks, desserts, chocolate and confectionary compared with their canteen non-user counterparts<sup>(35)</sup>. Although child factors such as food preferences and knowledge may play a role in canteen choices, food cost is also a significant driver of their decision making. Children aged 9–12 years in Australia suggested that improving the affordability of healthier foods sold at the canteen would likely influence their purchasing decisions<sup>(36)</sup>. Yet, an analysis of New Zealand school food services and canteens found that unhealthy foods such as chips, cakes/biscuits, sausage rolls and pies were the cheapest menu items, with sandwiches and filled rolls as the most expensive, and more unhealthy foods were sold each week as a result<sup>(14)</sup>. Healthy Food and Drink Guidance for Schools was recently published by the Ministry of Health provides guidance for developing a school food policy and classifying red, amber and green food items with recommendations for what foods should be available in schools<sup>(37)</sup>. However, pricing strategies to encourage healthy food purchases at schools are not addressed. In Australia, where a similar traffic-light guidance for schools has been adopted, a recent investigation found that ‘amber’ and ‘red’ food items were the cheaper option compared with ‘green’ foods, particularly in more disadvantaged areas<sup>(38,39)</sup>. This highlights that healthy food items available in schools need to be more affordable and pricing strategies to promote healthy food consumption may need to be part of a food policy.

### Political environment

**Implementation of healthy food and drink policies in schools.** School food policies have the potential to increase healthy food availability in schools, and targeted school food and nutrition policies have been shown to increase fruit and vegetable consumption, reduce intake of sugar-sweetened beverages and reduce intake of unhealthy snacks in children<sup>(40,41)</sup>. It is more likely that actions become structural if a policy on healthy nutrition is developed<sup>(41)</sup>. Food environment policies, especially for healthy food policies in schools, have major implementation gaps in New Zealand compared with international best practice<sup>(12)</sup>. In the School Food Environments Review and Support Tool Study (School-FERST) with 816 participating New Zealand schools in 2016, only 38.5% of primary and 44.8% of secondary schools reported having a written food and nutrition policy<sup>(42)</sup>. Of those schools that had a nutrition policy, the strength and comprehensiveness of that policy was extremely low. Schools can provide a healthier beverage

environment for students by curbing the availability of sugar-sweetened beverages and selling plain milk only alongside adequate provision of fountains to provide drinking-water, otherwise known as a ‘milk and water only’ school<sup>(37)</sup>. However, only two-thirds (67.5%) of primary schools self-reported to be a ‘milk and water only’ school, significantly higher than that of secondary schools (23.3%)<sup>(42)</sup>.

Among a sample of Wellington (New Zealand) primary schools, although many had been thinking about or were in the process of implementing an official or unofficial water-only policy to help to curb children’s consumption of sugar-sweetened beverages, only 28% had actually implemented a water-only policy<sup>(43)</sup>. Barriers to school food policy implementation identified in a recent meta-analysis included lack of support and training for school staff, lack of acceptance of healthy foods by the school community, unhealthy fundraising practices, lower level of priority, and costs to implement the policy if needing to provide healthier foods or install canteen facilities and drinking-water fountains<sup>(44)</sup>. Similarly, the lack of prioritisation and value by schools and parental resistance were significant barriers to school policy implementation in New Zealand<sup>(42,43)</sup>. Support from school staff members and concerns for children’s health tended to contribute to a successful implementation of a healthy food and beverage policy<sup>(44)</sup>.

Despite parental buy-in being perceived as a significant barrier, studies in Australia and New Zealand have shown that there is parental support for the implementation of a food policy. Williden *et al.*<sup>(33)</sup> reported that 67% of a sample of parents of children aged 5–12 years in New Zealand ( $n = 101$ ) thought that implementing a food policy to restrict unhealthy food would help their child eat more nutritious foods. Pettigrew *et al.*<sup>(45)</sup> reported that 91% of a cohort of parents of children aged 4–18 years in Australia ( $n = 1200$ ) felt that a policy was a good opportunity to teach children about healthy eating, and 62% agreed that a healthy food and drink policy reflected their own views on children’s diets. Where parents were identified as a barrier to policy implementation, it was mainly reported that the perceived lack of freedom that their child had to choose what to eat or buy impacted their support<sup>(44)</sup>. This could highlight that communication and understanding between schools and parents is a critical step to getting parental buy-in for a healthy food and beverage policy. In relation to profitability, implementation of a school food policy between 2006 and 2008 using a traffic-light system in Australian school canteens resulted in an increase in the number of schools achieving break-even, with no significant changes to profit or loss at the canteen<sup>(46)</sup>. A harder one to address is the issue of the schools’ prioritisation and value on implementing a healthy food and beverage policy<sup>(42,43)</sup>, and further investigation is needed to identify barriers and enablers to implementing a healthy school food policy in New Zealand.

**The Healthy Food and Drink Guidance for Schools.** National governments and the food industry are the two major stakeholder groups with the greatest capacity to modify food environments and population diets<sup>(20)</sup>. In 2020, the Ministry of Health introduced the Healthy Food and Drink Guidance for Schools in an effort to help schools develop a policy to improve access

to healthy food and drinks with a traffic-light food and beverage classification system<sup>(37)</sup>. The guidance suggests that the school canteen should be made up of at least 75% 'green' food items, and that 'red' food items should not be available for students<sup>(37)</sup>. The traffic-light system is easy to understand and effective, which makes it appealing as a tool to promote healthy food and drink choices<sup>(47,48)</sup>. The effectiveness of this traffic-light policy in New Zealand schools or communities is yet to be evaluated.

However, although a similar guidance using a traffic-light-based classification system was implemented in Victoria, Australia in 2006<sup>(49)</sup>, 5 years later and despite the guidance, an analysis of 106 Victorian primary and secondary schools found that 37% of school menus still contained 'banned' food items, and the largest proportion of items on the menu (51%) belonged to the 'amber' food category<sup>(50)</sup>. No school had a menu with >50% 'green' items as recommended. Similarly, in 2020, only 58% of Western Australian schools ( $n = 576$ ) met their 'Healthy Food and Drink in Public Schools Policy', which was implemented in 2014, with 18% still offering unhealthy food or drinks<sup>(51)</sup>. Despite this, the implementation of a traffic-light policy in schools has a potential community benefit. In Australia, the implementation of a traffic-light school food policy had influenced 24% of parents' decisions at the supermarket, since classifying foods as 'green', 'amber' and 'red' assisted them in evaluating the general healthiness of foods sold in the supermarket<sup>(52)</sup>. The evidence suggests that the guidance alone may not be enough to increase the healthiness of the school food service and there needs to be greater investment in resources to implement and support these policies; however, benefits of successful implementation of a school food and beverage policy could potentially have wider scope than just the school environment.

**Health promotion strategies in New Zealand.** An overview of previous and current strategies used to promote nutrition in schools is presented in Table 1. The data highlight that external school support has been useful for improving the school environment in different ways. For example, incentivised schemes like the Healthy Heart Award have been successful in reducing sales of less nutritious foods in schools and helping schools and early childhood education (ECE) centres to meet the dietary guidelines<sup>(53,54)</sup>. Programmes that provided nutrition guidelines such as Fuelled4Life were not very successful in changing food provision<sup>(59)</sup>. The food and nutrition knowledge of teachers and students were improved with curriculum-linked programmes such as the Heart Start Toitoti Manawa programme, Fuelled4Life and Garden to Table<sup>(55,59,68)</sup>. Some programmes that taught wider skills through label reading and supermarket tours such as the Food for Thought programme had wider benefits with knowledge extending out towards the community and influencing dietary choices of parents and caregivers<sup>(56)</sup>. Food provision programmes such as Milk in Schools, Fruit in Schools, KidsCan and KickStart Breakfast saw improvements in children's hunger, concentration and general health<sup>(61,65,69)</sup>. Milk in Schools and the Ka Ora, Ka Ako (Free School Lunch) programme also saw increases in the daily intake of nutritious foods such as milk and milk products, and fruits and vegetables,

respectively<sup>(60,69)</sup>. Where there have been external organisations actively working with schools, the outcomes have been more favourable, which suggests that schools could benefit from additional support to promote a healthy food and drink environment.

## Physical environment

### Internal school food environment

**School food availability.** Food availability in schools has an important role to play in promoting healthy food and drink choices. Children aged 9–12 years in Australia have identified that increased availability of healthier food options would positively influence their purchasing choices<sup>(36)</sup>. Yet, the main barrier to this is that the unhealthy alternatives are preferable. The New Zealand Healthy Food and Drink Guidance for Schools suggests increasing availability of healthy 'green' foods and limiting 'amber' and 'red' foods. Yet, food sales from five Wellington (New Zealand) schools showed that the 'sometimes' and 'occasional' foods still accounted for higher proportion of total sales even when they had restricted availability<sup>(74)</sup>. In 2019, as part of the New Zealand Child and Youth Wellbeing Strategy, the government introduced the free and healthy school lunch programme, Ka Ora, Ka Ako<sup>(75)</sup>. Prior to the implementation of Ka Ora, Ka Ako in the Hawkes Bay and Bay of Plenty regions (New Zealand), snack and sweet items and select fresh fruits were regularly available in the majority of lunches, with 88.6% of children having at least one snack or sweet item<sup>(60)</sup>. Many children (72.5%) did not have any vegetables available for lunch over the 4-day period evaluated prior to the implementation of Ka Ora, Ka Ako. Approximately 25% of students will be provided free school lunches by the end of 2021, and the providers of the school lunch programme will be required to meet the Healthy Food and Drink Guidance for Schools<sup>(75)</sup>. It is not yet known how this will affect school food availability, particularly in school canteens.

From previous analyses, canteen use has been associated with higher consumption of high-fat and high-sugar foods and beverages in New Zealand primary schools<sup>(14,16)</sup>. Many New Zealand primary school students purchase some or most of the food they consume at school from the canteen, and are more likely to consume soft drinks, chocolate, sweets/confectionary, pies and sausage rolls, compared with their non-canteen user counterparts<sup>(14,16)</sup>. In Australian primary schools, despite their similar traffic-light guidance, foods classified as 'green' and 'amber' were on par with their availability in the school canteen, yet 'amber' food items were the most frequently purchased<sup>(76)</sup>. Prediction models suggest that the school canteen needs to consist of more than 70% 'green' food items for the majority of children's food purchases to consist of healthier foods (>50%)<sup>(76)</sup>. An analysis of South Australian schools ( $n = 14$ ) suggested that barriers to implementing a healthy canteen included lack of staffing to prepare more time-consuming menu items, the need to return a profit, food preferences of students and lack of adequate facilities for healthy food preparation<sup>(77)</sup>.

Previously, vending machines were found to be rare, with only 3.5% of New Zealand schools ( $n = 200$ ) found to be



**Table 1.** Food and nutrition promotion in schools: previous and current strategies in New Zealand

Initiative	Provider	Year	Intervention	Evaluation/Outcomes
Healthy Heart Award	NZ Heart Foundation	1989 to present*	An incentive scheme which rewarded schools with a Heartbeat Award if they met set criteria to improve their food service (food policies/food availability) which could be applied for annually. Owing to low level of support needed, it was successfully implemented on a national scale.	Incentivised schools to reduce sales of less-nutritious foods in schools <sup>(53)</sup> . Continued participation was associated with a reported reduction in sales of less-nutritious foods, and increased sales of healthier foods such as sandwiches and filled rolls. More ECE centres were likely to meet dietary guidelines for recommended servings of different food groups if they were participating in the Healthy Heart programme <sup>(54)</sup> .
Heart Start: Toitoti Manawa	NZ Heart Foundation and Ministry of Health	2014–2018	A curriculum-linked programme which was offered to schools across NZ. Schools could choose which modules they wanted to complete so allowed for individuality. Also encouraged healthy food and drinks to be sold at school canteens. Contained 13 modules including tuckshop rules/guidelines and Fuelled4Life.	Student surveys showed that 78% of learners agreed that activities from the Heart Start programme has helped them to learn more about healthy food <sup>(55)</sup> , and 56% of schools said their involvement with the programme led to a development of a school food policy. Some changes to food availability occurred: 58% felt that their involvement in the programme led to the provision of healthier food in their school canteen; 81% of staff surveyed felt that it had improved their knowledge and awareness of healthy eating and physical activity. The modifiability of the programme was appealing to schools. No educational or social benefits were noted <sup>(55)</sup> .
Foodstuffs Food for Thought programme	Foodstuffs NZ and NZ Heart Foundation	2007 to present*	An educational tool to assist NZ primary school teachers to support their students to make healthier food and lifestyle choices. It was created to assist the teaching of food and nutrition in primary-school-aged children. The programme was designed to be completed over one term including two classroom sessions with a nutritionist and supermarket tours.	Families with children who participated in the programme were less likely to buy foods considered unhealthy compared to non-participants. Families also significantly decreased their purchase of unhealthy foods compared with 12 months prior. <sup>(56)</sup> Students felt that the Food for Thought programme helped them learn more about the nutritional content of foods available in supermarkets and how to read food labels, and resulted in greater awareness of front of pack labelling <sup>(55)</sup> .
Healthy Families NZ	Ministry of Health	2015 to present*	A large-scale initiative by the Ministry of Health to improve people's health where they live, learn, work and play. Focused on supporting and improving health promoting environments to enable people to make good food choices and be physically active, smoke-free and free from alcohol-related harm. Local strategic leadership groups in each location are responsible for supporting, driving and influencing change in their communities.	Not solely focused on the school environment, but evaluation found that the programme did positively influence the provision and promotion of water and removal of SSBs in schools <sup>(57)</sup> . Food gardens were established in schools through collaboration with partners. However, it was too soon to see if the programme made a change to chronic disease risk factors <sup>(57)</sup> .
Health Promoting Schools (HPS)	Ministry of Health	1997 to present*	An external support workforce where HPS facilitators help schools work with their community to identify and address health and wellness needs and priorities.	Schools that are participating in the HPS service saw increased positive outcomes for students, including improved attendance rates, decreases in stand-downs and suspensions, and improvements in learning and performance in reading <sup>(58)</sup> . The degree of support and communication given by the HPS facilitator to schools strongly predicted the overall successfulness of an HPS school <sup>(58)</sup> .
Fuelled4Life	NZ Heart Foundation and Ministry of Health	2012–2020	Provided nutrition criteria, tools and resources to support schools and early learning services to improve the food they provided. Also known as the Heart Foundation Food and Beverage Classification Service.	An evaluation of the programme found that there was a more significant increase in awareness and knowledge of healthy eating compared with changes in food provision <sup>(59)</sup> . In 2015, 63% of ECE services had heard of Fuelled4Life; of those, 70% used the tips and recipes, but few found the buyers guide useful <sup>(59)</sup> . Less than 15% of schools reported changes to their food provision as a result of Fuelled4Life <sup>(59)</sup> . Less than half of privately run ECE centres met the recommended serves of breads and cereals, milk and milk products, and meat and meat alternatives as stated in the guidelines <sup>(54)</sup> .

Table 1. (Continued)

Initiative	Provider	Year	Intervention	Evaluation/Outcomes
Ka Ora, Ka Ako: Free Healthy School Lunches	NZ Government	2020 to present*	A New Zealand Government initiative focused on reducing food insecurity among NZ children. Part of the NZ Government's Child Youth and Wellbeing Strategy. Providing free and healthy school lunches to schools and <i>kura</i> with the highest concentrations of learners from disadvantaged backgrounds on a daily basis <sup>(60)</sup> .	Pilot study looking at provision on free school lunches in Hawkes Bay and Bay of Plenty schools part of Ka Ora, Ka Ako <sup>(60)</sup> . Those with insufficient food prior to the provision of the free school lunches reported a 20% gain in fullness. Schools receiving the free school lunch saw a 40.6% increase in having at least one vegetable available in lunches, compared with only a 1.6% increase in schools not receiving the free lunch. The proportion of lunches that did not contain any snack or sweet items also increased by 14.7% among schools receiving the free lunch. Children receiving the free lunch on average consumed 0.88 ( $\pm 0.24$ ) more vegetable items and 0.52 ( $\pm 0.28$ ) fewer snacks and sweet items at lunch every day. Small benefits observed for quality of life and physical and emotion functioning. No clear benefits with regard to school attendance.
Fruit in Schools	Ministry of Health	2005 to present*	A food provision initiative providing students with a piece of fruit every school day. Schools in high-deprivation areas are eligible for the programme, with fruit being delivered to the school by local providers.	Evaluation was undertaken by Ball and Watts <sup>(61)</sup> . 87% of school principals highly rated Fruit in Schools as having a very positive effect. 85% of principals reported their school had fewer hungry children because of the programme. 72% of principals felt that fruit provision enabled children to stay on task and increased concentration in the classroom. Observed benefits to children included improvement in general health, fewer sores and skin infections, and reduced sick days. Most agreed that the programme contributed to awareness among staff and pupil about healthy eating, eating fruits and vegetables, and nutrition and health <sup>(61-63)</sup> . Parents reported that their children ate more fruit as a result of the programme, and 39% of families reported that the whole family eats more fruit as a result of the programme <sup>(62)</sup> .
KickStart Breakfast	Sanitarium, Fonterra, Ministry of Social Development	2009 to present*	A food provision initiative where the Ministry of Social Development partnering with Fonterra and Sanitarium provides Weetbix and milk every school day.	Uptake of the KickStart programme was associated a reduction in the proportion of students with a dental surgery outpatient appointment <sup>(64)</sup> . Schools reported improvements in general health and wellbeing of students (75.6%), improvement in concentration levels (74.8%) and improvements in children's behaviour (60.5%) <sup>(65)</sup> . A previous intervention study in NZ schools on the provision of a free breakfast in schools was not found to significantly affect children's school attendance and academic achievement, but did significantly decrease children's reported short-term hunger <sup>(66)</sup> .
Garden to Table	Charitable Trust	2008 to present*	Established to develop and introduce a curriculum-linked food education programme in New Zealand. A food education programme that connects gardening, cooking and academic learning.	Evaluation of Garden to Table was undertaken in 2013, with results showing that there were no associations between the Garden to Table programme and children's fruit and vegetable variety or consumption <sup>(67)</sup> . However, knowledge about cooking and gardening was significantly higher in Garden to Table schools <sup>(68)</sup> . Children were significantly more likely to have positive attitudes towards cooking, gardening and fruits and vegetables if they were in the Garden to Table schools <sup>(67,68)</sup> .
Milk in Schools	Fonterra	2013-2020	A food provision initiative that provided all primary-school-aged children with a 200 ml serving of low-fat UHT milk every school day to increase milk consumption.	The proportion of children meeting New Zealand guidelines for milk and milk product consumption increased significantly from baseline to 2 years follow-up (72% to 84%, respectively; $p < 0.05$ ). 72% of parents agreed that the programme positively impacted their child's health <sup>(69)</sup> .

Table 1. (Continued)

Initiative	Provider	Year	Intervention	Evaluation/Outcomes
KidsCan	KidsCan Charitable Trust	2005 to present*	A food provision initiative. Decile 1–4 schools can apply to partner with KidsCan. Food is made available to schools through KidsCan, including bread, baked beans, muesli bars, yoghurt and fruit. The programme was designed to address child poverty through the provision of food, clothing and other essential items.	An analysis from GoodMeasure on the social impact of KidsCan NZ that for every \$1 NZD invested was likely to lead to a \$2.80 NZD return on investment to New Zealand through several outcomes including improved physical health, educational outcomes, and reduced public healthcare costs <sup>(70)</sup> . Evaluation of KidsCan in ECE was undertaken by the University of Waikato in 2020. From this, KidsCan reported that children were more engaged with learning, had increased energy and attention spans, and had fewer minor health issues like coughs and colds as a result of KidsCan support <sup>(71)</sup> . The full results of the evaluation were not made accessible to the author.
Project Energize	Waikato District Health Board and the Regional Sports Trust (Sport Waikato)	2004–2020#	An external workforce initiative where ‘energizers’ employed by Sport Waikato supported schools to improve the health of their students by facilitating school changes and accessing regional initiatives to improve children’s physical activity and nutrition. The programme was designed to ameliorate childhood obesity and cardiovascular risk.	A 2-year evaluation found that Project Energize showed a trend for reduced rate of rise in systolic blood pressure and accumulation of body fat <sup>(72)</sup> . However, there was no significant change in BMI. A 5-year evaluation reported that younger and older children were 31% and 15% less likely to be overweight or obese, respectively, if they were in the ‘Energized’ schools <sup>(73)</sup> . Physical fitness was also improved.

Abbreviations: ECE, early childhood education; NZ, New Zealand; SSBs, sugar-sweetened beverages; HPS, Health Promoting Schools; UHT, ultra-high-temperature processing; BMI, body mass index.

Definitions: ‘kura’ – a school, typically one where lessons are conducted in Maori.

\* Present in 2021.

# Project Energize continues in Wellington and some parts of Northland New Zealand funded by individual district health boards; however, it was ceased in Waikato owing to district health board funding cuts.

operating one<sup>(14)</sup>. However, among those that did operate a vending machine, soft drinks, fruit juice and milk were sold more often. Similarly, analyses of Dutch and Australian schools reported that vending machines containing sweets and sugar-sweetened beverages were more prevalent than vending machines with fresh products<sup>(41,77)</sup>. Healthier beverage consumption is influenced by availability and access; having access to water fountains has been shown to increase water consumption, which may displace the consumption of sugar-sweetened beverages<sup>(78)</sup>. Access to water fountains in Wellington (New Zealand) was high in school environments, and although not statistically significant, the rates of water fountains were higher in more affluent areas, and rates of access to sugar-sweetened beverages higher in more deprived areas<sup>(78)</sup>. Making healthy beverage choices easy and equitable needs to start with increasing access to healthy drink options, such as water and milk, and decreasing access to sugar-sweetened beverages.

**School curriculum.** As children spend most of their weekday waking hours in the classroom, interventions at a school level play a key role in the promotion of healthy lifestyle behaviours. A meta-analysis looking at teaching approaches and healthy eating outcomes reported that many teaching tools including curriculum-based approaches, experiential learning and cross-curricular approaches were useful for significantly reducing energy intake, increasing fruit and vegetable consumption, reducing sugar consumption and increasing nutrition knowledge in children<sup>(79)</sup>. However, most studies within the meta-analysis were from the United States or the UK, and generalisability to the New Zealand curriculum and child outcomes is yet to be explored. The current New Zealand curriculum identifies that health and physical education is a key learning area with focus on health education, physical activity and home economics<sup>(80)</sup>; ‘food and nutrition’ is considered one of seven key areas of learning within this domain. The National Administration Guidelines state that the board of trustees is required to promote healthy food and nutrition for all students<sup>(81)</sup>. However, teachers face numerous barriers to providing nutrition education to students, including lack of knowledge and value on the topic, teachers’ confidence and capability to deliver the programme, lack of resources, lack of training and insufficient time<sup>(82–84)</sup>. Integrating nutrition education into core subjects such as mathematics, science and literacy may be a solution to the barriers reported<sup>(85)</sup>. In a scoping review of thirty-nine articles including literature from Europe and the United States, curricular integration in primary schools was perceived by teachers as valuable and easy to implement, had a positive impact on teaching time and improved the nutrition knowledge of children<sup>(85)</sup>.

Access to support services, for example, the Heart Foundation Healthy Heart programme, or Health Promoting Schools (HPS) (Table 1) has also supported some teachers and schools to deliver this part of the curriculum. Primary schools that are a part of HPS were doing a better job in promoting student wellbeing compared with schools that were not<sup>(86)</sup>. Schools and teachers are key players in promoting healthy food and drink consumption, but more work needs to go into supporting teachers to be able to do this. Intervention strategies that offered curriculum support, including Heart Start: Toitoti



Manawa, and Food for Thought, showed positive results for students' learning and teachers' confidence, suggesting that external nutrition education support through a health promotion workforce may be an avenue to explore in the future.

**External school food environment.** Oftentimes students are still purchasing unhealthy food items at outlets outside of the school, which may disincentivise schools to attempt to improve the internal school food environment<sup>(87)</sup>. A study of five schools in Wellington (New Zealand) found that a high percentage of students were likely to pass food outlets and outdoor food advertisements on the way to and from school<sup>(87)</sup>. Children's interactions with convenience stores were analysed as part of the Kids' Cam cross-sectional study in New Zealand<sup>(88)</sup>. The findings showed that 22% of the participating children ( $n = 168$ ) visited a convenience store within a 4-day period. From the photos collected, it was obvious that non-core food and drink items dominated their core counterparts at a rate of 8.3 to 1, and this was then reflected in the purchasing behaviours of children with non-core food items dominating total purchases (94.6%) over the study period. In New Zealand, access to food retailers is significantly higher in more deprived areas compared with less deprived areas<sup>(89)</sup>, and it has been shown internationally that children with less desirable eating habits are likely to be found in areas dense with easily accessible outlets selling mainly snack foods and takeaway meals<sup>(90)</sup>. However, correlation does not equal causation. An international systematic review found very little evidence suggesting that the retail food environment around schools affected food purchases and consumption<sup>(91)</sup>. This was further supported by a study of mid-high decile schools in Otago (New Zealand) with results suggesting that children's dietary quality and consumption was not associated with having easy access to local food outlets around schools<sup>(92)</sup>. Despite conflicting evidence, experts in New Zealand have called for action with regard to zoning laws to create healthy community food environments<sup>(12)</sup> with reference to international best practice including 'Green Food Zones', which ban the sale of fast foods and soft drinks within 200 m of schools in Korea, and prohibition of fast food restaurants within 500 feet of all schools in Detroit, USA<sup>(20)</sup>. Further research on the retail food environment around schools and children's consumption behaviours is needed, particularly in low-decile and more socio-economically deprived areas, to support public health action to regulate food outlets around schools.

Although access to food outlets and children's consumption still warrants more research, advertising is significantly associated with greater consumption of unhealthy food and beverages by children<sup>(93)</sup>. New Zealand school neighbourhoods are surrounded by junk food marketing, and more than 60% of the advertisements are considered in breach of the restrictions imposed by the Advertising Standards Authority: Children and Young Peoples Advertising Code<sup>(87,94)</sup>. The Food Industry Taskforce Report to Ministers in 2018 outlined suggestions to restrict fixed outdoor advertising of foods high in saturated fat, sugar and salt within 300 m of the main gate of schools<sup>(95)</sup>, yet, a recent 2020 study using Google Street View data around New Zealand schools found that 12.8% of all bus-stop advertisements within a 500-m distance of schools were for non-core food

items<sup>(96)</sup>. Given the higher density of food outlets in areas of higher deprivation, it is unsurprising that the proportion of junk food advertising is also significantly higher around low-decile schools<sup>(94,96)</sup>. Aside from traditional advertising through physical and televised media, children are now also more vulnerable to food marketing through the internet and social media. Although in New Zealand the extent of food marketing on popular, non-food websites was found to be low, a wide range of marketing techniques and features were identified on food brand websites that specifically targeted children, including games and free downloadable items<sup>(97)</sup>. Unfortunately, New Zealand falls short of international best-practice standards, with significant gaps in the implementation of policies that restrict the promotion of unhealthy foods to children through broadcast and non-broadcast media and within children's settings<sup>(12,20)</sup>. This leaves children especially vulnerable to unhealthy food and beverage marketing, given that they do not yet possess the cognitive ability to process, comprehend and evaluate the intent behind advertising<sup>(98)</sup>.

### Socio-cultural environment

#### *Child factors: food preferences, knowledge and attitudes.*

Elements of the socio-cultural environment are broad and variable in the current published literature, and open to situational or discipline-specific bias. However, food knowledge, self-efficacy, food beliefs, peer modelling and social relationships, parental influence, cultural beliefs and sensory appeal have been identified as high-priority research areas for school-aged children<sup>(99,100)</sup>.

By the age of 6 years, environmental factors that influence children's decision making are already set<sup>(101)</sup>. Both international<sup>(101,102)</sup> and New Zealand<sup>(103)</sup> studies have found that children do have good knowledge about the general healthiness of foods and are able to identify fruits and vegetables as being healthier compared with packaged food items such as chips (crisps) and sweets. Knowledge of healthy foods does not necessarily influence food preferences; this was highlighted in New Zealand, where children from the Manawatu Region were asked to construct a 'healthy' lunchbox and then construct their 'dream' lunchbox<sup>(104)</sup>. Most children (95.4%) selected fruits and vegetables to be in their 'healthy' lunchbox, compared with only 57.7% including these in their 'dream' lunchbox. The top four food items in the 'dream' lunchboxes were chocolate bars, donuts, lollies and chips. Interestingly, when asked about what their diet might be as adults, children aged 6–11 years in Wales with preferences for chips and sweets said that they would likely shift to eating more fruits, vegetables and meat<sup>(101)</sup>.

Children's preferences for fruit and vegetables are wide and variable. While some children in New Zealand may find misshapen fruit and vegetables unacceptable, others find them more appealing because of their interesting shapes<sup>(105)</sup>. Their preferences may also not be necessarily guided by learned experiences; for example, if they did not enjoy broccoli, they may also perceive other green vegetables to be less appealing out of fear that their senses will not be satisfied<sup>(103)</sup>. The New Zealand Food and Nutrition Guidelines for Healthy Children and Young People recommend that children over 5 years of age should eat at least



three servings of vegetables and two servings of fruit per day<sup>(7)</sup>. However, from the 2019/2020 New Zealand Health Survey, only 44.1% of children met the recommended fruit and vegetable intake. Over the past decade, there has been a significant reduction in the proportion of children meeting the fruit and vegetable intake guidelines (from 55.5% in 2011/2012). Food preferences of children are often shaped by many modifiable and fixed factors, including parental diet quality and habits, frequency of family meals, social norms and attitudes within their environment, media and advertising, and genetic predisposition<sup>(103,105,106)</sup>.

Children's lunchboxes may also be influenced by peer modelling or perceived social risk. A recent systematic analysis of international qualitative and quantitative studies on the influence of peers on children's healthy eating behaviours showed that the influence is negative more often than positive; however, some studies found no effect at all<sup>(107)</sup>. Where there were associations, children with friends who were concerned with eating healthy food and were in a scenario where peer attitudes and peer approval were generally positive towards healthy food had more positive healthy eating behaviours<sup>(107,108)</sup>. On the other hand, environments where peer models favoured energy-dense foods, and where energy-dense foods were instead perceived as socially acceptable, children were more likely to engage in unhealthy eating behaviours<sup>(107,109,110)</sup>. Limited data exist in New Zealand examining the social/peer influence on healthy eating; however, one study in New Zealand has highlighted that more than a third of surveyed children ( $n = 109$ ) reported that social influence from peers and friends affected their food choices<sup>(111)</sup>. There is a way to make this social situation work in the favour of children. In the Netherlands, a group of researchers recruited the most influential children in each classroom to promote water consumption to their peers<sup>(112)</sup>. Children who were exposed to the intervention reported a statistically significant increase in water consumption and a decrease in sugar-sweetened beverage consumption compared with those who did not have the classroom promotion from their peers. Promoting healthy eating through peers and social interaction is a unique opportunity that is missed in health promotion, yet much of the international literature<sup>(107-110, 112)</sup> highlights that this can both positively and negatively influence dietary intakes in children. More work needs to be done in New Zealand to examine peer-to-peer interactions on promoting healthy behaviours.

#### *Parent factors: role modelling, knowledge and affordability.*

The diets of primary-school-aged children are largely dependent on parental dietary intakes, likely owing to the lack of autonomy that children at this age have with regard to their dietary choices<sup>(113)</sup>. Parental role modelling, beliefs and attitudes influence children's eating behaviours<sup>(114)</sup>. Parental diet quality was assessed in relation to children's dietary patterns in Dunedin, New Zealand<sup>(113)</sup>, with results suggesting that, if parents had a poorer diet, their children's diet also tended to consist of more frequent consumption of unhealthy foods. Conversely, higher parental diet quality was associated with a lower consumption of unhealthy snack foods<sup>(113)</sup>. Higher frequency of family meals in New Zealand has also been associated with many positive eating behaviours in children, including intake of more fruits and

vegetables, eating breakfast before school and purchasing food less often<sup>(115,116)</sup>. Parents are often under-utilised in health promotion strategies (Table 1). Yet, parents with higher nutritional knowledge and who frequently communicated about healthier eating habits and critical understanding of food advertising led to children consuming less energy-dense foods<sup>(110)</sup>. This highlights parental role modelling, and parental knowledge and attitudes may be important to target in health promotion. However, these targets are complicated by external influences. For example, parents in New Zealand of Pacific Island descent are knowledgeable about healthy foods; however, cost, affordability and time restraints are more influential on food choices<sup>(117)</sup>. Similarly, Australian parents<sup>(118)</sup> and New Zealand parents<sup>(119)</sup> identified that they did not feel well equipped to choose healthy foods, particularly with increased food marketing, and felt that lifestyle demands, pressure from their children, increased density of food outlets, and peer social influence were barriers to healthy eating.

Although parents may feel that healthy eating is expensive, and cost modelling using New Zealand data has suggested that, compared with current New Zealand diets, 'healthier' diets are more expensive when matched calorically<sup>(28,120)</sup>, there is theoretical evidence that substituting current New Zealand diets for low-cost, nutrient-dense foods can result in healthier and more affordable diets for New Zealanders<sup>(121)</sup>. An Australian study looking at lunchbox composition in primary-school-aged children found that lunchboxes which contained more fruit juice/cordial, packaged snacks, chocolates and soft drinks were more expensive to construct compared with a typical lunchbox consisting of one sandwich, two biscuits, a piece of fruit, a packaged snack and juice/cordial or water<sup>(122)</sup>. It was noted that, on average, the lunches of children in the lowest socio-economic quartile were 20% more expensive than the lunches of children in the higher socio-economic quartile, equating to an additional AUD\$52 (US\$40) more per child per year<sup>(122)</sup>. Although small, this suggests that changes can be made to improve the healthiness of lunches in lower socio-economic groups while remaining affordable. Efforts to increase parental awareness and knowledge around healthy eating are needed but cannot be effective in isolation.

Public health policies aim to reduce inequities, particularly for Māori and Pacific peoples, and evidence suggests that societal biases may be a hindering factor. In a recent analysis of parental views on childhood overweight and obesity across ethnicities in New Zealand ( $n = 180$ )<sup>(119)</sup>, Pacific participants rejected the idea that 'big is seen as beautiful', and the idea that 'culture encourages eating' was deemed offensive to some participants. Respondents also commented on the lack of culturally appropriate information, resources and services available. Cost of healthy food, relative ease of access of takeaways, and lack of time were the top three perceived factors that influenced a child's weight<sup>(119)</sup>. Affordability of healthy food will always be relative to the amount of income a family receives. Policies that improve affordability and access to healthy food, and that address time scarcity of people living with food insecurity and those in socio-economically deprived areas, should also be at the forefront of health promotion.



**School factors: school leader and teacher perceptions.** International intervention studies to increase fruit and vegetable consumption in children have shown that teacher attitudes can influence children's perceptions and contribute to a programme's success<sup>(123,124)</sup>. Therefore, teachers have an important role in the promotion of healthy eating behaviours. The New Zealand education curriculum identifies that 'food and nutrition' is one of seven key areas of learning within the health and physical activity domain<sup>(80)</sup>. There are limited data within the New Zealand context with regard to teachers' perceptions and attitudes to nutrition promotion within schools. However, the lack of time within the curriculum, which is heavily centred on literacy and numeracy, and the limited nutrition training provided to teachers may be an obstacle<sup>(125)</sup>. This is also reported within international literature. Primary school teachers in New South Wales ( $n = 33$ )<sup>(84)</sup> and primary and secondary school teachers in California ( $n = 102$ )<sup>(83)</sup> reported that lack of resources and time were the most common barriers to teaching nutrition. Without an overhaul of the current curriculum, it is likely that external support will be needed to provide teachers with the tools to promote nutrition within the time-scarce teaching environment, similar to interventions such as the Heart Foundation Heart Start Toitoti Manawa programme, which delivered curriculum support in New Zealand for teachers (Table 1)<sup>(55)</sup>.

More work needs to be done in New Zealand to understand the enablers and barriers for teachers to promote a healthy food and drink environment. Some teachers may feel that the school food availability is not their responsibility; however, the types of food and beverage that dominate a school canteen can undermine the health and nutrition curriculum by promoting unhealthy foods<sup>(77)</sup>. In an analysis of New Zealand schools ( $n = 200$ ), 60% of teachers felt that nutrition was high on their list of priorities, yet only half of teachers thought that management supported the provision of healthy foods through the canteen or lunch order service<sup>(14)</sup>. An analysis of Australian school canteens ( $n = 203$ ) found that, while almost all canteen managers (92%) reviewed their menus annually to identify opportunities to improve the healthiness of food items sold, less than half labelled their menus to identify healthy options (43%), and less than a quarter had a canteen policy (22%) or included only healthy meals in their 'meal deals' (25%)<sup>(126)</sup>. This may be because canteens need to return a profit. A qualitative analysis of Australian school principals ( $n = 14$ ) and canteen managers ( $n = 14$ ) reported contradictory opinions between the two groups: canteen managers were under the impression that canteens needed to make a profit, whereas principals were not so concerned with profits and more concerned about what was sold to children<sup>(77)</sup>. These differing opinions and the wider impact on school food availability highlights the need for comprehensive school food policies.

Additionally, the importance of nutrition promotion in schools may be hindered by differing opinions on whom the responsibility lies with to promote healthy eating in the first place: the school, or the parents. Although many health promotion policies encourage a working relationship between schools and parents, negative parental reactions and parental resistance to changes in food policy have been identified as barriers to implementing a healthy food and drink environment in schools<sup>(74)</sup>. Interviews with New Zealand principals ( $n = 6$ )

and teachers ( $n = 26$ ) suggested that the primary goal of the school was health education, and that working with families to promote healthy eating behaviours in children was beyond the scope of what was manageable for schools<sup>(127)</sup>. This may tie in with the frustrations felt by teachers with regard to enforcing a food policy in schools given that children have limited control over foods brought to school, and because parents may resent the perceived criticism<sup>(86)</sup>. School principals are aware that time pressures on parents and food insecurity influence the foods that children bring from home<sup>(33,74)</sup>; however, many teachers perceive unhealthy foods to be a result of parental lack of nutrition knowledge, skills and ability<sup>(127)</sup>, which is a concept that adds to the hardship stigma. Policies to improve the school food environment should promote and provide guidance on ways to build a cohesive relationship between schools and the community, both of which have significant influence over children's health behaviours.

### Strengths and limitations

To the author's knowledge, this is the first broad overview of the New Zealand school food environment. This review included a comprehensive search of the literature using multiple databases to ensure relevant research papers were captured. The food environment was categorised according to the conceptualised four domains; economic, political, availability and socio-cultural, which guided the scope of this review<sup>(23)</sup>. There was overlap of the factors within each domain as some factors applied to several categories and, owing to the broad examination of the food environment, many connections and interdependencies exist. There are several limitations to this review. A systematic approach to the literature search was not undertaken for the purpose of including the limited available evidence within New Zealand. Despite this, the review provides the breadth of current evidence on the New Zealand school food environment, and owing to the relatively few New Zealand studies, evidence from Australian schools was included as the education system and school food guidance is similar. The literature search was guided by co-authors and a librarian to reduce the risk of bias. The search was restricted to English-language publications, and where data from New Zealand could be obtained pertaining to the four domains and subsections, further literature searches outside of New Zealand were not conducted in order to stay within the scope of this paper. Owing to the narrow regional scope of this paper, there is the potential that larger international and/or non-English language publications may challenge the conclusions drawn from this review.

### Conclusions

New Zealand data are lacking with regard to evaluating the effectiveness of school food policies and government guidelines in addressing the school food and beverage environment. On the basis of the existing evidence, school food policies have the potential to improve the healthy food and drink environment; however, they are not often implemented and lack comprehensiveness. There are many external influencers that are often not addressed in food policies and guidelines that may hinder implementation. This review highlights the importance of

food cost and lack of resources as a significant barrier to implementing a healthy food and drink environment within schools and in the community. Strategies to improve the affordability of healthy foods, particularly in lower socio-economic areas and those experiencing food deprivation, may help to promote healthy eating in the community and, as a result, positively influence children's food behaviours. Guidelines for improving school food availability should include pricing strategies alongside restriction of unhealthy foods sold in school canteens to incentivise students to make healthier choices. The food environment around schools is also something to explore as part of a health promotion strategy. Policies to restrict unhealthy food advertising and marketing to children should be improved in New Zealand, particularly around schools. Tools to promote nutrition education in schools should start with added support for teachers to improve their knowledge, confidence and skills. Using peer modelling may be an efficient way to promote healthy eating within schools without disrupting the current curriculum. Schools are uniquely placed to promote health and nutrition to children at a critical stage in their lives. They may also play a role in nutrition promotion for the wider community. Greater investment in resources to implement and support school policies through an external work force may be a viable option to alleviate the pressure from schools. The review highlights gaps in policy implementation, and potential factors that could enable successful implementation of a healthy food environment in New Zealand schools. Further research on the New Zealand school food environment, including analyses of current school food availability, food policies and the implementation of the new Healthy Food and Drink Guidance for Schools, would help to identify areas for improvement.

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