Teacher Perceptions of the School Food Environment: Has the Healthy Active Learning (HAL) initiative made a positive impact?

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ABSTRACT

Background: Childhood obesity is a growing concern. Eating patterns are carried through from childhood to adulthood making the school food environment a key setting to influence healthy eating. The 5-year long Healthy Active Learning (HAL) initiative aims to increase wellbeing in primary and intermediate students (5-13 years old) through physical activity and healthy eating. Teachers play a key role in facilitating a healthy school environment and school-based nutrition programmes. However, there is a limited understanding of teachers' perceptions of the school food environment, and the perceived roles they play in this. This study assessed teachers' perceptions of the school food environment throughout the HAL initiative.

Aim: To assess primary and intermediate schoolteachers' perceptions on the school food environment over the course of the HAL initiative, specifically from evaluation data collected from 2020/21 and 2022/23.

Methods: This mixed methods study used HAL evaluation data from 2020/21 and 2022/23. A survey to assess teachers' engagement with health topics, perceptions of school food policies, promotion, and provision was sent to primary and intermediate school teachers from participating HAL schools via email using Qualtrics (2020). Survey responses (n = 1728) were analysed using Pearson's Chi-square and Fisher's exact tests. Qualitative focus groups were undertaken to better understand survey responses and reveal nuanced themes. Teacher focus group transcripts (n = 538) were thematically analysed using NVivo.

Results: In both surveys 86% of teachers reported enjoying teaching health ($p = 0.96$) and ≥84% agreed healthy eating was key to student wellbeing ($p = 0.66$). Confidence in teaching nutrition decreased from 83% in 2020/21 to 78% in 2022/23 ($p = 0.02$). Food policies were upheld by ≥60% ($p = 0.56$) of teachers and ≥56% for external activities ($p = 0.76$). Schools providing milk and water decreased from 69% in 2020/21 to 58% in 2022/23 ($p = <0.001$). Most ≤78% teachers agreed healthy food was promoted at their schools ($p = 0.22$). More than half of schools worked with food providers (68% in 2020/21 to 63% in 2022/23 $p = 0.05$).

Focus groups revealed teachers believed schools are trying to create a healthy school food environment. Concerns were raised about food insecurity in students' homes and access to unhealthy foods from external food environments. Food promotion from external providers

such as *Fruit in Schools* were highly valued. Teachers expressed a need for professional development in nutrition education as they were not trained for this role.

Conclusions: Overall, teachers perceive schools were doing enough to create a healthy school food environment and are engaged with health topics. Some took on the responsibility of nutrition educators if they value nutrition and health. External providers, such as *Fruit in Schools, Breakfast Club, and Food for Thought*, were valued by teachers and the school community. The school food environment does not operate in a silo and is influenced by the community and home environment. Teachers perceives children's experience of food security at home impacts the school food environment, through what type of food students bring to school, or impacting their attendance.

So, what? Efforts to create a healthy school food environment need to consider the role of teachers and the external influences within the community and home environments. Teachers need more professional development opportunities to feel confident and supported in teaching nutrition topics to students.

Keywords: School policy, public health nutrition, food insecurity, school programmes, nutrition education, healthy food promotion.

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CONTRIBUTIONS

Author	Contribution to the study
Mae Young MSc Nutrition and Dietetics Candidate	The primary author of this research conducted a literature review, survey and focus group analysis, interpretation and discussion of the results, and recommendations.
Prof Carol Wham PhD, Primary Thesis Supervisor	Contributing public health nutrition expertise, and guidance throughout writing process, literature review direction, data analysis of survey and focus group data, and discussion focus, and revising thesis writing.
Prof Ajmol Ali PhD, Thesis Co-supervisor	Continuous guidance throughout the research development and revision of thesis. Healthy Active Learning initiative research co-director.
Dr Karen Mumme PhD, Healthy Active Learning Evaluation Data Analyst	Provided expertise to guide statistical survey data analysis. Conducted Healthy Active Learning evaluation statistical analysis.
Owen Mugridge MSc, School of Sport, Exercise and Nutrition	Healthy Active Learning project coordinator, developing data collection design, and conducting focus groups.
Kyria Bacinski Research Assistant, Massey University School of Sport, Exercise and Nutrition	Healthy Active Learning research team member, coding focus group transcripts for nutrition-related themes.
Danika Pillay PhD, Registered Dietitian	Previous research on the school food environment developed codes used in the thematic analysis of focus groups and conducted 2020/21 focus group thematic analysis of the school food environment.
Dr Warrick Wood PhD, School of Sport, Exercise and Nutrition	Advised on qualitative methodology, results, and discussion presentation.
Cherie Todd-Williamson Learning advisor, Massey University	Massey University writing consultant, providing feedback on academic writing.

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GLOSSARY

Equity Index	A measure of socio-economic barriers against schools
External providers	School-based nutrition programmes that are contracted from outside schools, to come to schools and implement a nutrition and healthy eating intervention, such as food provision, or healthy eating education.
Food accessibility	Similarly, to food security, access individuals have to adequate resources for attaining appropriate foods for a nutritionally adequate diet.
Food environment	The collective physical, economic, policy and socio-cultural surroundings, opportunities and conditions that influence people's food and beverage choices and nutritional status (Swinburn et al., 2013).
Food insecurity	A state of not having consistent and reliable access to a sufficient quantity and quality of affordable, culturally appropriate, and nutritious foods to meet one's basic needs.
Food security	Consistent and reliable access to a sufficient quantity and quality of affordable, culturally appropriate, and nutritious foods.
Healthy Active Learning	Healthy Active Learning is a joint government initiative between Sport NZ, the Ministry of Education, the Ministry of Health. It supports schools to improve the wellbeing of children through healthy eating and drinking, and quality physical activity. It is part of New Zealand's Child Youth and Wellbeing Strategy, a set of actions across government to improve the wellbeing of all children and young people under the age of 25.
Aotearoa NZ	Aotearoa New Zealand
Non-communicable diseases (NCDs)	Diseases that are not transmissible between people through infection but are typically a result of long-term unhealthy behaviours. Examples of NCDs are diabetes, kidney disease, heart disease, stroke, cancer, and chronic lung disease.
Obesogenic	Promoting obesity
School food environment	Spaces, infrastructure, and conditions inside and around the school premises where food is available, obtained, purchased and / or consumed (for example, tuck shops, kiosks, canteens, food vendors, and vending machines) (O'Halloran et al., 2020).

*For programme descriptions, please see appendix A.

CHAPTER 1: INTRODUCTION, AIMS AND OBJECTIVES

1.1 Background

Adequate nutrition is key during the dynamic stages of physical, cognitive, and behavioural development throughout childhood and adolescence. For example, the combination of sufficient protein, calcium, and vitamin D is essential for bone strength and growth, whilst other micronutrients such as iron and omega-3 fatty acids are vital in brain development (Bonjour et al., 2009; Huffman et al., 2011; Rucklidge et al., 2021). Therefore, it is important to promote healthy food environments to enable optimal development and growth in children during these significant stages. Children spend one third of their time at schools, making it an ideal setting for public health initiatives to influence children's eating patterns. In particular, the establishment of healthy eating habits from a young age will carry on through until adulthood, decreasing the risk of developing non-communicable diseases (NCDs) such as, diabetes, hyperlipidaemia, kidney disease and other health complications later in life (Mikkilä et al., 2005; Movassagh et al., 2017). With support from the government, and key stakeholders such as school leaders, local communities and families, schools are an ideal setting to implement public health initiatives to create healthy food environments.

The school food environment has been investigated as a key setting to influence health outcomes and deter the rising levels of childhood obesity over the last 30 years (Contento et al., 1992; D'Souza et al., 2022; Gillis et al., 2009). Associations have been made between food environments and eating patterns regarding their influence on determining health outcomes (Swinburn et al., 1999). The New Zealand Health Survey 2020/21 found that one third of children aged 0 - 14 years are overweight or obese, and these statistics are also linked to ethnic and socio-economic disparities (Chiavaroli et al., 2019; Ministry of Health, 2021). Obesity increases the risk factor of developing NCDs which were rarely seen in children before the last decade yet are becoming more prevalent in young populations (World Health Organisation (WHO), 2016). This trend in rising levels of childhood obesity and NCDs has been attributed to our food environments becoming more obesogenic, as an increase of energy dense and processed foods have become more accessible and convenient (Mackay et al., 2022; Swinburn et al., 1999).

Food insecurity affects 15% of Aotearoa New Zealand's child population and is a known barrier to a healthy school food environment (Duncanson et al., 2022). This means they do not have access to consistent and reliable sources of nutritionally and culturally appropriate

foods (Ministry of Health, 2022). Like obesity levels, ethnic disparities exist amongst Māori and Pacific children who are three times more likely to experience food insecurity when compared to their New Zealand European and Asian peers (Chiavaroli et al., 2019; Duncanson et al., 2022). This is a concern as it exacerbates existing health inequities that exist in Aotearoa NZ (Ministry of Health, 2002). Furthermore, food insecurity increases the risk of childhood malnutrition (being either underweight or obese) due to compromised nutrition intake. Homes that experience food insecurity compromise nutritionally dense foods such as fruits, vegetables, meat, and dairy for more affordable options which are typically energy dense, highly processed, convenience foods that should be consumed in moderation (Duncanson et al., 2022; Smith et al., 2013). As a result, food insecurity has been associated with mental and physical developmental concerns in young children (Gallegos et al., 2021).

Internationally, school-based nutrition programme providers have shown promise of facilitating healthy changes (Driessen et al., 2014; Gillis et al., 2009; Nelson & Breda, 2013). Although many of these interventions have fostered a net positive school food environment, more research is required to determine the effect of the school food environment on individual long-term health outcomes (Pineda et al., 2019; Vega-Salas et al., 2023; Welker et al., 2016). Furthermore, recent analysis of Aotearoa NZ's school food environment concludes that most are unhealthy. For example, most schools did not have a comprehensive food and drink policy, continuing to sell and fundraise with foods containing refined sugars, carbohydrates and being low in nutrients, which undermine efforts to support a healthy school food environment (D'Souza et al., 2022).

In Aotearoa NZ, many school-based nutrition programmes, also known as external providers, have directed efforts towards primary and intermediate schools to improve nutrition. Some programmes provide food, such as *Milk in Schools, Fruit in Schools,* and *Breakfast Club*. These programmes are funded by private companies such as Fonterra, or charitable trusts such as *5-Plus-a-day* in collaboration with Food Stuffs, Aotearoa NZ's largest food distributor. Food provision programmes are successful in addressing food insecurity and health inequities as they facilitate daily access to nutritious foods. Other programmes provide nutrition and health education sessions at schools run by nutrition experts directly to students and teachers. For example, *Garden-to-Table* and *Food for Thought* are charitable trusts that offer education sessions either in the garden or at the supermarket, as well as inside the classroom. They also provide educational resources and professional support to teachers to help children make healthy food choices. Further initiatives provide food and drink policy guidance to systematically change what food is available in schools. For instance, milk and water only policies have been shown to be

effective in reducing the number of sugar-sweetened-beverages consumed by students (Pineda et al., 2019). For context around what work has been done in the school food environment, table 2.1 presents a comprehensive breakdown of school-based nutrition programme providers in Aotearoa NZ.

Within Aotearoa NZ, one of the most recent healthy food initiatives has been the government-led Healthy Active Learning (HAL) initiative. This 5-year initiative is guided by the Child Youth and Wellbeing Strategy starting in 2020, targeting primary and intermediate schools across Aotearoa NZ. It is a collaborative effort between the Ministry of Health, the Ministry of Education, and Sport New Zealand, which aims to improve the school food environment through food and drink policy guidance and updated health curriculum and physical education. A large-scale evaluation was simultaneously conducted by Massey University researchers with the approximate 900 participating schools, which included surveys, focus groups, and anthropometric measurements with students, teachers, and family members. Teachers played a significant role in the initiative as they contribute to the school food environment by implementing food and drink policies and delivering the health curriculum.

Teachers are not only formal educators, but they are also role-models that directly influence students' ideas and behaviours (Donnelly et al., 2009). Historically, they have been required to go beyond their scope and confidence levels when teaching food and nutrition topics (Rangel et al., 2014). Moreover, teachers are in a unique position to understand how children's environments impact their development and learning. Public health initiatives such as HAL require assessment of key stakeholders' perceptions, such as teacher surveys and focus groups, to ensure the programme's future success. More importantly, teachers' perceptions provide valuable insights into how the school food environment operates on a practical level by identifying the enablers and barriers to a healthy school food environment. Furthermore, teachers' engagement with healthy eating topics are guided by their personal values regarding food and nutrition and their perceived benefits and / or consequences (Henry et al., 2010).

As a key stakeholder, support from teachers significantly contributes to the outcome of a school-based nutrition programme (Nickel, 2013). These initiatives also need the support from school leaders, parents, the community, and the government to develop systems, such as food and drink policies to support a healthy school food environment (Delisle et al., 2013; Rangel et al., 2014). Successful school food policies require the cooperation of teachers as they typically occupy the position for policy implementation (Chaleunsouk & Kutsyuruba,

2014; Van Ansem et al., 2013). Although the current literature can identify what contributes to a healthy school food environment, with an emphasis on stakeholder engagement, teachers' perceptions are not well understood. Therefore, it is vital for future programmes to understand teachers' perceptions as they enact the schools' values through their own teaching practices. Therefore, this study aims to identify teacher's perceptions of the school food environment to gain a deeper understanding of how to best support healthy eating behaviours in children.

1.1.1 Scope

This study will be exploring teachers' perceptions of the school food environment using HAL evaluation data. Specifically, teacher survey and focus group data collected during the 2020/21 and 2022/23 evaluations. This involves understanding teachers' engagement with healthy eating topics, and their perceptions on healthy food policy, promotions and provision, and current best practices and suggestions to improve the school food environment. The role teachers perceive they play in creating a healthy school food environment will also be discerned. The effectiveness of the HAL initiative will not be explored as this was not possible because of the evaluation design. Using data from two time points provides further insight to how teachers' perceptions of the school food environment may have changed over time.

This study explores teachers' direct experiences with the school food environment, which will provide honest and constructive feedback on how school food environments operate, and what they perceive their role to be in it. The results of this study will help schools, policy makers, and programme providers understand teachers perceived enablers and barriers are to a healthy school food environment.

1.2 Aim

To assess primary and intermediate schoolteachers' perceptions on the school food environment over the course of the 2020/21 and 2022/23 HAL initiative.

1.2.1 Objectives

1. Assess teachers' perceptions of the school food environment over the course of the HAL initiative using teacher survey and focus group data from HAL 2020/21 and 2022/23 evaluations.
2. Identify teachers' engagement with health topics, and perceptions of healthy food policy, promotion, and provision.
3. Identify teachers' perceptions of current best practices, and suggestions to improve the school food environment.
4. Contextualise and describe the role teachers perceive they play in the school food environment.
5. Describe and discuss what external factors influence the school food environment, and how to appropriately address these to empower healthy outcomes.

1.3 Report Structure

The structure of this thesis is broken down into four chapters. Chapter 1 includes an introduction of the study, along with the purpose, scope, aims and objectives, and researcher contributions. Chapter 2 is an in-depth critical review of the literature regarding the health of Aotearoa NZ's children, the school food environment, school-based nutrition programmes, and teachers' perceptions of and roles they play in the school food environment. Chapter 3 presents the main manuscript that includes an abstract, introduction, study methods, results, and a discussion of findings. Finally, Chapter 4 concludes the thesis by summarising the main findings, discussing the study's the strengths and limitations, and final recommendations and future directions for research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This literature review explored the role teachers' play school food environment, and its relationship with children's health, food insecurity. A food environment is comprised of its physical, economical, socio-cultural, and political environments. This includes what is physically available and where, what costs are involved, influencing cultures, attitudes, and beliefs, and what the associated rules are respectively (Swinburn et al., 1999; Swinburn et al., 2013). Firstly, this review explained the importance of adequate nutrition in childhood, then how food security impacts health outcomes for children. Followed by a review of the current state of the school food environment, and what programmes have addressed this, food and drink policy and healthy food provision. The Healthy Active Learning (HAL) initiative is contextualised, followed by a critical review of the current literature's understanding of teachers' perceptions of the school food environment and the role they play in it. Finally, gaps in the literature were highlighted, followed by a conclusion.

The Social-Ecological Model was used to discuss concepts through a prevention framework throughout this thesis (Centers for Disease Control Prevention, 2015). This model considers the individual, interpersonal, community and societal factors that contribute to an individual's health risk. Firstly, the individual level considers personal and biological factors, such as age, ethnicity, and level of education that contributes to a person's attitudes, beliefs, and behaviours. Secondly, relationships consider the individuals' peer group, such as a family's values, knowledge and interpersonal dynamics. Thirdly, the community level explores settings such as work, schools, neighbourhoods, and food environments that contribute to eating behaviours. Lastly, the societal levels address economic and political environments, and how they impact nutrition outcomes on each level previously mentioned (Centers for Disease Control Prevention, 2015). All levels contribute to health outcomes, individually and together. For example, certain parental perceptions, socio-economic demographic, and neighbourhood characteristics combined can be strong predictors for child obesity outcomes (Crespo et al., 2015).

This review aimed to critically evaluate the literature on the health of children in relation to food environments and assessed the current state of the school food environment. School-based nutrition programmes in Aotearoa NZ and internationally are contextualised and critically reviewed regarding their efforts to create a healthy school food environment, with a

focus on the HAL initiative. Teacher's perceptions on the school food environment and the roles teachers play in it were also explored.

2.2 Health and Wellness of Aotearoa New Zealand's Children

Adequate nutrition, according to the National Health and Medical Research Council et al. (2006) is essential to the healthy learning and development of children. Diet quality determines the dynamic physical, social, cognitive, and behavioural growth that occurs during childhood (Ministry of Health, 2012; Rucklidge et al., 2021). As a modifiable risk factor, diet has the potential to trigger or prevent non-communicable diseases (NCDs) such as obesity, heart disease, dyslipidaemia, and kidney failure. These conditions were previously a rare occurrence in children. The most recent New Zealand Health Survey 2022/23 found that over one third of children aged 0-14 years are overweight or obese, the highest rate recorded to date (Ministry of Health, 2023). Rising levels of childhood obesity has been correlated with the increased prevalence of NCDs in youth (Vandevijvere et al., 2016; World Health Organisation (WHO), 2016). Acknowledging the trends in the health of Aotearoa NZ's children informs direction on how to best support their outcomes. Making it a priority requires policy and government funding towards creating support systems to minimise modifiable health risks.

2.3 The Politics of Public Health Nutrition

Politics plays a key role in the operation of most school-based nutrition programmes, as many are government funded. It is important to acknowledge that different governments have varying approaches towards public health nutrition. For example, certain governments have certain guiding philosophies and must consider external factors and partnerships that guide their decision making. External factors in the context of public health nutrition include partnerships with food industry, economic ideology, and relatability to publics interests (Cullerton et al., 2016). The ebb and flow of government funding to school-based nutrition programmes is reflective of how these factors are valued. To achieve sustainable and effective change in dietary behaviours, programmes must be consistent throughout a child's entire school life (Nelson & Breda, 2013). Therefore, a whole government approach should consider long-term goals when allocating funding towards creating healthy school food environments (Fathi et al., 2024).

Another way governments play a critical role in empowering healthy food environments is through policy. For instance, the 2019 Labour government developed the Child and Youth Wellbeing Strategy (The Strategy) to improve child wellbeing by offering a structural framework for anyone to use (Department of the Prime Minister and Cabinet (DPMC), 2019). This framework is based on the Child Poverty Reduction and Wellbeing Legislation (Department of the Prime Minister and Cabinet (DPMC), 2018a) which invites accountability from both political and public sectors to implement wellbeing policy directly within communities. For example, the Children's Act 2014 requires youth to be consulted with during the development and implementation of The Strategy (Brown et al., 2020; Department of the Prime Minister and Cabinet (DPMC), 2014; Office of the Children's Commissioner & Oranga Tamariki, 2019). Consequently, the government consulted with over 6,000 children and young people across Aotearoa NZ, which revealed food security as a key concern for children. These children reported not having enough money for food, and asking specifically for schools to provide lunches, highlighting the importance of key stakeholder involvement in policy development that affects them (Office of the Children's Commissioner & Oranga Tamariki, 2019). A prospering youth population results in better educational, financial, and health outcomes for the whole country (National Research Council & Committee on Population, 2005).

Without legislation in place, it is difficult for governments and public health units to enact systemic equitable change. For instance, in Aotearoa NZ, legislation such as the Child Poverty Reduction Act 2018 and the Childrens Amendment Act 2018 enforces the political accountability of children's wellbeing (Department of the Prime Minister and Cabinet (DPMC), 2018a, 2018b). These acts set a precedent for child poverty to be addressed, allowing resources to be channelled appropriately. For example, community health services that require extra resources such as education, training, food provision, budgets, and public health services become eligible for funding.

An international example of how nation-wide policy impacted student nutrition outcomes is the Healthy, Hunger Free Act (HHFA) 2010 in the US. This required a revision of the nutrition standards for schools whilst simultaneously allocating a budget for nutrition and free lunch programmes for schools for the next 5 years (S.3307 - 111th Congress, 2010). Similarly, to HHFA, *Ka Ora Ka Ako* was implemented in Aotearoa NZ to provide healthy free school lunches across the country in 2020 because of The Strategy. Overall, there were similar successes and challenges evident between HHFA and *Ka Ora Ka Ako* (Ministry of Education, 2023). Both HHFA and *Ka Ora Ka Ako* recognised food wastage as a key challenge, yet both programmes were successful in addressing food insecurity, increasing

variety and nutrition of diets, and supporting a healthy learning environment (Garton, Riddell, McKelvie-Sebileau, Glassey, Tipene, et al., 2023). Although, HHFA has been associated with a reduction in obesity trends, it is too soon to understand the impact *Ka Ora Ka Ako* has had on childhood obesity in Aotearoa NZ (Kenney et al., 2020). Though correlation does not mean causation, these examples showcase how legislation may directly impact the school food environment, their surrounding communities and improve childhood health outcomes.

2.4 Food In/Security

It is challenging to achieve a healthy school food environment without addressing food insecurity. The nutritional implications of food insecurity are detrimental to overall academic, behavioural, and emotional development outcomes in children (Shankar et al., 2017). Food insecurity is defined as children living in households "where food runs out sometimes or often" and is often related to socio-economic barriers such as low income (Duncanson et al., 2022). Nutritious foods such as fruits and vegetables, cereal and dairy are sacrificed for cheaper and usually less nutritious options, which affects 15% of children in Aotearoa NZ and contributes to poor health outcomes (Duncanson et al., 2022; Ministry of Health, 2019, 2022; Smith et al., 2013).

This compromise for more affordable yet less nutritious foods increase the risk of children experiencing malnutrition, poor academic performance, and developmental and behavioural problems due to not having access to adequate food (Gallegos et al., 2021; Gundersen & Ziliak, 2015; Nyaradi et al., 2013). Food security, having reliable and consistent access to safe and nutritious foods that are culturally appropriate, is a quality measure of child wellbeing (Child and Youth Wellbeing, 2023; Smith et al., 2013). The consequences of inadequate nutrition related to food insecurity highlight the necessity for government and community action, including nation-wide policy and public health initiatives, to increase access to healthy food for children.

It is equally important to consider the ethnic differences that exist within socio-economic status, which are reflected in Aotearoa NZ's food security statistics. For instance, Māori and Pacific children are more likely to come from lower socio-economic backgrounds and are also "more likely to purchase foods on the way to or at school" (Duncanson et al., 2022; Parnell et al., 2003). Furthermore, Pasifika and Māori children are four times more likely to live in a household that "sometimes or always ran out of food" than their NZ European and Asian peers (Duncanson et al., 2022). These statistics provide a clear link between public

health nutrition policy and food insecurity, as this presents how health inequities are exacerbated due to the compromises households must make between being able to afford food and everyday living costs.

2.5 The School Food Environment

Food environments shape dietary patterns therefore influencing health outcomes. A food environment is comprised of its physical, economical, socio-cultural, and political environment (Swinburn et al., 1999). This includes what is physically available and where, what costs are involved, influencing cultures, attitudes, and beliefs, and what the rules are respectively (Swinburn et al., 1999; Swinburn et al., 2013). For example, food swamps are areas with higher relative density of unhealthy food outlets, which are commonly found in areas of high deprivation and has been associated with increased prevalence of obesity in children (Vandevijvere et al., 2019). This can be reflective of what policies allow for the physical retail food environment to operate this way. Community food retailers also reflect the cultural demographic of the area, heavily influencing the type of food on offer. This demonstrates the various influences on food environments which have direct and indirect consequences on the health and wellbeing of the community, including schools and their students.

The school food environment encompasses food accessibility and availability within schools (Food and Agriculture Organization of the United States, 2023). This includes food provision such as food brought into schools from home or community retailers, school canteens and vending machines, the promotion of foods, and food and drink policies. Children exposed to unhealthy food environments, food insecurity and limited nutrition education are at higher risk of NCDs (Norriss et al., 2022; Swinburn et al., 2011). Considering that the average Aotearoa NZ child spends one third of their waking time at school from the age of 6 up until 16 or 18 years old (New Zealand Immigration, 2022), many programmes have targeted the school food environment to intervene throughout these significant developmental stages.

Young children are at an ideal developmental age to introduce healthy eating habits, making schools a good place to implement healthy food provision and promotion through education (Henry et al., 2010). Various studies have shown that healthy eating habits established in childhood will continue into adulthood (Mikkilä et al., 2005; Movassagh et al., 2017). Moreover, a ‘whole school’ approach is best practice when creating a healthy school food environment opposed to targeting individual students (Pineda et al., 2019; Welker et al.,

2016). Simultaneous implementation of various nutrition interventions can address the multiple aspects of the school food environment whilst providing consistent messaging. This could include increased healthy food accessibility, policy implementation and monitoring, professional development for staff, and nutrition education. Considering the largest barriers to promoting a healthy school food environment has been found to be the convenience of preparing processed foods compared with healthier options and resistance from parents (Ali et al., 2021), the integration of nutrition interventions creates an avenue to empower collaboration and communication between schools and the community. Despite past efforts being made, the literature calls for further development of a systematic framework to understand school and community food environments and their impact on health outcomes (Gray et al., 2019; Ni Mhurchu et al., 2013; Swinburn et al., 1999).

The school food environment should be considered in relation to home and community settings as food environments do not operate in a silo (Van Hook & Altman, 2012). The Whole School, Whole Community, Whole Child (WSCC) model recognises the important role community plays in supporting health and academic outcomes (Centers for Disease Control and Prevention, 2023). This model considers a child's physical activity, nutrition, social and emotional and physical environments, levels of community and family involvement, as well as access to health and social services (Centers for Disease Control and Prevention, 2023). Although there is yet to be a clear implementation guide, the WSSC model provides a potential framework to improve health and academic outcomes for students (Lewallen et al., 2015; Rooney et al., 2015). For instance, the WSCC model considers how culture, income, food value and knowledge at home directly impacts what a student may bring to school for lunch. Additionally, community food retailers may influence what types of food students buy to take into school. Although the 2002 NZ Child Nutrition Survey found that 84.4% of children brought most of their food from home, approximately half of the sample bought at least some food at the school canteen or local takeaway shop (Parnell et al., 2003). This reflects how retail food environments influenced by social, community and interpersonal factors impacts the school food environment. Equitable food environments are created through school wide programmes that aim to impact all students equally and effectively.

Investigations into the Aotearoa NZ school food environment have consistently found it be unhealthy. Weak food and drink policy, and questionable fundraising activities using unhealthy foods are the main barriers to a healthy school food environment (D'Souza et al., 2022; Pillay et al., 2022). This may be reflective of the schools' economic environment, since over 60% of school canteens run for profit offering mainly unhealthy food options as they are non-perishable and are more likely to sell (Carter & Swinburn, 2004). Despite 60% of

schools saying that nutrition was a high priority, this was not reflected in their food policies and practices, which proposes that profit may be a priority over the health of their students. This highlights the urgent need for a stronger national-level nutrition policy that addresses health engagement, and healthy food promotion and provision in schools. Current strategies that have shown to have a positive effect on the school food environment include increased access to fruits and vegetables in a highly palatable manner through provision of healthy meals, replacing sugar sweetened beverages with water, and promoting collaboration with external providers and the community (Pineda et al., 2021). This combines healthy food policy, provision, and promotion to create a healthy school food environment.

The literature concludes that food environments have an impact on health outcomes, although the differences in study designs make it difficult to discern how specifically the school food environment influences health outcomes for children. Interpersonal and community predispositions such as having a high level of parental support, parental education and socio-economic status combined with a healthy school food environment have been associated with lower levels of obesity in children (Gray et al., 2019). Other studies have found associations between socio-economic levels, healthiness of food environments in and surrounding schools, and increased risk of undesirable health outcomes, though it is important to note investigative studies were observational experiments (Driessen et al., 2014; Fitzpatrick et al., 2017). More high-quality intervention studies with control groups are needed to gain a more refined understanding of the relationships between external and internal school food environments, student dietary behaviours, and health outcomes such as obesity levels.

Since the COVID19 pandemic, truancy rates have increased and attitudes towards education have shifted, especially for those from lower socio-economic backgrounds, exacerbating existing inequities (Shepherd & Mohohlwane, 2021; Tsolou et al., 2021). Hence, efforts to influence eating behaviours in children should also focus on the community setting.

2.5.1 School-based Nutrition Programmes

Since the 1990s, numerous school-based nutrition programmes in Aotearoa NZ have aimed to maximise health and education benefits and reduce the risk of NCDs such as obesity or heart disease. Most of these programmes are run by charitable trusts and funded by private enterprises and / or the government, such as *Fruit in Schools*, *Garden to Table*, or *Ka Ora*

Ka Ako. Table 2.1 presents current and previous school-based nutrition programmes based on the type of intervention and what issue they are targeting. For programmes to be effective, they should last over a year, become normalised as a regular activity within the school, engage parents, and introduce nutrition education into the standard curriculum (Silveira et al., 2011). For example, *Project Energize* was a multi-component physical activity and nutrition programme which aimed to reduce weight gain in primary school children (AUT Child and Youth Health Research Center, 2011). The programme implemented *"Energizers",* a taskforce who worked directly with schools to increase fitness levels of students and promote healthy eating. A 2011 evaluation found that obesity rates decreased by 3% in participating schools, and this framework has been applied in countries such as Ireland and California in the US (Elaine Rush et al., 2014). A summary of Aotearoa NZ programmes and evaluations can be found in Appendix A. Like *Project Energize*, the HAL initiative is a multiple component school-based programme which aims to improve children's wellbeing through physical activity and nutrition education.

An example of a school-based nutritional food provision programme is *Ka Ora Ka Ako* which aims to address food insecurity (Ministry of Education, 2023). The currently eligibility criteria include 25% of students facing the most socio-economic barriers, who receive a free school lunch which meets certain nutrition standards (Ministry of Education, 2024). However, the Growing Up in New Zealand study found that one third of children living in severely food insecure households, did not have access to the programme (Gerritsen et al., 2023). Here, the equity index is currently the main measure to determine eligibility. Also, flexibility must be cautioned as a whole school approach is more effective, rather than targeting individual students. This leads to children and their families feeling shame or being ostracized by their peers due to their receiving support from the government (Bhatia et al., 2011). In addition, multiple reports have found that an all-schools approach to creating healthy school food environments is preferred in countries such as Poland, UK, and the US. This preference leads to an overall higher success rate as this becomes the norm for all schools and students regardless of their socio-economic background (Bhatia et al., 2011; Nicol-Williams, 2023).

Table 2.1

School-based nutrition programme external providers by health target and type of programme.

	Food provision
Food insecurity	• Ka Ora Ka Ako, Healthy School Lunches Programme: Funded by Aotearoa NZ Government (Garton, Riddell, McKelvie-Sebileau, Glassey, Leech, et al., 2023) • Fruit in Schools: Funded by Ministry of Health (Watts, 2023) • Kickstart Breakfast Club: Funded by Sanitarium, Fonterra, and the Ministry Social Development (D'Souza et al., 2022) • KidsCan Food Programme: Run by KidsCan Charitable trust (Impact Lab, 2020) • Milk in Schools: Funded by Fonterra (ceased in 2020) (Marsh et al., 2018)
	Education / curriculum based
Obesity and NCD risk	• Healthy Families NZ: Funded by Ministry of Health (Matheson et al., 2022) • Project Energize (Waikato operations ceased, now Wellington only) (AUT Child and Youth Health Research Center, 2011) • Nestlé Cook for Life, Ka Tunu Ka Ora (Nestle, 2023)
Healthy eating education	• Food for Thought programme: Foodstuffs (Heart Foundation, 2023a) • Garden to Table: Charitable Trust (Wakefield, 2013)
	Policy development
All the above	• Healthy Heart Award: NZ Heart Foundation (Heart Foundation, 2023c) • Healthy Active Learning (HAL) (Ali et al., 2021; Ali et al., 2022)

Much of the literature on whether multiple or single component interventions are the most effective in improving dietary behaviours in school children (Obbagy et al., 2012; Pongutta et al., 2022) are mostly observational cross-sectional study designs. Single component interventions focus on a single barrier to behaviour, providing one intervention at one time (Squires et al., 2014) for example, most food provision programmes, such as *Fruit in Schools, Milk in Schools,* or handing out education flyers at school (Marsh et al., 2018; Watts, 2023). Multiple-component interventions target several barriers by implementing multiple interventions at one time (Squires et al., 2014). *Garden to Table* is an example of a multiple-component intervention as it offers an educational component as well as a practical element of cooking and gardening (Wakefield, 2013). A randomised, controlled intervention study (The *HEALTHY study*) (Gillis et al., 2009) found the integration of multiple interventions had a strong effect on children's health outcomes The intervention goals included offering healthier options at schools, such as low-fat options, high fibre grains and more fruits and vegetables. The study also instigated increased physical and healthy eating messaging, education, staff training and regular meetings with food service managers. The *HEALTHY study* included nutrition goals and prescriptive strategies which involved collaboration and rapport building between school staff and intervention study staff which contributed to the intervention's success (Gillis et al., 2009).

Conversely, a meta-analysis found no statistical difference between single or multiple component interventions to reduce BMI or increase fruit and vegetable intake (Pineda et al., 2021). Though the literature is unclear on how many, and which specific components are the most effective, any intervention in combination with a physical activity element consistently proved successful (Pineda et al., 2021). Nutrition education can make an impact on children's dietary behaviours when combined with interactive interventions, such as cooking classes and gardening (World Health Organisation (WHO), 2016). These studies reflect that interactive, and consistent messaging is necessary to make meaningful change in children's dietary behaviours.

2.5.1.1 The Healthy Active Learning (HAL) Initiative

The HAL initiative is a government funded programme aiming to increase the wellbeing of students through physical activity and improving the school food environment. The 5-year (2020 – 2025) initiative aligns with The Strategy's outcomes for children to be happy and healthy. The $47.6 million investment is a lead by the Ministry of Health, Ministry of

Education, and Sport NZ to increase the wellbeing of students through healthy eating and drinking, and quality physical activity (Ali et al., 2021; Government of New Zealand, 2019; Ministry of Education, 2022a). The voluntary nation-wide initiative is made up of three components in a collaborative manner by each respective agency to address child wellbeing and is still being implemented at the time of writing.

Firstly, the Ministry of Health (now referred to as Te Whatu Ora) focused on the school food environment through employing a health promotion workforce. This workforce aimed to work directly with schools to create healthier food environments by providing practical support in adopting healthy food and drink policies. The Healthy Food and Drink Guidance for Schools was developed and replaced the previous Heart Foundation's Fuelled4Life programme's Food and Beverage Classification System (Mhurchu et al., 2016; Ministry of Health, 2020b). This document guides the recommendations in the Healthy Food and Drink Toolkit to help schools create comprehensive food and drink policy (Ministry of Health, 2020c). The toolkits provide policy examples, and the nutrition workforce would help to implement these (Ministry of Health, 2020c).

Secondly, the Ministry of Education contributed to a healthy school food environment by developing a new health focused curriculum and resources for teachers (Ali et al., 2021; Ministry of Education, 2022a). This part of the initiative was also implemented by the nutrition workforce who would also assist teachers in professional development. Due to the COVID19 pandemic, the nutrition workforce was diverted from the initiative, and the physical activity workforce was able to partially fill this role to support teachers to be confident and capable in delivering Health and Physical Education and Hauora (Wellbeing) Curriculum (Ali et al., 2021).

Finally, Sport New Zealand collaborated with regional sports trusts across the country to provide a physical activity workforce working directly with ~900 schools (approximately 45% of NZ schools). This workforce included on-the-ground activators to create healthy and active learning environments through providing quality physical activity training. Facilitators worked directly with schools to create more meaningful connections with their local communities (Ali et al., 2021).

This collaborative approach connects local communities and experts to promote a healthy school food environment. At no cost to the schools, they have access to physical activity and health advisors, professional development for staff, and health and physical activity resources that best support their health goals (Ministry of Education, 2022a). The initiative aims to evaluate and improve the effect on quality physical activity and the school food

environment within schools. Each agency addresses the value of health and physical education and wellbeing curriculum through their respective strengths to support children, schools, and their teachers.

Evaluation reports (Ali et al., 2023; Ali et al., 2021; Ali et al., 2022) have investigated how the HAL initiative has made an impact on the school food environment through data collected from students, teachers, school leaders and families. The initial report found the biggest barriers to a healthy school food environment were convenience foods and resistance from parents (Ali et al., 2021). The interim report found families felt their schools promote healthy food and drink, and schools reported having healthy food and drink policies because of the initiative (Ali et al., 2022). A more recent report found that communications and the upholding of healthy food and drink polices had declined over time (Ali et al., 2023). These reports provide help to identify enablers and barriers for key stakeholders towards creating a healthy school food environment.

2.5.2 School Food and Drink Policy

The School Food Environment Review and Support Tool (School-FERST) found that less than half of schools (38.5% of primary and 44.8% of secondary) in Aotearoa NZ had a written nutrition policy (Vandevijvere et al., 2018). Schools that did have nutrition policies did not uphold specific nutrition standards, using suggestive rather than prescriptive language which is not effective (D'Souza et al., 2022; Vandevijvere et al., 2019; Welker et al., 2016). These findings directly influenced the development of a Food and Drink Policy Toolkit as part of the HAL initiative to help schools have a comprehensive policy. School food policies have consistently shown to be effective in improving children's eating behaviours and improving dietary behaviours, both within Aotearoa NZ and internationally (Mhurchu et al., 2016; Micha et al., 2018). Best practice guidelines from the International Network for Food and Obesity / NCD Research, Monitoring and Action Support (INFORMAS) group found robust monitoring and evaluation, and the support of stakeholders such as canteen owners, teachers, and parents on policies contribute to sustainable and effective policy implementation (Delisle et al., 2013; Nelson & Breda, 2013; Swinburn et al., 2013). HAL's policy toolkit demonstrates how schools can follow best practice guidelines to create a healthy school food environment by providing templates with predefined goals and specific policy implementation strategies.

Additional policy enablers include support from key stakeholders including teachers, genuine concerns for child health and welfare, and positive and consistent communication between

key stakeholders about food messaging (Micha et al., 2018). Conversely, barriers included not having enough funding, materials, or training, as well as low levels of engagement from parents and the wider community. Furthermore, the literature confirms barriers to successful food policy included not enough training and / or resources provided to staff, rejection of healthy food alternatives by children, fundraising activities using unhealthy foods, nutrition was a low priority and costs to implement changes such as installing water fountains and buying in healthy food to sell (Pineda et al., 2021; Ronto et al., 2020). Strategies to address these barriers involved engaging parents in healthy food discussions and involving students in policy development (Nelson & Breda, 2013; Ronto et al., 2020).

2.6 Teachers' Roles

Teachers coordinate and facilitate children's education, making them fundamental to the learning and development of students. When teachers are well supported professionally, financially, and provided with the appropriate resources to do their job, student learning is also fully supported. Teachers' perceptions provide valuable insight into how students interact with their environment and their peers, including eating patterns. Understanding the teachers' perceptions of a collaborative multi-agency initiative is key to progressing the effectiveness of the initiative. Teachers' perceptions of the school food environment are not well cited within the current literature. The role teachers' play in facilitating a healthy school food environment were identified through previous programme evaluations, however more research is needed to understand teachers' perceptions.

2.6.1 Teachers' Role in the School Food Environment

As a key role model in students' lives, teachers play an important part in facilitating a healthy school food environment. Teachers facilitate nutrition education, model healthy eating, and provide opportunities to make healthy choices. For these things to occur, teachers require awareness, knowledge, and confidence. Firstly, teachers require awareness about their school's food and nutrition policies to implement them (Nelson & Breda, 2013; Nickel, 2013). Lack of awareness of such policies can undermine efforts to create a healthy school food environment (Lanier et al., 2012). Secondly, teachers require healthy eating awareness, knowledge, and skills. Basic nutrition knowledge is fundamental in establishing its value within the community. Lastly, teachers must have confidence in their knowledge and skills to

engage in conversations, deliver education, and provide educational opportunities. Therefore, it is vital for teachers to be involved in professional and resource development of healthy school initiatives.

Such a large investment in the wellbeing of students should require the insights of those who facilitate learning and development. There are over 20,000 primary and intermediate school teachers in Aotearoa NZ (Teaching Council of Aoteroa New Zealand, 2023). They can tell us firsthand what is working well and what could be done better to improve wellbeing outcomes. The government and policy makers should actively engage with teachers to make effective change. The HAL initiative enables this through providing resources, professional development opportunities, policy guidelines and active evaluation.

2.6.2 Teachers' Role in School-based Nutrition Programmes

Teachers' roles in the HAL initiative were to implement school food and drink policy and to teach health and nutrition resources in the classroom. This required schools having a policy and the teachers being aware of this policy. When key stakeholders such as teachers are not aware of or involved in the process of developing their schools' policy, there is little to no implementation (Nickel, 2013). This is not conducive to a healthy school food environment. Previous teachers' perceptions on school-based nutrition programmes have identified the need for programmes to engage with teachers directly. Although most teachers agree nutrition is important, they also note it is challenging to prioritise amongst a growing syllabus, making it difficult to incorporate into the curriculum (Belansky et al., 2009). A lack of communication between programme providers and stakeholders, such as teachers, parents and students, and limited time to teach nutrition is a recurring barrier to a programme's success (Micha et al., 2018). Additionally, teachers' attitudes and instructional practices have a greater effect on students than certification alone (Palardy & Rumberger, 2008). A variety of values and beliefs determine perceptions on the school food environment which impacts the implementation of nutrition education, food provision, and policy (Henry et al., 2010).

2.7 Summary

The relationship between the school food environment and children's health is well cited yet predominantly formed by observational correlational findings. To understand what specific

aspects of the school food environment influence health outcomes, more long-term research is needed. Measuring food diaries, geographical location, urban areas, food accessibility, obesity and long-term health outcomes would help to achieve this. Although the current state of the school food environment in Aotearoa NZ is unhealthy, it is an ideal place to influence healthy eating behaviours. The literature concludes that a collaborative approach, such as having comprehensive food and drink policies and active engagement between key stakeholders works best to create a healthy school food environment. Evidence for teachers' perceptions of the school food environment is scant. Teachers play an important part in facilitating healthy eating behaviours as role models and educators as their perceptions provide insight into the lived experiences of the school food environment. Teachers are pivotal in the implementation and therefore success of any school-based nutrition programmes.

CHAPTER 3: RESEARCH STUDY MANUSCRIPT

Teacher Perceptions of the School Food Environment: Has the Healthy Active Learning (HAL) initiative made a positive impact?

3.1 Abstract

Aims: To assess teachers' perceptions of the school food environment using Healthy Active Learning (a nation-wide school-based nutrition and physical activity programme) survey and focus group evaluation data from 2020/21 and 2022/23.

Methods: Surveys (n = 1728) assessed teachers' engagement in teaching nutrition and their perceptions of school food policies, promotion, and provision. Focus group (n = 538) transcripts were thematically analysed using NVivo.

Results: In both surveys 86% of teachers reported enjoying teaching health ($p = 0.96$) and ≥84% agreed healthy eating was key to student wellbeing ($p = 0.66$). Confidence in teaching nutrition decreased from 83% in 2020/21 to 78% in 2022/23 ($p = 0.02$). Food policies were upheld by ≥60% ($p = 0.56$) of teachers and ≥56% for external activities ($p = 0.76$). Schools providing milk and water decreased from 69% in 2020/21 to 58% in 2022/23 ($p = <0.001$). Most ≤78% teachers agreed healthy food was promoted at their schools ($p = 0.22$). More than half of schools worked with food providers (68% in 2020/21 to 63% in 2022/23 $p = 0.05$).

Focus groups revealed teachers' concerns about food insecurity in students' homes and access to unhealthy foods from external food environments. Food promotion from external providers such as *Fruit in Schools* were highly valued. Teachers expressed a need for professional development in nutrition education as they were not trained for this role.

Conclusion: While teachers perceived nutrition to be important to create a healthy school food environment, future initiatives need to consider nutrition professional development for teachers and address external influences that impact the school food environment such as food insecurity and community retail environments.

Keywords: School food and drink policy, public health nutrition, food insecurity, school-based nutrition programmes, external providers, teacher confidence, nutrition education.

3.2 Introduction

Diet quality shapes the dynamic growth and development that occurs during childhood (Ministry of Health, 2012; Rucklidge et al., 2021). The New Zealand Health Survey found that one third of children aged 0 - 14 years are overweight or obese (Ministry of Health, 2021), and one in five children are living in food insecure households (Ministry of Health, 2019). Together these findings indicate the important role and shared responsibility of caregivers, teachers, community, and policy makers to facilitate optimal outcomes for children, such as providing access to nutritious foods. Teachers specifically have a significant influence on their students' behaviours and ideas including food selection (Chen et al., 2020). Children spend over a third of their waking hours at school making it an ideal place to establish healthy eating habits at a young age (Micha et al., 2018; Movassagh et al., 2017; Welker et al., 2016).

Healthy food environments enable healthy communities. The school food environment is an important setting to consider when attempting to improve public heath due to its impact on dietary behaviours therefore influencing health outcomes (Swinburn et al., 2013). Current research shows the Aotearoa NZ school food environment is unhealthy: schools' menus provide limited healthy options offering mostly baked pastry, unhealthy foods for fundraising like sausage sizzles, and/or have incomprehensive food and drink policies to protect children's health (D'Souza et al., 2022; Green, 2023; Pillay et al., 2022).

Best practice recommendations to create a healthy school food environment include schools having stakeholders (teachers and students) agreeing with and helping develop food and drink policies (Swinburn et al., 2013). Successful polices need to address food composition, promotion, prices, and provision. Policies require awareness from stakeholders, such as teachers for successful implementation, monitoring, and support (Pineda et al., 2021; Vandevijvere et al., 2018). Considerable research has shown what works to create a healthy school food environment, however the conclusive recommendations which are discussed below, are not yet common practice in Aotearoa NZ schools.

The Healthy Active Learning (HAL) initiative is one of the most recent efforts to improve the school food environment in Aotearoa NZ primary and intermediate schools. It is a collaboration between Sports NZ, the Ministry of Health (later renamed Te Whatu Ora Health NZ), and the Ministry of Education to improve the wellbeing of children through physical activity and quality nutrition (Ali et al., 2021; Ministry of Education, 2022a). HAL increases access to physical activity and targets the school food environment by providing food and

drink policy guidance, and the development of new health and physical education curriculum and resources for teachers, respectively. The role teachers play in facilitating these aspects makes them a key stakeholder, as they are in a unique position to provide insight into how to best improve the school food environment. Preliminary evaluation reports (Ali et al., 2023; Ali et al., 2021; Ali et al., 2022) found the biggest barriers to a healthy school food environment were convenience foods and resistance from parents (Ali et al., 2021). Families felt their schools promote healthy food and drink, and schools reported having healthy food and drink policies because of the initiative (Ali et al., 2022). However, communications and the upholding of healthy food and drink polices had declined over time (Ali et al., 2023). These reports used data gathered from key stakeholders such as school leaders, teachers, and families.

The current literature identifies best practice guidelines for school food and drink policy, and what factors may contribute to a healthy school food environment. Teachers play an important role in facilitating a healthy school food environment, yet their perceptions of it and their perceived roles are not well understood. This study explored specifically teachers' perceptions and the perceived roles they play in the school food environment, as well as their engagement in health topics, and perceptions on healthy food policy, promotion, and provision. The aim of this study was to assess teachers' perceptions of the school food environment, and how it may have changed over time.

3.3 Methods

3.3.1 Study Design and Data Collection

An observational parallel mixed-methods design (O'Cathain et al., 2008) was used to understand primary and secondary teachers' perceptions regarding the effect of the HAL initiative on the school food environment over time. Evaluation data gathered from qualitative teacher focus group transcriptions were used to triangulate and better understand quantitative Likert-scale survey responses. The data for this study was gathered over two time-periods by a small group of Massey University researchers during 2020/21 and 2022/23.

A total of ~900 schools were involved in the HAL initiative. Firstly, the initiative was implemented in ~300 schools in 2020/2021 (Stage 1). Secondly, the initiative was additionally deployed to ~600 schools in 2022/2023 (Stage 2). At the time of writing, Stage 2 schools have not yet completed their full course of the initiative. Therefore, the perceptions

of the teachers from Stage 2 schools may change after more exposure to the HAL initiative. Teacher survey and focus group data was collected separately in 2020/21 and 2022/23, and the results have been used in this study to provide the first analysis of teachers' perceptions of the school food environment in Aotearoa NZ.

The original HAL evaluation design meant that Stage 1 schools were participating in the initiative at the time of 2020/2021 data collection, and Stage 2 schools were yet to or had just begun the initiative during the 2020/2021 data collection. This meant that data collected in 2022/2023 from Stage 1 schools may be reflective of the impacts of the initiative as they had completed the initiative, whereas Stage 2 schools were participating in the initiative at this time. Therefore, Sage 2 schools in 2020/2021 were initially intended to serve as a non-experimental control for this study. The reality of the evaluation process caused a cross over between HAL stages and data collection timepoints, which no longer validated completely distinguished groups to compare results with. Additionally, the consequences of the COVID19 pandemic induced a diversion of the Ministry of Health's health and nutrition workforce, low school attendance rates, unarranged data collection dates, inconsistent school engagement and learning effects from data collection being carried over. Therefore, this is not an experimental design with a control group and therefore, only data from participating HAL schools collected by research teams at Massey University in 2020/2021 and 2022/2023 was used for this study. The 2020/21 and 2022/23 HAL evaluations were accepted for ethical approval by the Massey University Human Ethics Northern Committee (NOR 20/07).

3.3.2 Teacher Survey

3.3.2.1 Measures

Teachers' perceptions of the school food environment were measured and classified using four themes. Firstly, engagement measured teacher's enjoyment, value, and confidence in teaching health and nutrition. Secondly, policy measured teachers' perceptions of upholding school food policies inside and outside of schools, and students input in said policies. Thirdly, promotion measured perceptions of working with external providers, healthy food and drink promotion and students' active involvement. Lastly, provision measured perceptions of plain milk and water only being sold at schools. Teacher characteristics were also measured; including years teaching, priority ethnicity, and geographical region (see Table 3.2).

Teacher perceptions were measured using 12 agreement statements related to the school food environment. In addition, a free textbox was provided for two open-ended questions which asked teachers for “suggestions to improve” the school food environment, and what their schools’ “current best practice” was to promote a healthy school food environment. However, “suggestions to improve” were only asked for in the 2022/2023 survey, therefore it is not possible to compare these responses with those from the 2020/2021 data.

The teacher survey was sent all primary and intermediate teachers at participating HAL schools via email using online software Qualtrics (2020) in 2020/2021 and 2022/2023. Responses to the survey were interpreted as providing consent to take part.

3.3.2.2 Survey Analysis

Responses to the teacher survey were measured using a five-point Likert-scale: “strongly agree”, “agree”, “neither agree or disagree”, “disagree”, and “strongly disagree”, or when asked about confidence: “very confident”, “moderately confident”, “slightly confident”, “not confident at all”, and “not applicable”.

For the analysis, the Likert-scale was collapsed into “Yes” or “No” (Jae Jeong, 2016) to make the data more easily understandable. “Yes” included responses of “strongly agree” and “agree”, and when asked about confidence “very confident”, and “moderately confident”. While “No” included “neither agree or disagree”, “disagree”, and “strongly disagree”, and when asked about confidence, “slightly confident” and “not confident at all”.

The open-ended survey responses were thematically analysed using codes developed by Pillay et al. (2022) (Appendix B) originally used to analyse the healthiness of Aotearoa NZ’s school food environment (Crabtree & Miller, 1992).

3.3.2.3 Statistical Analysis

The sample teacher population was compared to the overall primary and teacher population using the latest information available on the Education Counts website at the time of writing (Education Counts, 2023b). The sample population was divided by the overall population for ethnicity, region, and urban area.

Statistical analysis was undertaken using IBM SPSS Statistics software (IBM Corp., 2022). A *p*-value of 0.05 or less was considered statistically significant. Pearsons Chi-Squared (Plackett, 1983) tests were used to find statistical differences in survey responses between Stage 1 and Stage 2 within each data collection year, and between 2020/2021 and 2022/2023 for teacher characteristics and agreement statements. Fishers exact test was used when the assumptions for Pearson Chi squared test were not met (expected cell frequencies were under 5) (Kim, 2017). Associations between teacher agreement levels and school stage were examined using logistical regression analysis by stage, living area, and teaching experience to explain differences between 2020/2021 and 2022/2023.

Teacher survey statements were categorised into themes (Table 3.3). Data is reported as the number and proportion (*n* (%)) of the total number of responses for each statement. Furthermore, singular blank responses were not included in the analysis.

3.3.3 Teacher Focus Groups

3.3.3.1 Data Collection

Focus groups were held in-person at schools, guided by two trained researchers, audio recorded and later transcribed (Fullstop Transcribing, Auckland, NZ). One researcher guided the conversation using a facilitator guide (Appendix C) that were related to the HAL evaluation learning objectives to minimise bias. The second researcher took time-stamped notes to aid the interpretation of the transcription and highlight key points. Teachers were encouraged to share their opinions as a variety of viewpoints provided meaningful data. The focus groups were held throughout the year and were run by the researchers during 2020/2021 and 2022/2023.

Best practice suggests that the group size (n = 4 – 8) allows for equal contribution from group members to the conversation for ideas to rise and be investigated (Sparkes & Smith, 2014). Teacher characteristics for 2020/2021 were not collected as this was not part of the data collection protocol. This was later added to the protocol for data collection in 2022/2023.

3.3.3.2 Focus Group Analysis

The author conducted a hybrid approach of inductive and deductive thematic analysis (Boyatzis, 1998; Byrne, 2022; Crabtree & Miller, 1992; Fereday & Muir-Cochrane, 2006). The initial reflexive inductive approach followed six steps: i) data familiarisation, ii) code generation, iii) theme generation, iv) theme review, v) defining and naming themes, and vi) identifying examples (Braun & Clarke, 2006). Secondly, a deductive analysis was done using codes (Appendix B) generated from Pillay et al. (2022) related to food environments, schools, policies, practices, provision, and accessibility, to connect codes and identify themes between steps ii), iii), and iv).

Teacher focus group transcripts from 2020/2021 were thematically analysed using NVivo 13 (QSR International, 2020) in 2021 by previous researchers as part of the HAL evaluation (Appendix D). These results were then used in this study to better understand and compare findings with the 2022/2023 focus group data. Moreover, the transcripts from 2022/2023 were coded in 2023 for nutrition and food-related topics by another research assistant using codes developed by Pillay et al. (2022)

To ensure a baseline level of inter-coder reliability, the researcher sampled and applied the same thematic analysis process to 20% of the 2020/2021 transcripts (Cheung & Tai, 2023). Furthermore, to ensure confidentiality, names and urban area were removed, and years teaching were used to contextualise quotes.

This study used an interpretivist approach to understand teachers' subjective perceptions of the school food environment as they experience and interact with it. Here, in relation to ontology, the school food environment can be seen through a positivist perspective as an objective and measurable entity (Swinburn et al., 1999). The quantitative element of this study measured objective agreement statements regarding the state of the school food environment, teachers' enjoyment and confidence in teaching nutrition, and food policy, promotion, and provision. The school food environment can also be seen through an interpretivist perspective as a complex system influenced by socio-cultural, economic, political, and geographical factors. In particular, the qualitative element of this study was implemented to capture these specific nuances of the school food environment that teachers may perceive.

3.4 Results

3.4.1 Teacher Survey

3.4.1.1 Participants

A total of 1,728 teachers responded to the survey in 2020/21 and 2022/23. Table 3.1 shows the percentage of teachers represented in this study relative to the population of primary and intermediate schoolteachers according to 2022 data from Education Counts (2023a). The ethnic spread of the sample accurately represents the actual ethnicities of Aotearoa NZ's teacher population according to Education Counts. No national level data was available regarding teachers experience at the time of writing.

Teacher survey characteristics of respondents are presented in Table 3.2. This study sample represents approximately 8% of all primary and intermediate teachers in Aotearoa NZ (Education Counts, 2023b). This is a convenience sample and should not be interpreted as a representation of all primary and intermediate schoolteachers. The ethnic and geographical spread of the sample is reflective of the Aotearoa NZ primary and intermediate schoolteacher population, meaning a variety of perceptions will be represented.

Table 3.1

Sample teacher population compared to overall primary and intermediate teacher population of Aotearoa NZ.

	NZ	Sample n (%)
Priority Ethnicity		
Asian	751	76(10)
European	15368	873(6)
MELAA	238	17(7)
New Zealand Māori	2642	259(10)
Pacific Peoples	910	87(10)
Other Ethnicity	356	12(3)
Region		
Auckland	5335	489(9)
Upper North Island	4207	259(6)
Lower North Island	2587	205(8)
Wellington	2688	112(4)
Upper South Island	917	37(4)
Canterbury	3335	302(9)
Lower South Island	1301	316(24)
Urban Area		
Urban Area	14475	1271(9)
Rural Area	5884	428(7)

Note. MELAA: Middle Eastern, Latin American, African. % represents sample divided by overall population according to Education Counts (2023).

3.4.1.2 Survey Responses

There were 564 respondents in 2020/2021, and 1,356 in 2022/2023. The 2.4 times increase from 2020/21 and 2022/23 response rates are directly related to how the survey was distributed amongst schools. In 2020/21, the Massey University evaluation team communicated with the schools' administration team, who then sent the survey to teachers. Due to the low response rate, in 2022/23, the HAL physical activity workforce who were working with schools communicated directly with school staff about the survey to increase the response rate. Teachers' responses to agreement statements are shown in Table 3.3.

Engagement. Overall, most teachers (86% in 2020/21 and 86% in 2022/23) enjoyed teaching health. Most (84% in 2020/21 and 85% in 2022/23, *p = 0.66*) teachers' schools see healthy eating and drinking as a key part of student wellbeing and (83% in 2020/21 and 78% in 2022/23, *p = 0.02*) felt confident in teaching food and nutrition topics. However, confidence declined over time.

Policy. More than half of teachers upheld their school food and drink policy (62% in 2020/21 and 60% in 2022/23, *p = 0.56*). There was a drop when it came to upholding policies outside of schools, such as on school trips (56% in 2020/21 and 43% in 2022/23, *p = 0.79*), though this was not statistically significant. Few teachers agreed their schools sought student input into healthy food and drink policy, however this improved over time (32% in 2020/21 and 36% in 2022/23, *p = 0.07*).

Promotion. More teachers agreed that healthy food and drinks are promoted at their schools (75% in 2020/21 to 78% in 2022/23, *p = 0.22*). Schools worked with fewer external providers over time (68% in 2020/21 to 63% in 2022/23, *p = 0.05*). Few teachers perceive students were actively involved in promoting healthy food and drink environments at their school (35% in 2020/2021 and 36% in 2022/23, *p = 0.63*).

Provision. There was a significant decrease in schools providing only plain milk or water from 69% in 2020/21 down to 58% in 2022/23 (*p = <0.001*). More than half of teachers agreed that unhealthy food and drink are not sold, and that healthy foods were main type of food sold at their schools in 2022/23.

Table 3.2

Teacher characteristics by 2020/2021 data versus 2022/2023 data and by Stage 1 and Stage 2 schools.

	2020/2021			2022/2023			2020/2021 vs 2022/2023
Characteristic	**Stage 1** n = 413	**Stage 2** n = 151	**p-value †**	**Stage 1** n = 436	**Stage 2** n = 720	**p-value ‡**	**p-value §**
Years Teaching	**n (%)**	**n (%)**	0.87 †	**n (%)**	**n (%)**	0.1 ‡	0.822 §
Early	152 (38)	52 (35)		163 (3**x**)	293 (41)		
Mid	154 (38)	65 (43)		153 (35)	271 (38)		
Late	102 (25)	32 (21)		119 (27)	149 (20)		
^Priority Ethnicity			0.061 †			**0.027 ‡**	**0.002 §**
Asian	37 (9)	6 (4)		15 (4)	18 (3)		
European	261 (64)	104 (69)		247 (68)	461 (76)		
MELAA	6 (1.5)	0 (0)		3 (1)	8 (1)		
New Zealand Māori	69 (17)	33 (22)		66 (18)	91 (15)		
Other Ethnicity	4 (1)	1 (1)		4 (<1)	3 (<1)		
Pacific Peoples	32 (8)	6 (4)		27 (7)	22 (4)		
Region							**<.001 §**
Auckland	174 (42)	25 (17)		152 (35)	138 (19)		
Upper North Island	76 (18)	27 (18)		64 (15)	92 (13)		
Lower North Island	0 (0)	35 (23)		0 (0)	170 (24)		
Wellington	47 (11)	22 (15)		21 (5)	22 (3)		
Upper South Island	0 (0)	2 (1)		0 (0)	35 (5)		
Canterbury	91 (22)	28 (19)		57 (13)	126 (18)		

Lower South Island	25 (6)	12 (8)		142 (32)	137 (19)	
Urban Area			**<0.001 †**		**<0.001 ‡**	**<.001 §**
Urban Area	349 (90)	109 (72)		351 (81)	462 (64)	
Rural Area	44 (11)	41 (27)		85 (19)	258 (36)	

Notes. Bolded text indicates value of 0.05 or lower is considered statistically significant value. Regions defined as: Upper North Island: Northland, Waikato, Bay of Plenty. Lower North Island: Gisborne, Hawkes Bay, Taranaki, Manawatu-Wanganui. Upper South Island: Marlborough, Nelson, Tasman. Lower North Island: West Coast, Otago, Southland. MELAA: Middle Eastern, Latin American, or African, as per Statistics NZ Ethnicity New Zealand Standard Classification 2005.

† Pearson's Chi-squared test; Fisher's exact test by Stage 1 and 2 within 2020/2021.

‡ Pearson's Chi-squared test; Fisher's exact test by Stage 1 and 2 within 2022/2023.

§ Pearson's Chi-squared test; Fisher's exact test between Stage 1 and Stage 2 in 2020/2021 and Stage 1 and Stage 2 in 2022/2023.

^Priority ethnicity allocates people to a single ethnic group in an order of priority, even if they identified with more than one ethnicity.

Table 3.3

Teacher responses to agreement statements related to the school food environment 2020/2021 versus 2022/2023.

Theme	Agreement Statements	2020/2021		2022/2023		*p-value
		Yes n (%)	No n (%)	Yes n (%)	No n (%)	
Engagement	I enjoy teaching Health	471 (86)	79 (14)	947 (86)	160 (14)	0.961
	Our school/centre sees healthy eating and drinking as a key part of student wellbeing	380 (84)	710 (16)	894 (85)	146 (15)	0.663
	How confident are you in the HPE focus areas - Food and nutrition	428 (83)	87 (17)	678 (78)	190 (22)	**0.023***
Policy	We uphold our policy to sell and provide only healthy food and drinks at our school	237 (62%)	147 (38)	592 (60)	394 (40)	0.568
	We uphold our policy to sell and provide healthy food and drinks for activities outside of school (e.g., class trips, athletics day, school camp)	221 (56)	170 (43)	566 (57)	422 (43)	0.796
	The school seeks student input into healthy food and drink policies	136 (32)	294 (68)	364 (36)	627 (64)	0.075
Promotion	Healthy food and drinks are promoted at our school	330 (75)	111 (25)	767 (78)	219 (22)	0.221
	Our school works with external providers (e.g., Heart Foundation, nutrition health promoters) to improve healthy food and drinks available at the school	363 (68)	174 (32)	705 (63)	420 (37)	**0.05***
	Students are actively involved in promoting healthy food and drink environments	152 (35)	258 (65)	356 (36)	630 (64)	0.631
Provision	Unhealthy food and drink are not sold or provided at our school	-	-	616 (63)	356 (37)	-
	Healthy foods are the main type of food sold or provided at our school	-	-	636 (65)	347 (35)	-
	We provide or sell plain milk and water as the only beverages provided at our school	264 (69)	121 (31)	572 (58)	409 (42)	**<.001***

Note. Pearson Chi-squared and Fishers exact test were run to express *p*-values which shows the difference between responses between 2020 and 2022 for yes only responses. HPE: Health and Physical Education. * Indicates significant findings <0.05.

3.4.1.3 Open-ended Survey Responses to Current Best Practices (2020/21 and 2022/23)

Food and Drink Policy. Teachers mentioned their schools already have food and drink policies such as water or plain milk only, banning sugar sweetened beverages and pre-packaged foods such as a "Nude Food" policy. Banning pre-packaged foods reduced the number of processed foods being brought in school lunches, and were often replaced with whole, homemade foods.

Healthy Food Provision. Teachers reported their schools only offered healthy food at school or changed their school lunch provider to provide healthier food options. Food provided from external providers provided healthy food options which contributed to a healthy school food environment, such as free lunches from the *Ka Ora Ka Ako* Healthy School Lunches Programme, *Breakfast Club* or *Fruit in Schools*.

External Providers. Many teachers praised the various external providers they worked with such as *Breakfast Club, Fruit in Schools*, *Food for Thought, Healthy Heart Award, Life Education Trust, Garden to Table, Enviro Schools*, and food provision by regional charitable trusts (E.g., Kai for Kids, Koha Kai, Ka Pai Kai). For example, one teacher noted:

> *"Being part of the healthy lunch initiative… Now we know that the kids are getting their 5 plus a day, a healthy meal and have noticed the positive impact that this has had on their learning and all aspects of their wellbeing. Along with the fruit and milk in schools and the breakfasts that we supply."*

Working with external providers contributed to creating a healthy school food environment, as they provided food which also helped to address food insecurity and offered nutrition education and resources. Specifically, Fonterra's *Milk in Schools* programme was highly regarded by teachers as a good source of nutrition for teachers to provide to students. This programme ceased at the end of 2020 and their resources were redirected into *Breakfast Club*. For some teachers this was the only external provider they mentioned. In 2022/23, teachers mentioned they were no longer working with *Milk in Schools*, and there was a larger focus on *Breakfast Club* and milk and water only policies:

> *"Yes, we do have Milk in Schools but I'm not sure if you've heard but we've only got them until the end of the year or the end of this term. They'll be discontinued."*

> *"This year* [2020] *we have been informed that as from next year we'll not have milk because Fonterra has decided to give this milk out in the community, and they feel there is better use of that resource out there in the community than in the school, so this is the last year, last term for us to be having milk from Fonterra… Yeah I'm a bit disappointed with it because I would have over half my class drinking milk."*

Overall, teachers highly valued working with external providers, especially those which provided healthy foods, and provided nutrition education to both students and teachers.

3.4.1.4 Open-ended Survey Responses to Suggestions for Improvement (2022/23 Survey Only)

Increase Healthy Food Accessibility. Some teachers suggested more healthier food options should be made available for students at school. Teachers want to continue working with external food provision programmes, specifically *Ka Ora Ka Ako, Fruit in Schools*, and *Breakfast Club*, as they see how this benefits their students. Teachers mentioned how schools are up against the external food environments, with one stating:

> *"As a private business our tuck shop is competing against McDonald's, KFC and a supermarket less than 800m away... To compete with the tuck shop* [food] *are high in sugar etc."*

This comment highlights how local food retailers who sell unhealthy options surrounding schools can become a key barrier to creating a healthy school food environment.

More Nutrition Education for Students and Teachers. Teachers suggested schools should get students involved in health promotion in schools. This would involve students participating in policy development, planning, and creating healthy messaging campaigns and poster making, as one teacher said:

> *"Get student input and they help to decide and then implement."*

Additionally, teachers responding to the survey wanted more professional development opportunities, another teacher mentioned:

“More personal learning development support and resources for teachers.”

These types of comments emphasise teachers wanting more dedicated professional development opportunities regarding nutritional education and resources. This includes dedicated teaching time to support structured nutrition education within the school curriculum.

Schools are Doing Enough, Need Guidance at Home. Some teachers believed their schools were already doing enough by working with multiple external providers and implementing a food and drink policy. Some teachers mentioned:

“This is already working well at school, more guidance needed at home.”

“It is already promoted well but not all families get on board with this.”

Teachers want to engage parents in healthy food promotion by providing more guidance to homes and within the community. Suggestions included utilising the school newsletter, sending out healthy lunch ideas, and incorporating more opportunities for parents to get involved in creating healthy food environments. This highlights how teachers perceive the external food environment is impacting the school’s food environment.

3.4.2 Teacher Focus Group

3.4.2.1 Participants

A total of 307 teachers took part in 53 focus groups (n = 6 $\pm$ 2) held in 2021/2022 (Ali et al., 2021). A total of 231 teachers took part in 45 focus groups (n = 5 $\pm$ 1) held in 2022/2023. Discussions on average lasted 49 $\pm$ 10 minutes.

3.4.2.2 Thematic Analysis 2020/21

Food Insecurity. Teachers noticed how food insecurity at home impacts students' food accessibility, attendance, and behaviour at school. Teachers experience the consequences of children who do have adequate access to food, as some say they are unable to concentrate, and exhibit antisocial behaviour:

> *"I noticed a change in the kids with how settled they were once we had had breakfast and come back into the classroom."*

Other teachers noticed absences from school due to children not having enough food at home:

> *"We do have some families who have kept their children home because they haven't had food to send them with."*

Teachers perceived that food and nutrition is not always a key value at home, as families are experiencing financial and time barriers against healthy eating.

> *"Families who don't have huge amounts of money, don't send their kids* [to school] *without food, have skewed opinions about what healthy eating is or what wellbeing is ... You certainly have to tread carefully; you can't bowl into the classroom and be like everyone needs healthy food because there is a massive chunk of your class that can't afford healthy food."*

> *"We just quietly don't let any kid go hungry either like many schools if you've got a kid in your class who for whatever reason isn't bringing in decent food. We just quietly make sure it happens."*

As illustrated, many teachers witness the various challenges families experience, and the consequences of this on their students, such as not being able afford enough food, experiencing shame which in turn, acts as a barrier to accepting or seeking help. Teachers also prioritised students having access to food, albeit unhealthy, rather than policing unhealthy foods.

> *"I don't police it that much for the sake that I know children who have food and don't have food at home..."*

"I know I have got a decent handful in my class that are just surviving really when it comes to food.... they just get what they are given on the day, and they are grateful for that amount of food."

These quotes present teachers' concerns about how food insecurity at home impacts the school food environment.

Healthy Eating Role Models. Teachers understood the influence of role models in children's healthy eating behaviours. Some took on the responsibility of modelling healthy eating behaviours for their students, as one teacher mentioned:

"The kids get to see us as adults also eating and the same at lunch eating time as well. We go out there as well and they get to see us having food as well and yes, teachers do eat."

Other teachers recognised the important role of community role modelling, which includes more than just teachers:

"It's the people in your background, the people that are around you and supporting you and modelling what life is all about."

"If we want to get a community to eat healthy and eat smart, we need to start modelling…"

This presents teachers' perceptions that the community is also involved in creating overall healthier food environments.

Food Environment Interactions. School, home, and community food environments interact with each other. Most teachers perceived the influences of external food environments and the impact they have on children's food accessibility and the school food environment. They recognise that the school food environment does not operate in a silo and is influenced by home and community food environments. For example, one teacher explained how their community retail food environment influences eating patterns:

> *"When you are looking at the town itself, how many takeaway stores are in town, there would be at least six or seven, there is* [sic] *two Four Squares, … one of the most expensive small superettes, so … the fast food is the cheap food, we don't have a Pak n Save or a New World close ... there is not a fresh vege like stall or... we haven't got a good butchery..."*

Teachers also perceived that healthy eating education and promotion should be implemented outside of schools. Engagement with members of the community will positively impact the school food environment, as on teacher explains:

> *"Where we need to be focusing a little bit when it comes to healthy eating is not too much on the children themselves but on what's on the outside of our walls, so we need a programme. Okay let's slowly try to teach the community, let's teach the older people that are impacting on the younger because the younger, they are learning to make good choices but as we all said if you cannot afford to buy the right things to eat, you're going to still just eat your pie."*

Healthy eating patterns take time to establish, and teachers would like to implement strategies to empower children's support systems to ensure sustainable and effective change.

> *"If we just teach the children, they're only going to start making those choices when they are an adult, when now we need to teach the people behind them to support them to make those positive choices."*

The school food environment is influenced by community food retail and home food environments, which is currently perceived as a barrier. However, these barriers can be turned into enablers of healthy food environments if engaged appropriately.

Schools are Creating Healthy Food Environments. Teachers reported current practices their schools are doing towards creating a healthy school food environment. For example, one teacher explained how changing eating and playing times has been beneficial for students:

> *"They* [students] *were not eating and they were rushing out to play … And so, to ensure that they would get the play over and done with and then eat we switched it round and that was the rationale behind flipping it. I think it's been a big success."*

Additionally, working with external providers were highly valued by teachers. One teacher reported how beneficial *Food for Thought* was to her students and themselves:

> *"Last year when we had the nutritionist come in, I learnt a lot from her myself as well because I never really knew how to read labels properly so that was something that I learnt, would be quite cool to have someone like that come in every year to take the kids and teach them things."*

However, some external providers may be less effective due to any extra work required outside of their teaching scope, as another teacher mentioned:

> *"We did have a garden, there was lots of problems around that, like when the harvest time is when we are not here. ... drying out is another problem and then ultimately you need to have the space... "*

Structural changes such as changing eating times, celebrating cultural diversity, prioritising sustainability, and offering professional development opportunities to teachers enable a healthy school food environment.

3.4.2.3 Thematic Analysis 2022/23

Teachers' Values Determine Teaching Practices. Teachers who personally value healthy eating reflected this through their teaching practices and policy implementation. One teacher explained how their personal value of healthy eating influences their teaching practices:

> *"I like to eat healthily myself and as a teacher, your outlook within your mahi, your own personal outlook informs what you do."*

Some would incorporate nutrition education through day-to-day conversations with their students. Another teacher explained they found this to be most effective way to incorporate healthy eating education into their teaching practice:

> *"The casual conversations that we have with the kids and* [talking about] *the benefits of doing this and the benefits of doing that, so I think that's probably where they've picked up most of that information..."*

As indicated above, teachers' personal values and level of confidence in nutrition related topics determines their teaching practices and how they choose to incorporate healthy eating education, regardless of what the curriculum or school food and drink policies may be.

Enabling a Healthy School Food Environment. Provision of healthy foods, working with external providers, and implementation of food and drink policy facilitates opportunities for teachers, students, and family to create a healthy school food environment. However, limited resources (time, funding, and volunteers) are a barrier to a healthy school food environment. When asked about their school's food and drink policy, one teacher explained how their school has implemented policy and structured breaks to create a healthier school food environment:

> *"Policy is as per school doc. It's fairly generic from most schools that use it in New Zealand ... We've been a water* [only] *school since I've been here … We provide in their enrolment packs nutritional guidelines, suggestions for lunches as per Ministry*

of Education guidelines. And the fruit and veggie break, we brought that specifically in to encourage more eating of fruit and veggies."

Another teacher mentioned the increasing syllabus and limited teaching time as a barrier to incorporating healthy eating education, and how, teachers, themselves needed to adapt how they deliver required curriculum:

"We keep being slammed, with our numeracy and literacy across the country is going down... The curriculum is getting bigger and bigger and bigger, but the number of hours of the day is the same. So, we've had to get quite creative with our thinking."

Teachers valued working with external providers to create a healthy school food environment, however some teachers explained specific barriers, such as needing extra resources to run the programmes that were not so helpful:

"Garden to table. Enviro Schools, it's really hard to get them on the road without having the funding and being able to maintain that."

"[Another teacher] *and I had a meeting with KidsCan... a lot of the problem is volunteers. You need someone to be able to ... provide lunch every day but it's about the volunteers. That's the hard part."*

"Garden to table ... it's a really good example of giving it lots of lip service and we're going to do this and going to do that."

When asked directly about the HAL initiative, some teachers were not aware of it. This may be because this particular teacher had been away on leave or new.

Facilitator: "Do you guys even know about the HAL programme other than [another teacher]*?"*

Teacher: "No."

Although the above example quotes have highlighted barriers to working with external providers, such as requiring more resources and time, overall teachers value the relationships their schools have with external providers. Moreover, teachers see the benefits of working with food provision programmes, as detailed below:

"Those children's attendance has increased because Mum, solo Mum or other reasons may know why my kid will be fed breakfast, they'll get lunch at school and is going to be healthy kai that is coming home. That's been pretty awesome."

"I was going to say they love having the fruit. My kids absolutely devour [the food]*. If I get it out at the end of the day, a whole bucket's gone."*

These perceptions highlight how schools can create healthy school food environments by implementing policies, creating structured eating, and playing times to optimising learning, and maintain positive relationships with external providers.

Food Environment Interactions. Most teachers are considering how home and local food retailers interact with the school food environment, as they perceive the impacts of food insecurity and obesogenic environments.

"We're only one part of their life so there's all the outside influences and there's what they see at home, what they hear at home. What they watch at home and what's provided at home, so their tastebuds aren't necessarily refined to fresh fruit you know. They're used to a lot of processed foods and so some of these healthy lunches that we've had they think it's disgusting. ... I think it's now about educating families as well as educating our children. The kids don't buy the groceries."

Teachers perceive how both the community food retail environment and food insecurity at home can determine what food children bring to school. The quote below reflects how teachers are considering how families are managing their finances to be able to afford food:

"What's the priority at the moment? Is it food on the table or paying the power bill that week, so we're very mindful and how we speak to the children because we know that if the children go home, parents get angry with them. The children come back to school with that on their shoulders like I just got in trouble for going home and telling my parents they should be buying healthy food. Apples are a lot more expensive than a bag of chips at the moment."

Additionally, this teacher explains how the local food retailers directly influences the school food environment:

> *"Food coming into school, one thing I struggle with our juniors is lunch packs from the local dairies. There's just lots and lots and lots of sugar and nothing nutritional in it. "*

Teachers acknowledge the influence of caregiver's values on eating behaviours. Home knowledge about healthy eating and socio-economic status can either enable or inhibit food accessibility, which affects foods brought into the school food environment. Inversely, the school food environment (healthy eating education, food provision, and food and drink policy) influences the home food environment as students can take positive messaging, education, and lunch ideas home with them.

3.5 Discussion

This study found teachers perceptions of the school food environment are largely positive. Most teachers felt their schools were creating a healthy food environment through having a food and drink policy, working with external food providers, and engaging with families. Some teachers believed more education and support need to be provided at home and within the wider community.

3.5.1 Teacher Engagement

Surveys found most teachers enjoyed teaching health topics, such as nutrition in the classroom. Focus group discussions revealed teachers wanted to learn more about food and nutrition for themselves and their students but, they experienced a lack of opportunities for professional development in this area. The World Health Organization (WHO) and Regional Office for Europe (2006) recognise that teachers need to be given the opportunity to improve their nutrition knowledge to create a healthy school food environment. Additionally, teaching nutrition as a separate and integrating it with other topics enables students to consolidate their learnings (FAO, 2005). An external provider which integrates this approach is *Food for*

Thought by upskilling and educating both teachers and students in nutrition knowledge and addressing confidence barriers (Heart Foundation, 2023a).

Teachers agreed their schools see healthy eating and drinking as a key part of student wellbeing. From the 2022/2023 focus groups, teachers' who valued food and nutrition actively generated and facilitated food and nutrition related discussions with their students. Focus group discussions revealed teachers took on the responsibility as nutrition teachers, advocates, and role models. These findings align with existing evidence which examined the roles teachers play in nutrition education (Prelip et al., 2006). Another study found that when leadership figures, such as teachers, model behaviour such as engaging in sports, students replicate the modelled / observed behaviour (Donnelly et al., 2009). Teachers' attitudes and instructional practices have a greater effect on students than certification alone and may translate to healthy eating and drinking practices at school if teachers are modelling appropriately (Palardy & Rumberger, 2008). Although teachers wanted to prioritise healthy eating with their students, mounting pressure due to curriculum expansions was highlighted, restricting the opportunity to deliver all teaching content. A previous study in Los Angeles also found teachers wanted to incorporate more nutrition education but were limited by time, resources, funding, and training (Prelip et al., 2006).

Teachers' confidence in teaching nutrition declined slightly over time (83% in 2020/21 to 78% in 2022/23), which may be explained by the Dunning-Kruger effect which describes the tendency for people with limited skills or knowledge to overestimate their competence initially (Kruger & Dunning, 1999). However, once gaining more skills and knowledge, they can see their limitations in the area. If this is an effect of HAL, future evaluations may see an increase in teacher confidence if nutrition professional development is provided. Teachers' confidence and value for food and nutrition is a key enabler in successful nutrition education but more professional development opportunities and provision of nutrition resources, including teaching time and skills, are necessary to increase teacher confidence in teaching nutrition (Metos et al., 2019; Nanayakkara et al., 2022).

3.5.2 Food Policy

The open-ended survey responses revealed school food and drink policies were one of the best practices schools implemented to create a healthy school food environment. This aligns

with best practice guidelines in Aotearoa NZ and internationally (Gillis et al., 2009; Nelson & Breda, 2013; Pineda et al., 2019; Swinburn et al., 2013). Over half of teachers responding to this study's survey implement their school's policies, however this declined further when it came to activities outside of school (e.g., class trips, athletics day, school camp). It would be ideal to see more teachers upholding policy as monitoring and implementation are key in creating a healthy school food environment (Fathi et al., 2024).

Teachers' perceptions of children experiencing food insecurity at homes and not having adequate access to food throughout day may explain why policies are not being implemented. When a student has access to only unhealthy foods, teachers from this study either provided them with nutritious foods or allowed them to eat what they have been provided for lunch from home, as implementing the policy may ostracise the student (Bhatia et al., 2011). A critical summary of children in developed countries reported students going without food at school is negatively impacts students' behavioural, academic, and emotional development and wellbeing (Shankar et al., 2017).

The survey showed one third of schools sought student input when developing policies. Previous studies have shown that engaging key stakeholders, such as students, in the development and implementation process of healthy food policy and promotion is required for successful outcomes (Delisle et al., 2013; Nelson & Breda, 2013). Future efforts to create healthy school food environments should require all stakeholders, including teachers and students, input during the development stage. Ongoing education and promotion of said policies will assist in monitoring and implementation.

The HAL initiative developed the Healthy Food and Drink Guidance for Schools Toolkit to help schools establish a comprehensive food and drink policy to enable children to have access to healthy foods, develop healthy preferences and learn to make positive food and drink choices (Ministry of Health, 2020c). The 2021 HAL evaluation report found that 83% of school leaders reported having a healthy food and drink policy, providing examples such as implementing water-only policies, fruit breaks, protected eating times as ways to prioritise healthy eating (Ali et al., 2021). Moreover, the same report found the main barriers against food and drink policy were convenience of processed ready-to-eat foods, and resistance from parents (Ali et al., 2021). This aligns with teachers' perceptions from this study that convenience foods inhibit a healthy school food environment.

3.5.3 Food Promotion

Most teachers agreed that healthy food and drink are promoted at their schools (75% in 2020/21 and 78% in 2022/23). From the surveys, teachers reported their schools “current best practice” to create a healthy school food environment was having a comprehensive food and drink policy, providing access to healthy foods, and tailoring eating times to suit students’ needs. These results remained consistent over the three-year duration of the HAL initiative. The variety of responses emphasises that nutrition education, when combined with changes to the food environment, are effective in improving student’s dietary behaviours (U.S. Department of Agriculture, 2012).

The survey showed fewer teachers reported working with external providers over time (68% in 2020/21 to 63% in 2022/23*).* The COVID19 pandemic is likely to be a contributing factor as nationwide lockdowns limited school and external providers operations. Focus group discussions revealed schools worked with a variety of external providers and teachers valued their contribution to the school food environment, especially when providers facilitate 100% of the programme. For example*, Food for Thought*, and *Ka Ora Ka Ako* required no extra workload from staff, and either provided nutrition education or healthy lunches. Conversely, *Garden to Table* required ongoing input that were surplus to teachers’ capacity, such as needing volunteers, time, and labour. Additionally, most harvesting times did not always align with school terms. Nevertheless, some teachers enjoyed how interactive the programme was, and teaching their students where food comes from. Overall, external providers bestow positive opportunities for teachers and students to learn about nutrition and healthy eating.

Fewer than half of teachers (35% in 2020/21 and 36% in 2022/23) agreed that students were actively involved in promoting healthy food and drink environments. This finding remained consistent over time, which may highlight an area for improvement for schools to focus on when creating a healthy school food environment. A key suggestion from the open-ended survey was for students to be more involved in heathy eating promotion. This could be done through creating posters and being more actively involved school canteen menu options. This was also one of the key recommendations from the initial HAL evaluation report (Ali et al., 2021).

Other key findings from the teacher survey's "suggestions to improve" the school food environment included, increasing student involvement in health initiatives, increasing accessibility to healthy foods, more comprehensive policy, and providing healthy eating guidance to homes. These results align with best practice guidelines and research from America and Aotearoa NZ, which recommend considering all environments (including schools, communities, and homes) and peer influence of a child's nutrition intake to create a healthy food environment (Swinburn et al., 2013; U.S. Department of Agriculture, 2012).

3.5.4 Food Provision

Food provision was mostly catered by external providers. Programmes such as *Ka Ora Ka Ako,* and *KidsCan* significantly contributed towards creating a healthy school environment, whilst also addressing food insecurity. These external providers supplied teachers with resources to ensure students were fed throughout the school day. For example, *Ka Ora Ka Ako* not only addressed food insecurity, but also increased the nutrient density of students' diets (Ministry of Education, 2022b). This increase in students access to healthy eating opportunities adheres to healthy school food and drink policy and should be encouraged to continue, if not expand to all schools. Food provision programmes are valuable to students, teachers, and the wider community including parents. Reliable access to food should not be such a concern for school children to face that it impacts their attendance. How highly regarded some of these food provision programmes may highlight just how families are struggling to provide food.

There was a significant decline in schools providing milk and water as the only beverages over time. Teachers noted that this was likely linked to Fonterra's *Milk in Schools* programme, which ceased its operation at the end of 2020. The *Milk in Schools* programme was redirected to serve the wider community instead of focusing on just schools. In focus groups discussions, teachers expressed their disappointment with the programme ceasing, as they saw the benefits of providing their students with a nutritious drink with energy to support growth and cognitive development. Additionally, in 2021, Fonterra's resources were included in Sanitarium *Kickstart Breakfast*, a highly valued programme by teachers, and parents as evidenced by this study. According to participants, the *Kickstart Breakfast* programme enabled higher levels of engagement in class, as students who would otherwise

not eat breakfast were being fed and as a result were noticeably more settled in class during the day.

3.5.5 Food Environment Interactions

Focus group discussions revealed teachers perceived external influences having an impact on the school food environment, such as the presence of external food retailers and socio-economic status of families at home. Teachers expressed how students' food accessibility at home impacts the school food environment, and that food environments do not operate in silos. The Whole School, Whole Community, Whole Child (WSCC) model directly addresses the connection between education and health by highlighting the relationship between all environments a child is exposed to (Centers for Disease Control and Prevention, 2023; Lewallen et al., 2015). For instance, one teacher mentioned being grateful for living in a rural area as there were no convenience stores or fast-food retailers near their school. This highlights the importance of looking at multiple environments when trying to improve students' health and dietary intake. Family and communities may play a major role in reinforcing healthy behaviours outside of the school setting.

Teachers are in a unique position to observe students' eating patterns and consequent behaviours, such as irritability or restlessness. The latest KidsCan report where 65% of respondents includes teachers, found that poverty is worsening in their communities. This demonstrates how economic challenges at home may affect children at school (KidsCan, 2023).

3.6 Limitations

This study successfully identified teachers' perceptions of the school food environment; It is important to note that the author of this thesis was not involved in the data gathering or planning process, or in the designing and conducting phases of the research. The data collection methods in 2020/21 and 2022/23 was designed for the purpose of evaluating the impacts of the HAL initiative. However, university protocol made it possible for the author to utilise data for this study and perform a thorough analysis of the findings.

For the qualitative data, comparisons between 2020/21 and 2022/23 open-ended survey responses and focus groups data were not appropriate as themes were very similar, even complementing each other. Additionally, the open-ended question asking teachers for "suggestions to improve" the school food environment was only asked in 2022/23. Therefore, responses were not compared over time for this question.

This study did not include a control group because of the COVID19 pandemic which heavily affected the implementation of the HAL initiative. It also impacted schools' ability to work with external providers. More specifically, the pandemic caused a diversion of the Ministry of Health's nutrition workforce from working with schools. Additionally, schools experienced low attendance rates, data collection dates were rearranged due to lockdowns causing inconsistent school engagement periods. Learning effects of data collection were carried over from 2020/21 to 2022/23, which meant protocols were improved, and different survey questions were asked. Finally, the full course of the initiative is yet to be completed and teachers' perceptions may change by the end of 2025.

3.7 Future Directions and Recommendations

The HAL evaluation teacher survey used in this study inquired about teacher engagement, and school food policy, promotion, and provision. Future research to understand teachers' perceptions of the school food environment should incorporate the findings from this study. Future surveys and focus group facilitation guides would include themes such as food insecurity, external environments, and teachers' perceived roles. Additionally, inquiring about teachers' personal values and nutrition knowledge, and about their teaching practices may provide insights on how teachers want to be involved. A greater focus on teachers' suggestions to improve the school food environment would provide insight and direction for current and future school-based nutrition programmes.

Food insecurity, food provision and professional development for teachers should be considered when allocating programme funding, as these were deemed, by teachers, the most valuable and effective towards creating a healthy school food environment. Teachers perceive students experiencing food insecurity and the negative effects it has on students' behavioural, academic, and emotional wellbeing. Programmes such as *KidsCan*, *Ka Ora Ka Ako,* and *Fruit in Schools* currently target schools in high deprivation areas to help bridge the

health equity gap and should be encouraged to continue their operations. In particular, *Ka Ora Ka Ako* was shown to be one of the most valuable external providers, as it contributed to a healthy school food environment by addressing food insecurity and increased exposure to new fruits and vegetables to students who were then more likely to eat new foods. Access to nutritious foods should be made available to all schools. Additionally, student engagement in health promotion at schools should be looked at further.

The findings of this research highlight the benefits of on-going professional development opportunities for teachers to encourage and empower healthy eating habits and conversations with students. A train-the-trainer programme to upskill and increase teachers' confidence in food and nutrition topics would be an ideal way to address this gap. Future government funding and partnerships with organisations, for example The Heart Foundation, would be allocated to enable qualified nutritionists and dietitians to engage with teachers to provide nutrition training. Specific development of resources on how to have healthy conversations about eating with students such as instructional materials, goal setting, and frequent engagement with teachers to build their nutrition confidence, skills, and knowledge would be included. Train-the-trainer models have been shown to be effectively disseminate information and implement guidelines (National Center for Chronic Disease Prevention and Health Promotion, 2019).

3.8 Conclusion

This study showed that teachers' values determine their teaching practices. Their confidence in teaching nutrition slightly decreased over time and they expressed a need for more professional development opportunities. Teachers need to be able to prioritise nutrition education, while their schools work with external providers and engage with communities and families. From this study teachers' perceptions highlight the school food environment does not operate in a silo and is impacted by community and home food environments.

The HAL initiative aimed to improve the school food environment through providing a nutrition support work force, providing new curriculum resources and food and drink policy guidance. However, the effects of the pandemic required the nutrition work force to be redirected and teachers did not have had the full nutrition support and professional

development opportunities that the initiative originally planned to provide. Whether this initiative made a difference to the school food environment is difficult to conclude, since the data gathering process did not aim to gather teachers' perceptions of how the initiative impacted the school food environment.

Teachers appear to believe that their schools are doing enough to create a healthy school food environment, however, they have concerns about the impact of food insecurity at home and the effect of the wider community food environment on students' food access. This has a flow on effect into the school food environment. When teachers are supported by a school that values nutrition through food provision, a food and drink policy, and have tailored eat and play times, teachers can enable a healthier school food environment.

CHAPTER 4: CONCLUSIONS AND RECOMMENDATIONS

4.1 Summary of Findings

The aim of this study was to understand teachers' perceptions of how the Healthy Active Learning (HAL) initiative impacted on the school food environment. Teachers' engagement with health topics, and perceptions on food provision, promotion and policy regarding the school food environment were measured using surveys and focus groups. This involved contextualising and understanding the perceived roles teachers played in the school food environment.

A critical review of the literature combined with findings from this study infer that the school food environment does not operate in a silo and is influenced by external community and home environments. The school food environment has limited impact on students' dietary habits when they are not supported at home. Efforts to create a healthy school food environment should consider parents and the wider community. Furthermore, teachers want more professional development opportunities with nutrition experts to feel confident in teaching nutrition topics to students.

Teachers' perceptions of the school food environment were largely positive. Current best practices for schools to create a healthy school food environment were identified as working with external providers, having a food and drink policy, and collaborating with the community. Main barriers to a healthy school food environment included food insecurity at home, teachers not being confident or trained in nutrition, and limited time teaching nutrition as standard curriculum. Suggestions to improve the school food environment included engaging parents and students in healthy eating promotion, increasing access to healthy food, and including nutrition education in the curriculum for students and have nutrition training for teachers. External factors that influenced the school food environment were specifically students experiencing food insecurity at home and the surrounding community and home environments (physical, economic, and food). Recommendations based on teachers' perceptions in 2020/21 and 2022/23 for creating healthy school food environments is discussed below.

The survey identified teachers' engagement with health topics, and perceptions of healthy food policy, promotion, and provision. The survey results found most teachers enjoyed teaching health, and agreed healthy eating was key to student wellbeing. This suggests there was a high level of engagement in health topics from teachers. Most teachers felt confident in teaching nutrition, although fewer teachers upheld school food policies. This declined further when it came to activities outside of school. Focus group discussion about students experiencing food insecurity may explain teachers implementing food policies, as teachers reported students had limited access to food at home. Fewer schools provided milk and water only over time, however most teachers agreed that healthy food was promoted at their schools. Most schools worked with external providers to promote a healthy school food environment. Food promotion from external providers such as *Fruit in Schools* and *Ka Ora Ka Ako* were highly valued by teachers.

Focus group discussions contextualised the role teachers perceive they play in the school food environment, as they reported being responsible as nutrition educators and healthy eating role models, despite not being trained. Teachers wanted more nutrition professional development opportunities and raised concerns about food insecurity in students' homes and access to unhealthy foods from external food environments. This related to teachers who valued health and nutrition integrating these aspects into their teaching practices.

4.2 Strengths

This study provided the first exploration of its kind into teachers' perceptions of the school food environment in Aotearoa NZ. This study provides a unique insight into how the school food environment operates at an experiential level. A mixed methods design was another key strength, as the thematic analysis was able to provide nuanced evidence to support quantitative findings. Themes that were either not asked about, or not able to be recognised through the survey questions, were conveyed via the focus group discussions. For example, food insecurity was not something that was asked about in the survey but was a significant theme teachers discussed in the focus group discussions.

Moreover, utilising data gathered from the HAL evaluations to assess teachers' perceptions has been advantageous, as the data for this thesis was a cost effective and time efficient

way to access a significantly large sample from the 2020/21 and 2022/23 evaluations. Although this was a convenience sample, and while it was not representative, it was significantly large and reflected the overall primary and intermediate teacher ethnic and geographical spread (Education Counts, 2023b). Ethical approval had already been processed for this study, and future research will be able to build on this existing data base to understand changes or trends over time. Comparing the findings from this study with 2024/25 HAL evaluation data (post-intervention) would provide a more complete picture of teachers' perceptions over time. This in turn, would strengthen existing recommendations and guide future programmes to continue creating healthy school food environments, along with the literatures best practice guidelines (D'Souza et al., 2022; Pillay et al., 2022; Pineda et al., 2021; Swinburn et al., 2013; Vandevijvere et al., 2019)

Overall, the findings from this study contributes to the existing literature about the school food environment and the effectiveness of school-based nutrition programmes. It also provides new contextual insights into teachers' perceptions on how to improve the school food environment and external providers relationships with teachers.

4.3 Limitations

The data collection methods utilised for this study were designed for the purpose of evaluating the impacts of the HAL initiative. Also, the author of this thesis was not involved in the data gathering or planning process, or in the designing and conducting phases of the research. However, university protocol made it possible for the author to adopt this study and perform a thorough analysis of the findings.

It is also important to note that the survey used in this study asked about teacher engagement, and school food policy, promotion, and provision. Future research to understand teachers' perceptions on the school food environment would ideally consider the findings of this study. Themes such as food insecurity, home and community food environments could be added in future surveys and focus group discussions. Additionally, teachers' personal values and knowledge regarding nutrition, and how they incorporate nutrition education into their teaching practices may provide a deeper understanding of teachers' perceptions and how to effectively create a healthy school food environment.

Future research should also consider exploring how teachers want to be involved in nutrition education and how it would best be implemented in schools. A greater focus on teachers' suggestions to improve the school food environment would provide insight and direction for current and future school-based nutrition programmes.

For the qualitative data, comparisons between 2020/21 and 2022/23 data were not appropriate as themes from the open-ended survey questions and focus groups were very similar and complimented each other. Additionally, teacher survey findings were able to be compared at the two time points, the open-ended question regarding "suggestions to improve" the school food environment was only asked in 2022/23. Therefore, suggestions were not compared over time.

The effects of COVID19 affected the implementation of the HAL initiative and impacted schools' ability to work with external providers. As a result, this study did not include a control group. More specifically, the pandemic caused the Ministry of Health's nutrition workforce being diverted from working with schools. Additionally, schools experienced low attendance rates, data collection dates were rearranged due to lockdowns causing inconsistent school engagement periods. Learning effects of data collection were carried over from 2020/21 to 2022/23, which meant protocols were improved, and different survey questions were asked. Finally, the full course of the initiative is yet to be completed and teachers' perceptions may change by the end of 2025.

4.4 Use of Findings, Future Directions and Recommendations

The findings from this study can be used to help school-based nutrition programmes become more effective in creating healthy food environments for primary and intermediate school students in Aotearoa NZ. Based on teachers' perceptions, external factors such as food insecurity should be addressed. Schools can now gauge how external providers can align with their values for future food provision and healthy food promotion, in the same way, programmes can adjust how they engage with schools. If the government needs to evaluate how to allocate funding in the most effective way to address the school food environment, the findings from this study highlight the following major considerations.

4.4.1 Food Insecurity

Teachers perceive students experiencing food insecurity and the negative effects it has on students' behavioural, academic, and emotional wellbeing. This is supported by current literature and evidence from how well food provision programmes are received at schools. Efforts to improve the school food environment must address food insecurity as a key contributing factor to unhealthy eating habits that may present at schools.

4.4.2 Food Provision

External providers are key in addressing food security and exposing students to a variety of new foods. School-based food provision programmes effectively address food security by increasing access to nutritious foods children may not otherwise have. Programmes such as *KidsCan*, *Ka Ora Ka Ako,* and *Fruit in Schools* currently target schools in high deprivation areas to help bridge the health equity gap and should be encouraged to continue their operations. In particular, the continuation and expansion of *Ka Ora Ka Ako* to all school across Aotearoa NZ would prolong these benefits and reduce health inequities (Garton, Riddell, McKelvie-Sebileau, Glassey, Leech, et al., 2023). The findings from this study proved this programme to be one of the most valuable external providers, as teachers perceived its contributions to a healthy school food environment. Consequently, it increased exposure to new fruits and vegetables to students who were then more likely to eat new foods.

4.4.3 Professional Development for Teachers

Teachers need more support to facilitate being healthy role models and educators to their students to create healthy environments. Similarly, the findings of this research highlight the benefits of on-going professional development opportunities for teachers to encourage and empower healthy eating habits and conversations with students. An ideal way to address this issue is the development of a train-the-trainer programme to upskill and increase teachers' confidence in food and nutrition topics. Future government funding and partnerships with organisations such as The Heart Foundation would ideally be allocated to allow qualified nutritionists and dietitians to visit schools and provide nutrition training to teachers. Specific nutrition resources on how to have conversations about healthy eating with their students would be developed, such as instructional materials, goal setting, and frequent engagement

with teachers to build their nutrition confidence, skills, and knowledge. Train-the-trainer models have been shown to be effectively disseminate information and implement guidelines (National Center for Chronic Disease Prevention and Health Promotion, 2019).

4.5 Conclusion

The HAL initiative, a 5 – year school-based nutrition and physical activity programme, provided a pertinent opportunity to investigate teachers' perceptions of the school food environment. The first of its kind to assess in Aotearoa NZ. In conclusion, teachers' perceptions of the school food environment were largely positive, as they were engaged in health topics and valued working with external providers. However, concerns of food insecurity affecting students learning and developmental outcomes were evident. The findings from this study further confirm that teachers play a significant role in the school food environment and are witnesses to how external factors, such as home and community environments, may influence students eating patterns. More research is needed to understand specifically teachers' perceived roles in the school food environment. This would improve communications between schools and external providers regarding effective programme implementation. This study also found that most teachers were confident in teaching nutrition, and agreed nutrition is an important part of student wellbeing. However, more professional development opportunities and dedicated curriculum times need to be available for teachers to improve their confidence and self-efficacy regarding nutrition-based education. Given this, a proposed nationwide train-the-trainer programme, with nutrition experts may help to solve this issue.

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Appendices

Appendix A - Past and present school-based nutrition programmes in Aotearoa NZ

Years running	Programme	Funded and led by	Programme aims	Programme Evaluation
2020 - current ¶	*Healthy Active Learning*	Government funded - Led by Sports NZ, Ministry of Health and Ministry of Education.	Aims to improve child wellbeing through increase physical activity, and healthy eating knowledge through targeting the school food environment. It is a joint government initiative between Sports New Zealand, the Ministry of Health and the Ministry of Education	Teachers are confident in teaching Health and Physical Education however there are opportunities to improve their teaching practices such as, making lessons more inclusive to meet the needs of all students and integrating physical education with other learning areas. Health and Physical Education is only rated as a 'medium' priority by teachers. Future efforts aim to improve the culture and value of Health and Physical Education within schools. Most schools that responded to the Healthy Food and Drink Environment Survey indicated they highly value Healthy Eating and Drinking but there is inconsistency with regards to the implementation of these policies (Sport New Zealand, 2022).
2019 – current ¶	*KidsCan school lunch programme*	Aotearoa NZ government and KidsCan	The government funds daily free lunches for year 1-8 students in around 30 schools with high levels of disadvantage children across the country to address child poverty through the provision of food, clothing, and other essential items.	Impact Lab GoodMeasure Report: 6.4 million serves of food served to 745 low decile schools. Every dollar invested into the programme delivers $2.80 of measurable good to NZ through health, jobs, and income. The social value of the programme is

				$20,869,163, which equates to $509 for each participant (Impact Lab, 2020).
2019 – current ¶	*Ka Ora Ka Ako | Healthy School Lunches programme*	Aotearoa NZ government	To improve food security, wellbeing and overall health for students, improve school attendance, and support healthy child development and learning, improving social behaviour, academic performance and reduce financial hardship for families by providing government funded lunches to students experiencing socio-economic barriers, based on the Equity-Index (Ministry of Education, 2023).	An interim report on the Ka Ora Ka Ako reported students in participating schools found mental wellbeing rose by 14%, physical functioning rose by 2.9%, quality of life rose by 14% when compared to students from non-participating schools (Peirce et al., 2021).
2015 – current ¶	*Healthy Families NZ*	Ministry of Health	A largescale prevention initiative that focuses on bringing communities together to create healthier environments where people live, learn, work and play, including schools.	This programme promoted the removal of sugar sweetened beverages in schools and in the wider community settings. Funding from this programme was used for additional water fountains in schools and community settings. Community food gardens were established in schools in collaboration with partners (Matheson et al., 2018).
2011 – current ¶	*Nestle Cook for Life, Ka Tuna Ka Ora*	Funded by Nestle and operates in partnership with Massey University, New Zealand Nutrition Foundation, Diabetes NZ and the Heart foundation.	Aims to provide young people from ages 13 to 19 about nutrition and core cooking skills, empowering them to make healthy food choices. Provision of resources and interactive and practical sessions provided by dietetics students from Massey University.	No third-party evaluations available at the time of writing.
2009 –	*Kick Start Breakfast /*	Sanitarium, Fonterra and the Ministry of	School communities run KickStart *Breakfast Club*, and Fonterra and Sanitarium supply milk and Weet-Bix	95% of participating schools were very satisfied with the programme. Additionally, students receiving the

current ¶	*Breakfast Club*	Social Development	breakfast cereal. In 2013, Government funding allowed KickStart to be offered five days per week instead of two, and to all schools, not just decile 1-4.	programme were associated with a 1.2 percentage point reduction in the proportion of students with a dental surgery outpatient visit (Wilson et al., 2018).
2008 – current ¶	*Garden to Table*	Garden to Table Charitable trust	Develop and introduce a curriculum-linked food education programme in NZ schools. Each session involves half the class beginning in the garden and the other beginning in the kitchen and is based on an annual membership fee for schools which are heavily subsidised through the trust who provide regular training for educators.	Of 57 surveyed Principals 98% say the programme contributes to better health outcomes and is beneficial for their students (Garden to Table, 2023; Wakefield, 2013)
2007-current ¶	*Food for Thought Programme*	Educational Trust is a registered charity and part of Foodstuffs New Zealand.	A free nutrition education programme for primary aged children's years 5 and 6. The programme aims to help children make healthier food choices through the provision of resources for teachers. The *Food for Thought* information resource booklet provided to teachers contains 125 activities are tailored to students' individual learning styles, ethnicities, ages and skill abilities (Heart Foundation, 2023a).	The programme reaches the right audience and can change behaviours. Families of the children who participated in the programme showed a significant decrease (-2.7%) in the purchase of unhealthy food options compared to their purchasing behaviour 12 months prior. The programme contributed to a 7% reduction in the soft drink category, and a 2% reduction in confectionery as a share of their total shop (Heart Foundation, 2023b).
2004 – current ¶	*Fruit in Schools*	Te Whatu Ora (previously known as the Ministry of Health)	*Fruit in Schools* is a government-funded initiative that supplies fresh fruit for students at schools facing socio-economic barriers. Funded by Te Whatu Ora and managed by United Fresh (a non-profit incorporated society representing the Aotearoa NZ pan-produce industry), Fruit in Schools is available to Years 1-8 schools.	An evaluation report found 92% of principals said Fruit in Schools supported their school greatly to promote a healthy food environment. Moreover, 93% of principals said Fruit in Schools is a great support for feeding hungry children with healthy food. Additionally, 9 out of 10 principals said Fruit in Schools is a great support to promoting healthy eating (Watts, 2023).
2004-	*Project*	Waikato District	This programme encouraged children to eat healthier and	A randomised control trial comparing data from a 2-year

2020	*Energize – Now merged with HAL initiative*	Health Board and Sport Waikato (Regional Sports Trust)	exercise more in over 130 school in Waikato. “Energizers” worked with schools, teachers and parents to coordinate and deliver physical activity sessions, nutritional advice and help implement health and fitness programmes within primary schools. The programme aimed to improve childhood obesity and CVD risk	evaluation in 2004-2006 and again in 2011, found the prevalence of overweight and obesity among children was lower by up to 31% in participating schools when compared to non-participating schools (E. Rush et al., 2014). The programme was found to be cost effective way to improve quality of life and improve health outcomes and reduce obesity levels (Elaine Rush et al., 2014).
1989 - current	*Healthy Heart Award*	Heart Foundation	The *Healthy Heart Award* aims to improve children’s health by increasing access to nutritious foods by influencing policy development to create a healthy school food environment. The programme is free and partially funded by the MoH. Schools that sign up are assigned a nutrition advisor to help them achieve their goals, and be awarded with either bronze, silver or gold depending on the criteria they meet (Heart Foundation, 2023c).	Participation was associated with a decrease in sales of unhealthy foods (donuts, sausage rolls, pies, and sweets), and an increase in sales in healthier foods (sandwiches and filled rolls) (Carter & Swinburn, 1999). Participating Healthy Heart Award schools were statistically associated with a heathier menu at schools (Gerritsen et al., 2017).
1987 – current	*Life Education Trust – Learning with Harold*	Life Education Trust	A mobile classroom that visits schools to teach pre-primary and intermediate schools about food and nutrition, human biology, relationships, identity and substances. Students attend two to three lessons. The programme also offers professional development opportunities to school staff.	Teacher feedback revealed that 68% agreed that Life Education Trust delivered lessons that met the needs of their children, and 97% agreed the programme provides children with useful skills for the future, and 95% would definitely recommend the programme to other schools in their area (Life Education Trust, 2022).
2012 - 2020	*Fuelled4Life*	Heart Foundation	Developed nationwide nutrition criteria for the Food and Beverage Classification System (FBCS) (Mhurchu et al., 2016). Foods and beverages are classified according to their nutrient profile and divided into three categories:	Focused on providing nutrition guidelines, this increased awareness around schools however did not impact food provision (Pillay et al., 2022). The classification system was used in numerous studies to measure the

			everyday, sometimes and occasional. This is now being replaced with the Ministry of Health's Healthy Eating Guidelines (Ministry of Health, 2020a).	healthiness of the school food environment (Gerritsen et al., 2017).
2011-2020	*Milk in Schools*	Fonterra - now part of Kickstart Breakfast Club	Aimed to increase milk consumption amongst primary schools by serving 200ml of ultra-high-temperature low-fat milk every day at school.	In 2018, a 2-year follow up programme evaluation found the proportion of children's milk intake increased and were meeting the Aotearoa NZ guidelines for milk consumption over seven days and has significantly improved bone health when compared to a control group (Marsh et al., 2018; Rowan, 2017).
1997-2020	*Health Promoting Schools*	Ministry of Health	*Health Promoting Schools* addressed community health by providing an external workforce to help schools focus on healthy school policy, physical and social environment, health skills and services and community integration with the purpose to achieve educational goals through addressing health issues within an educational framework guided by the World Health Organization Health Promoting Schools framework (Swinburn et al., 2014).	A 2017 programme evaluation found Health Promoting Schools contributed to a decrease in stand-downs by 42%, and therefore improved attendance rates by 60%, as well 29% improvement in reading and learning performance (Leeson, 2017)
2014 - 2018	*Heart Start: Toitoi Manawa*	Heart Foundation and Ministry of Health	To ignite the heart - free programme that helps schools create learning environments that promote healthy eating and physical activity. The Heart Foundation's *Heart Start Award* provides school staff with information, planning tools, and curriculum guides. The free programme is open to all Aotearoa NZ primary, intermediate and secondary schools.	No evaluations found at the time of writing.
2006	*Mission On*	Government imitative in partnership with	A 67-million-dollar package of 10 initiatives designed improve children's understanding and skills related to	No evaluations found at the time of writing.

		Sports and Recreation NZ	healthy nutrition and being more physically active. Mission-On builds on the existing cross-government programmes within schools, early childhood education services, and communities around Aotearoa NZ. These include *Push Play, Active Schools, Fruit in Schools, Active Movement* (in early childhood), and *Active Communities*.	

Note. ¶ Current in 2024

Appendix B – Deductive thematic analysis codes from Pillay (2022).

Milk in Schools
School directives, policies
Fruit in Schools
Garden to Table
Breakfast Club
Availability of school lunches
KidsCan
Parents are the decision makers
Water and milk only policies
Children's knowledge and preference for healthy food
Protected eating times
Monitoring the consumption of unhealthy foods in schools
Nutrition curriculum
Need for community support to facilitate healthy practices
Processed and packaged foods
Food cost
Schools helping community
Stigma or Shame or Embarrassment
External education providers
Children don't have enough food for lunch
Effectiveness of nutrition education
Food and the Environment
Nutrition Education from Teachers
Addressing children's hunger
Missing Breakfast
Something is better than nothing
Cooking and food prep as a teaching tool
Food donations
Information and Resource Finding
School events
COVID-19
Free School Lunches Program
Life Ed
Religion, cultural, social influencers
School food policies are not enforced
Special lunch orders on certain days of the week
Canteen, Tuck Shop
Children want to fit in
External Food Provides

Food availability around schools (dairy, takeaway)
Formal training in nutrition for teachers
Children's attitude and mood
Dispersion of knowledge to home environment
Food insecurity
Fundraising activities
Healthy Lunches from home
Ideas for school initiatives
Role modelling - Teachers
Teachers own perception of healthy eating
Facilities and funding
Fizzy-Free
School communication with parents
Classroom food availability
Eat My Lunch
Low-decile schools
Nutrition from home is more important
Nutritionist or Dietitian input
Student perceptions of healthy food not being tasty
Time and Resources for PD in health
Body Image
Fussy eaters
Label Reading
Role modelling - Parents
School Performance
Weight management is important for children
Attendance
Complexity of government food and drink guidelines
Heart Foundation
Marketing of food
Rewarding for teachers
Teacher initiatives
Health Education Caravan
Need for school food policies

Appendix C – Teacher Focus Group Facilitation Guide 2020/21 & 2022/23

Teacher Focus Group Notes

Teacher Focus groups will be a central aspect of the Healthy Active Learning evaluation. They will be conducted with the objective of exploring and capturing the teachers' perceptions of the Healthy Active Learning initiative, including, their perceptions of school processes, the Healthy Active Learning initiative and student outcomes. The following outlines how the focus groups will be carried out.

Facilitation

Prior to the beginning of each focus group, participants will be provided with refreshments and encouraged to mingle to make them feel more comfortable and develop a sense of rapport amongst the group. This will also give the moderator time to assess the participants and how they will be seated (louder participants nearer to the moderator so can more easily direct conversation away from them if they become overly active, and quieter ones opposite from the moderator so that eye contact is easily established and maintained).

While the moderator will work to build rapport and make the participants comfortable, the participants will be reminded that while informal, this is a scientific evaluation and so need legitimate information.

Each focus group will be facilitated by an individual with experience in conducting focus groups. In addition to the lead moderator, an assistant will also be present to support the moderator should they need any assistance regarding such areas as, for instance, issues with a recording device, preparing water and snacks, and/or any other areas needing support. The assistant will also be partly responsible for recording notes throughout the focus groups of anything that they perceive as being relevant or worthy of further exploration.

Participants will be thanked for their involvement at the beginning of each focus group, and this is also the point at which some important messages are communicated to the participants:

- Names will not be attached to any data throughout the study (participants will be assigned a letter/number combination), including within any publishing of findings.
- Participants are free to withdraw themselves from the focus groups at any time should they become uncomfortable.
- Due to audio recording the focus groups, only one person can speak at a time, and no side discussions between participants – we want to hear what each participant has to say.
- There are no right or wrong answers, just different points of view (which is why we are here, to explore individual ideas, experiences and opinions, which are all valuable)
- Even if you do not agree with someone, be respectful of them and give them a chance to speak.
- All information shared is confidential, and will not leave the room, other than for evaluation/research purposes.
- Cell phones need to be turned off, if you are expecting a call then answer it quietly out of the room and return quickly.

It will also be emphasised that the moderator's role is only to guide the discussion and that we are looking for the participants to discuss the topics between themselves. If a question is not answered for one of the groups, the moderator will use probing questions.

Probing techniques include:

- Repeating (or rephrasing) the question
- Pausing and waiting for an answer
- Repeating the reply back to them
- Ask when, what, where, which and how questions
- Neutral comments such as 'anything else?' or 'can you say more about that?'

If particular participants are dominating the conversation, or the conversation veers too far off track, the moderator will redirect conversation to other members of the group by thanking them for their contribution, and either restating the question or asking if anyone has a differing point of view or experience on the topic. Other strategies include giving nonverbal cues (looking at people, eye contact etc) and directly addressing those who may be reluctant to talk, however respecting their wishes if they do not wish to contribute to a particular question.

The moderator will strive to remain impartial (including verbal responses and body language) to responses given by participants and will strive to avoid conveying any personal views on the matters discussed.

Size

Consistent with suggestions from the literature (e.g., Sparkes & Smith, 2014), where possible, the focus groups will involve between four and eight participants as it is believed that a number within this range allows good interaction and ideas to surface and be explored, whilst also providing opportunities for everyone to contribute. Seats will be arranged for participants around a table or in a circular shape with the moderator amongst the group, as opposed to occupying an obvious position of power. It is envisaged that this will create a more relaxed and non-threatening environment to share experiences and ideas.

Timing

As often as possible, we will look to conduct focus groups immediately following the school day (approximately 3.30pm – 5pm). Whist there is no perfect time to conduct the focus groups, it is believed that holding the focus groups during the day (e.g., lunch time) would mean there is an inevitable risk that they would need to be cut short so that the teachers can resume teaching. Notwithstanding, the evaluation team understands that this may, at times, be beyond our control and will need to adapt and be flexible when required.

The following table provides an outline including questions and prompts for the focus groups as well as the learning objectives that they are aligned to. Questions will be adapted slightly so that they are worded appropriately and relevant for each focus group at each sampling point.

First (baseline) Focus Group

Conducted prior to Healthy Active Learning initiative to get baseline data (2020)

OBJECTIVES & QUESTIONS		
LO	**OBJECTIVE:**	**QUESTIONS:**
Medium-term 2	Improved quality of HPE delivery	- Can you describe your current level of ability to integrate physical activity into your daily teaching? - What areas need improvement to be able to do this more effectively?
Medium-term 3	School processes	- Do you feel that your school values physical activity? ▪ What makes you feel this way? - Do you feel that your school values a healthy eating environment? ▪ What makes you feel this way?
Medium-	Student motivation &	- Describe your students' motivation regarding physical activity.

term outcome 6	understanding	- How engaged are your students during sessions that involve physical activity? ▪ What could improve their engagement levels? - Do you feel that your students have an understanding of the benefits of physical activity? - Do you feel your students have an understanding of healthy food choices?

Additional Sampling Point Focus Groups

OBJECTIVES & QUESTIONS		
LO	**OBJECTIVE:**	**QUESTIONS:**
Outcome Question 3 **Medium Term Outcome 4 & 6** **Long-term outcome 2**	Success of HAL	- Can you describe any changes that you are seeing/saw in your students' levels of physical activity? - Have you noticed other changes in the level of engagement in your classroom? ▪ Does that apply to everyone or are there more noticeable changes with particular individuals or groups? - Have you/did you notice any changes to ▪ student motivation? ▪ student enjoyment ▪ student confidence? ▪ individual engagement ▪ classroom behaviour and focus on learning? ▪ response to challenges (resilience)? ▪ Relationships between students within your class? - Have any parents commented on any changes in their children?
Medium Term Outcomes 1, 2 & 3	School processes	- Do you feel that your school values physical activity? ▪ How do you know this? ▪ Has this changed? ▪ Resources ▪ Support to staff ▪ Policy change ▪ Strategic plan - Do you feel that your school values a healthy eating environment? ▪ How do you know this? ▪ Has this changed? ▪ Resources

		▪ Support to staff ▪ Policy change ▪ Strategic plan - Have you seen any changes to how HAL is delivered within your school? ▪ Frequency of access to PA? ▪ Types of access/modes of exercise?
Long-term outcome 5	Contribution of Initiative	- How would you describe the overall contribution of Healthy Active Learning to the desired outcomes of the initiative?

Appendix D – NVivo codes for 2022/23 focus group transcription codes

The 2022/23 focus group transcriptions were coded according to the related HAL Short-term/Mid-term Outcome as seen below by a Massey University research assistant in 2023.

N_ Nutrition components of the Healthy Active Learning evaluation – HAL 2.0

i_ST01: Schools, community agencies, providers and whānau work effectively together to offer quality PA opportunities and support, in education settings, healthy food environments.

1_Formal Training and Support

2_Schools working together with external education providers

3_Schools working together with external food providers

4_Whānau views on communication about healthy food in school

j_ST03: School leaders value and actively support quality HPE and PA, and healthy food and drink environments

5_School policies on healthy food and drinks

k_MT03: School cultures and processes value and prioritise quality HPE, PA and healthy food and drink environments

6_Implementation of Healthy Food and Drink policies

7_Presence of milk and water only policies

8_Prioritising health education

l_MT05: Schools* demonstrate, promote and support healthy food and drink environments

9_Promoting and supporting healthy food and drink environments

10_Barriers to promoting and supporting a healthy food environment

m_MT06: Tamariki and rangatahi have the motivation, understanding, knowledge and skills to make positive and informed choices about food and drink, and PA

11_Tamakiri and rangatahi knowledge and understanding of healthy foods and drinks

12_Challenges in the application of healthy food and drink knowledge