

# Exploring Australian parent perspectives of an acceptable school- provided meal system

By

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## KEY ABBREVIATIONS

<b>ABS</b>	Australian Bureau of Statistics
<b>AUD</b>	Australian Dollars
<b>CAD</b>	Canadian Dollars
<b>CI</b>	Confidence Interval
<b>CPI</b>	Consumer Price Index
<b>DCE</b>	Discrete Choice Experiment
<b>EU</b>	European union
<b>IQR</b>	Interquartile Range
<b>kJ</b>	Kilojoules
<b>NGT</b>	Nominal Group Technique
<b>NR</b>	Not Reported
<b>NZD</b>	New Zealand Dollar
<b>SD</b>	Standard Deviation
<b>SEIFA</b>	Socio-economic Indexes for Areas
<b>UK</b>	United Kingdom
<b>US</b>	United States of America
<b>USD</b>	United States Dollar

# GLOSSARY

<b>Children</b>	Refers to children under the age of 18 years.
<b>Core/healthy foods</b>	<p>Core foods describes the five food groups essential for a healthy diet, and are defined by the Australian Dietary Guidelines<sup>1</sup> as:</p> <ul style="list-style-type: none"> <li>• vegetables and legumes/beans</li> <li>• fruit</li> <li>• grain (cereal) foods</li> <li>• lean meat and poultry, fish, eggs, nuts and seeds and legumes/beans</li> <li>• milk, yoghurt, cheese and dairy alternatives.</li> </ul> <p>Healthy foods are referred to as foods made predominantly with a range of core foods, contributing towards a healthy diet aligned with the Australian Dietary Guidelines.</p>
<b>Diet quality</b>	A diverse, balanced and healthy diet, which provides energy and all essential nutrients for growth and a healthy and active life.
<b>Families</b>	Members of a family including children, primary and secondary caregivers (including but not limited to biological and non-biological parents/caregivers, grandparents/caregivers, and other relatives) who identify as a "family".
<b>Features</b>	Key aspects of school food models that impact the way the system functions, such as the cost or nutrition, which can influence program participation, sustainability and impact.
<b>Food relief</b>	Food relief is food provided to those may be experiencing food insecurity, usually by a charitable organisation.
<b>Lunchbox</b>	Lunchbox, or packed lunch provision, consists of food and beverages that are purchased outside of school, prepared and brought to school to be consumed across the school day. This is the primary model of school food provision currently used in Australia.
<b>Parents</b>	The primary caregivers of children who are most commonly parents/caregivers (mothers/fathers), but could also include grandparents/caregivers, other relatives, legal guardians and carers. Parents are a key consumer in school-provided meal systems, as primary food providers.
<b>Schools</b>	The term 'schools' is used to describe education facilities that typically serve children aged 4-18 years, regardless of whether they are public, private or independent schools. In Australia this captures primary and secondary schools. This specifically refers to day schools, excluding boarding schools or home schooling when food provisioning is

already considered. This thesis focuses predominantly on primary schools, education for children typically 5-12 years of age.

<b>School food system</b>	This refers to the broader system beyond the service of food alone. This may capture many other aspects of school food environments including vegetable gardens, nutrition curriculum activities etc.
<b>School-provided meals</b>	School-provided meals is the term used to describe food provided in school, primarily for the mid-day meal, by the school or an associated catering service. School-provided meals can also be referred to as school lunches or school dinners internationally.
<b>School food model/provision model</b>	The way food is provided in schools, including school-provided meals, lunchboxes and canteens. This involves different stakeholders responsible for providing food. These models are embedded within different school food systems.
<b>School food program</b>	Refers specifically to the program used in a certain country or jurisdiction, for example the National School Lunch Program used in the US <sup>2</sup> .
<b>Social pricing</b>	Used to define pricing strategies that consider family household income or capacity to afford meals. This applies concepts of proportionate universalism, in that all have access to a system, but resources are allocated according to need to achieve equity <sup>3</sup> . Social pricing is commonly used in France for school-provided meal costs, with higher costs for families of higher income <sup>4</sup> .
<b>Food service</b>	Used in reference to how school-provided meals are prepared and served within the school setting. This acknowledges schools are a food service setting, with trained staff and food safety requirements. This does not capture the broader components of a school food system, such as classroom education.
<b>Students</b>	Used to refer to children while in the school setting.
<b>Unhealthy choices</b>	Foods and drinks that are not needed for a healthy diet and do not fit into the five food groups, and are not environmentally sustainable, contributing to poor diet quality. Otherwise known as “discretionary choices” “nutrient-poor choices” or “sometimes foods”, they are high in saturated fat, added sugars, salt and/or alcohol and low in fibre and the Australian Dietary Guidelines (2013) (p.5.) <sup>1</sup> recommend that their consumption should be limited.

Definitions adapted from Manson et al. 2022<sup>5</sup>



# THESIS SUMMARY

## **Purpose**

Schooling is a unique health promotion setting, where children consume over 2000 lunches. Currently in Australia, school food provision is predominantly reliant on parents/caregivers and home packed lunches. Interest is growing for adoption of school-provided meals nationally; however, parent perspectives are not well understood. This thesis therefore aimed to generate an original contribution to knowledge in understanding the perspectives of parents, as key stakeholders, in a school food system. Specifically, this thesis explored parent perspectives of a school-provided meal system in the Australian context, addressing the research questions 1) What do parents value in an Australian school-provided meal system? and 2) How do school-provided meal systems need to be tailored to meet various socio-ecological contexts and parent perspectives?

## **Methods**

Five inter-related studies were conducted, underpinned by socio-ecological and consumer consultation frameworks. The studies included a review, case studies of school food systems internationally, Nominal Group Technique workshops, analysis of lunchbox costs, and a survey, including a Discrete Choice Experiment. Studies formed unique findings and comprehensively addressed the thesis research questions. An advisory group of school food stakeholders informed the research methods and result interpretation.

## **Findings**

Over 90% of Australian parents were interested in a school-provided meal system being introduced. The findings indicate school-provided meals would be acceptable to parents, if the system is comprehensive and appropriately designed. Perspectives indicate the need for any Australian school-provided meal program to be designed based on the socio-ecological contexts including individuals, families, regions and schools, avoiding a one size fits all approach. This includes tailoring dietary requirements, costs, and menu offerings. Parents were willing to financially contribute to a school-provided meal, particularly attributing financial value to a system that provides nutritious, quality food, offers menu choice, is environmentally sustainable, integrates the meal into learning, and is universally accessible.

## **Conclusions**

Thesis findings indicated there is potential for an acceptable and feasible school-provided meal system to be introduced in Australian primary schools. A system transformation would be acceptable to parents, if the offering was appropriately designed. Particularly, alignment

with parent values and tailoring of the system would increase acceptability, forming a system that is universal, but not uniform. Findings align with previous international research and growing stakeholder perspectives on a potential system, which should be considered to optimise uptake and impact. Knowledge established within this thesis can be used to drive transformative action, ensuring parent perspectives are considered in the growing conversations on school-provided meals in Australia.

## THESIS CHAPTERS

This thesis uses a multi-stage, comprehensive process to address the thesis aim and two research questions, described over eight chapters.

**Chapter 1** provides a comprehensive summary of relevant literature and justification for thesis studies.

**Chapter 2** outlines the theoretical frameworks that inform the thesis methods and describes the use of an advisory group of school food stakeholders to guide the research

**Chapter 3** describes the narrative review of literature on parent perspectives, exploring what parents identify as the key features of school food provision models, and parents' perspectives of school food internationally.

**Chapter 4** describes an observational study of the food service of school-provided meals across different countries and contexts, using a food service framework.

**Chapter 5** describes a series of Nominal Group Technique workshops, aiming to understand the most important features of a potential school-provided meal system to parents of primary school children in Australia.

**Chapter 6** describes a cost analysis study, aiming to understand school food costs internationally, determine what parents are currently paying for lunchboxes for Australian primary school children, and to examine associations between lunchbox food costs, socio-demographic factors and diet quality.

**Chapter 7** describes a survey, including a Discrete Choice Experiment, used to understand parent preferences and values for a school-provided meal system in Australian primary schools. This research explored if parent preferences differed depending on socio-demographic factors and parent considerations around school food.

**Chapter 8** is a synthesis and discussion of thesis studies. Thesis content is collated to address the aim and research questions, with findings consolidated in the context of broader literature. Findings inform recommendations for future considerations of school-provided meals in Australia.

## THESIS PUBLICATIONS AND DISSEMINATION

Modified versions of thesis chapters have been published and disseminated throughout this candidature, described in Table 0-1. All work was led by the PhD candidate, with supervision, guidance or support provided from co-authors.

**Table 0-1: Summary of publications, dissemination and associated coauthors for work completed during this thesis**

Chapter	Citation/Stage of publication	Other dissemination	Co-authors
<b>Three</b>	Manuscript published Manson, A. C., Golley, R. K., & Johnson, B. J. (2025). Global parent perspectives on school food service internationally: A mixed papers narrative review. <i>Nutrition &amp; Dietetics</i> <a href="https://doi.org/10.1111/1747-0080.1292">https://doi.org/10.1111/1747-0080.1292</a>	Poster presentation ISBNPA conference	Rebecca K Golley, Brittany J Johnson
<b>Four</b>	Manuscript published Manson, A. C., Johnson, B. J., Middleton, G., Evans, C., Dunbabin, J., Rossiter, J., Nicklaus, S., Sundin, A., Sundin, N., & Golley, R. K. (2024). Getting school-provided meals to the table: an international multiple-case study of school food service. <i>Health Promotion International</i> , 39(6), daae177. <a href="https://doi.org/10.1093/heapro/daae177">https://doi.org/10.1093/heapro/daae177</a>	Oral presentation Home Economics Institute of Australia conference	Brittany J Johnson, Georgia Middleton, Charlotte Evans, Julie Dunbabin, Jo Rossiter, Sophie Nicklaus, Anders Sundin, Niina Sundin, Rebecca K Golley
<b>Five</b>	Manuscript published Manson, A. C., Golley, R. K., Dutch, D. C., & Johnson, B. J. (2025). "Not just students in need": Findings from a nominal group technique study of what parents want in an Australian school-provided meal system. <i>Australian and New Zealand Journal of Public Health</i> , 49(2), 100221. <a href="https://doi.org/10.1016/j.anzjph.2025.100221">https://doi.org/10.1016/j.anzjph.2025.100221</a>	Channel 9 News interview Dare to Share session ISBNPA New Zealand	Rebecca K Golley, Dimity C Dutch, Brittany J Johnson
<b>Six</b>	Manuscript published Manson, A. C., Johnson, B. J., Wolfenden, L., Sutherland, R., & Golley, R. K. (2024). Unpacking the cost of the lunchbox for Australian families: a secondary analysis. <i>Health Promotion International</i> , 39(1), daad194. <a href="https://doi.org/10.1093/heapro/daad194">https://doi.org/10.1093/heapro/daad194</a>	Oral presentation ISBNPA Sweden Channel 7 News interview Flinders University Best Higher Degree by Research Publication Award College of Nursing and Health Science	Brittany J Johnson, Luke Wolfenden, Rachel Sutherland, Rebecca K Golley
<b>Seven</b>	Manuscript under preparation	Oral presentation ISBNPA New Zealand	Rebecca K Golley, Victoria Brown, Brittany J Johnson

See Appendix 9.2 for copies of published work. All additional activities across candidature, including other publications, are described in Appendix 9.1.

ISBNPA: International Society of Behavioral Nutrition and Physical Activity

## **SIGNIFICANT ORIGINAL CONTRIBUTION TO KNOWLEDGE**

This thesis makes a significant original contribution to research by filling a critical evidence gap regarding the Australian parent perspective on school-provided meals. There is a growing interest in the potential adoption of school-provided meals and system transformation in Australia. However, the parent perspective had not been understood, which is necessary for a transformation that will shift food provision responsibility and potentially impact parent autonomy. This thesis ensures that parents, as key consumers and stakeholders, have their voices heard, being the first research to comprehensively explore parent perspectives and values of school-provided meals in the Australian primary school setting.

Within the school food field, this research approach is innovative in engaging parents through various strategies to understand their perspectives, capturing a more representative and comprehensive understanding compared to the limited existing literature. As a result, the new knowledge generated through this thesis demonstrates the key priority areas for parents. Additionally, this research is unique in considering feasibility to optimise the potential impact of research findings. This allows for the design of a potential system that is accepted by consumers and purpose-built to increase equity and social impact across families of various socio-demographics within different socio-ecological settings. Therefore, this thesis forms a significant and valuable original contribution to the literature, with the potential for impactful public health influence.

## DECLARATION

I certify that this thesis:

1. does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university
2. and the research within will not be submitted for any other future degree or diploma without the permission of Flinders University; and
3. to the best of my knowledge and belief, does not contain any material previously published or written by another person except where due reference is made in the text.

Signed: *Alexandra Cate Manson*

Date: 31/07/2025

## ACKNOWLEDGEMENTS

Three years ago, my wise supervisors told me that it takes a village to complete a PhD. At the time, much like many valuable pieces of advice I have received from them over these years, I didn't quite appreciate what this meant. However, this candidature has been one large validation study of this advice. So, this is a thank you, to my highly populous village, for everything.

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# CHAPTER 1. INTRODUCTION

## 1.1 THE IMPORTANCE OF HEALTH IN CHILDHOOD

Childhood is a key stage for development of healthy dietary habits<sup>6</sup>. The food consumed by children influences their health, growth and development<sup>6, 7</sup>. Food exposure also plays an important role in the development of children's food preferences, and to address the fear of unfamiliar foods, known as neophobia<sup>8</sup>. Dietary intake during childhood, being key formative years, can influence lifelong dietary behaviours<sup>9</sup>. Diet quality established in childhood, including consumption of vegetables, fruit, and fibre, is associated with a lower risk of chronic disease later in life, including, but not limited to, dental caries, obesity, cardiovascular disease, bowel cancer, type 2 diabetes and heart disease<sup>10,11</sup>. Therefore, consuming a healthy diet during childhood is critical in supporting health and development across the lifespan.

## 1.2 AUSTRALIAN CHILDREN'S DIETARY INTAKE

The dietary intake of children across numerous high income countries is not aligned with recommendations<sup>12</sup>. In Australia, dietary guidelines encourage children to consume "*sufficient nutritious foods to grow and develop normally*" and enjoy a variety of nutritious foods from the core food groups daily (p.5.)<sup>1</sup>. In addition, recommendations include limiting intake of food and beverages high in "*saturated fat, added salt, added sugars and alcohol*" (p.5.)<sup>1</sup>, referred to as unhealthy choices. However, 96% of Australian children do not consume enough vegetables, with 45% overconsuming sugar sweetened beverages<sup>10</sup>. Analysis of a nationally representative sample of children aged 2-18 years found 39% of daily energy consumption was sourced from unhealthy choices<sup>13</sup>. The most consumed unhealthy choices were sugar-sweetened beverages, cakes, muffins and slices, sweet biscuits and potato crisps<sup>13</sup>. Furthermore, children are under consuming the core food groups, required for healthy growth and development.

There are a diverse range of influential factors on the dietary intake of children. Factors include child and parent food knowledge and preferences, product availability, household income, peer influence, provision guidelines and the food environment<sup>14, 15</sup>. These factors can be explored using a socio-ecological lens, to understand how inter and intra-personal factors, settings and policy all influence dietary intake and this complexity therefore must be considered in nutrition promotion initiatives<sup>16</sup>. Previous initiatives have lacked comprehensive considerations of these complex, multi-faceted influences on dietary intake, resulted in limited sustained dietary change. As such, the misalignment of children's dietary intake with the Australian Dietary Guidelines has been prevalent for decades<sup>10, 13</sup>. Therefore, there is a need for alternative, comprehensive initiatives to support healthy growth and development.

### 1.3 SCHOOL AS A KEY HEALTH PROMOTION SETTING

Health promotion efforts targeting nutrition promotion settings and policy have greater influence on the population<sup>17, 18, 19</sup>, when compared to initiatives targeting the individual level, such as education programs<sup>16</sup>. This influence is attributed to setting and policy initiatives having a broader population reach, increasing initiative cost-effectiveness and equity<sup>17</sup>. Schools have been identified as a key setting for health promotion efforts targeted towards children, with education settings having a national reach and age-appropriate timing for health and development initiatives<sup>20</sup>. Primary and secondary education spans key developmental stages for habits, preferences and knowledge, while also supporting physical and mental development<sup>1, 21, 22, 23, 24</sup>. As such, experiences within this stage can shape lifelong health behaviours<sup>1, 21, 22, 23, 24</sup>. Therefore, school is a focus for numerous public health campaigns, being a setting where children eat, learn, play and grow<sup>25, 26, 27</sup>. A systematic review of school stakeholders' perceptions of the role of primary schools in preventing childhood obesity, including parents, teachers, school staff, students and principals, found that all stakeholders agree that schools have an important role in health promotion<sup>28</sup>. Countless initiatives have utilised schools as an opportunity to make widespread change on the behaviours or knowledge of children<sup>29, 30, 31, 32, 33</sup>. This aligns with the World Health Organization's (WHO) stance that schools play a "*central role in safeguarding student health and well-being*", describing nutrition and food safety programmes as an avenue for schools to become health promoting (p.1.)<sup>20</sup>. Additionally, a systematic review of 42 international studies explored the impact of school-based interventions, identifying that school-based interventions are effective in improving fruit and vegetable intake<sup>34</sup>.

### 1.4 THE AUSTRALIAN SCHOOL FOOD SYSTEM

Children in Australia typically attend school from 5-17 years of age<sup>35</sup> for six hours each weekday. The Australian Institute of Health and Welfare reported that, in 2024, attendance for students in grades 1-6 was 90%<sup>36</sup>, demonstrating a broad population reach. School is also a unique setting with reach to most Australian children, with children of all socio-economic and cultural backgrounds attending school<sup>36</sup>.

The typical Australian school day runs from approximately 8:30am-3:00pm, with lessons and two or more breaktimes, for food consumption and play<sup>37</sup>. These breaktimes consist of a 'recess' or snack break, and a longer lunch break<sup>37</sup>. The lunch break is the major eating occasion in Australian schools, with most food consumed during this time<sup>38</sup> and thus being the greatest opportunity for health promotion. Breaktime structure differs across schools; however, in the primary years, food consumption typically occurs at the beginning of the breaktime, followed by time for play. An Australian study found that most primary schools had 10 minutes of allocated eating time during lunch breaks<sup>39</sup>. Primary schools commonly also include an additional snack

opportunity during lesson time. This concept was popularised by the 'Crunch & Sip' program, designed to improve the water and vegetable intake of children<sup>40</sup>. This program has been widely adopted, also referred to as a 'brain break', where students are commonly encouraged to consume specific food and beverage items (e.g., water, fruit, vegetables or other healthy snacks).

Food consumed by children during school hours in Australia is typically provided through three avenues; 1) lunchbox provision, 2) canteens or other catering models and 3) food provision as a form of food relief, typically by the school or an external food relief organisation<sup>5</sup>. Lunchbox, or packed lunch provision, consists of food and beverages that are purchased outside of school, prepared and brought to school to be consumed across the school day. Foods provided may be influenced by a school food policy, encouraging healthy food provision. In Australia, these foods are commonly packed into a lunchbox for storage, often insulated or provided alongside an ice block for temperature control, and consumed across the breaktimes, as the primary food provision model. Challenges for lunchbox provision are described below in section 1.5.1.

In Australia, canteens are a small shop existing within the school, run by private organisations or volunteers, which offer options to pre-order or purchase food and beverages<sup>41</sup>. Canteens vary between schools, as not all Australian schools offer a canteen or food purchasing service or only offer this service on some days of the week. Canteens provide food to approximately 10% of Australian children per day<sup>38</sup>. Canteen facilities increasingly allow parents to order food via an app or online system, or children can purchase food directly from the canteen during breaktimes. Food and beverages sold in canteens are guided by the canteen and food provision policies of the school. These may be designed with incorporation of the state/territory canteen guidelines, as well as national canteen food provision guidelines<sup>42</sup>. The national guidelines classify foods according to a traffic light system (i.e., red being unhealthy choices, amber being 'occasional' choices, green being core foods), using nutrition information and portion size as guidance<sup>42</sup>, however compliance is not monitored or mandatory for canteens. A 2015 study investigating stakeholder canteen perceptions in Catholic and independent primary and high schools found 94% of children consumed food from the canteen, with 93% of these students consuming snack food items<sup>43</sup>. These results reinforce the use of canteens as a supplemental 'treat' provision by parents, rather than as a main meal provision option<sup>43</sup>. The use of the canteen for treat provision is consistent with other Australian qualitative studies, with parents describing canteen food provision as a reward for the child, or a break for themselves from food preparation<sup>44, 45</sup>. Most Australian canteens do not have access to a commercial kitchen and facilities. This limitation, in addition to difficulties funding and maintaining staff and volunteers, result in reduced capacity for canteen food preparation. As a result of reduced capacity, canteen services are increasingly outsourced to a private organisation<sup>5</sup>. As such, canteens are limited as a comprehensive school-provided meal model, with minimal adoption, capacity and mixed parent perception.

There are several food relief agencies within Australia aiming to provide children with food to consume during school hours, acting as another alternative form of food provision within the school setting. These agencies exist predominantly to address food insecurity and may serve schools in lower socio-economic areas to ensure children have sufficient food to fuel their day. Several versions of these programs exist, for example, the Kickstart for Kids program in South Australia<sup>46, 47</sup>, which provides breakfast, and Eat Up, an Australia-wide program that provides a sandwich for lunch<sup>48</sup>. Other organisations running school feeding programs include Foodbank, Second Bite, Anglicare, St Vincent de Paul and Baptist Care<sup>49</sup>. Demand for these programs is fast-growing, contextualised by rising costs of living within Australia and low food affordability<sup>5, 50</sup>, however programs typically only receive limited state or federal funding to support their efforts, resulting in reliance on volunteers, donations and sponsorships. Therefore, many of these programs are limited by resources with implications on the capacity to provide regular nutritious, quality food and the number of schools they can service<sup>51</sup>. Program stakeholders have reported that expansion capabilities are limited<sup>46</sup> and the welfare of households dependent on charitable food is a public health concern<sup>51</sup>.

Additionally, children may consume meals before or after school, provided in Out of School Hours Care<sup>52</sup>. These programs run around school hours and provide care to students. These programs commonly provide breakfast and afternoon snacks, which may be guided by food policy<sup>52</sup>. Other food consumed during the school day may be distributed as rewards, birthday celebrations or purchased in fundraising events<sup>5</sup>. While these programs offer food to children, not all students participate, or programs run on an ad hoc basis, lessening the opportunity for health promotion. As such, Out of School Hours Care and breakfast programs are not a focus in this thesis, in comparison to the main lunchtime eating occasion, with potential to reach more Australian children.

#### **1.4.1 Initiatives to improve food provided or consumed at schools in Australia**

The importance of the school food setting and challenges in the current Australian system for lunchboxes and canteens have led to countless initiatives and programs implemented within Australian schools<sup>30, 31, 53, 54, 55, 56, 57</sup>. Many of these programs were implemented with the aim of improving the nutrition intake of children. Common initiatives include parent education, classroom education canteen nutrition policy, and lunchbox nutrition policy implementation<sup>31, 45, 54, 55, 58, 59</sup>.

There is mixed evidence on the sustained success of school food initiatives, with limited long-term impacts indicated by the consistent diet quality of Australian children across decades. The nutrition quality and food products consumed during school have remained consistent in study findings across a 20-year period, with studies from 1995, 2011-12 and 2017 finding similar results<sup>60, 61, 62</sup>. A systematic review and meta-analysis of school food interventions in Australia indicated randomised controlled trials only resulted in a moderate increase in vegetable provision of 0.28 serves (95% CI 0.16, 0.64), with impacts on unhealthy choices being inconsistent<sup>63</sup>. Furthermore, interventions that use a combination of strategies, considering the complex socio-ecological influences on food

intake, were found to be more successful in obesity prevention than single arm interventions, posing the need for comprehensive initiatives to impactfully improve school food in Australia<sup>64</sup>.

Many initiatives have not adequately addressed barriers experienced by parents and other key stakeholders or lack a comprehensive approach to creating positive school food environments<sup>5, 65</sup>. A systematic review of ten lunchbox nutrition intervention studies found all trials included strategies to increase parent knowledge<sup>63</sup>. These lunchbox interventions commonly include pamphlets, newsletters, posters or parent workshops that provide information and recommendations for appropriate food provision choices<sup>63</sup>. However, these interventions further contribute to the parent burden of food provision and do not address equity disparities<sup>66</sup>. Alternatively, policy informing food that can be provided in lunchboxes have contributed to parent lunchbox shaming<sup>67</sup> or led to reformulation of foods to be lunchbox or child appropriate<sup>68</sup>, discussed further in section 1.5.1.

While canteen specific interventions, particularly policy, have been associated with improvements to the nutrition of food offerings<sup>69</sup>, the aforementioned challenges limit the capacity of canteens across Australia to drastically improve offerings without transforming the food service system (i.e., changes to staffing, kitchen resources, budgets and the utilisation by school community members). Furthermore, challenges mentioned for food relief avenues, including resources, limit the expansion of this food provision model to all students across Australia<sup>46, 51</sup>. As such, challenges exist for transforming these models to ensure all Australian students have access to nutritious food provided within the school setting. As a result, alternative and transformative approaches should be considered, to support healthy food provision and consumption within school.

## 1.5 ALTERNATIVE SCHOOL FOOD PROVISION MODELS

The most common school food provision model internationally is the school-provided meal, existing in many countries with the aim of reducing incidence of food insecurity and acting as a food provision safety net<sup>70</sup>. Of 195 United Nations member states, 161 countries offer a form of school feeding<sup>70</sup>. Further, approximately one in every two schoolchildren globally receive a school-provided meal every day<sup>70</sup>. School-provided meals typically include daily lunch and/or snack provision, with some programs offering a before-school breakfast<sup>71</sup>. School-provided meals are widely supported by international organisations, including the World Health Organization, World Food Programme and the School Meals Coalition—an emerging international initiative, supported by governments and partners<sup>20, 72</sup>. School-provided meal models are recognised as beneficial for improving nutrition and ensuring equitable food access by international organisations, with food availability being influential in formation of dietary habits<sup>73</sup>. A school-provided meal model is often designed to align with the needs of schools, nutrition guidelines and families in a financially viable/sustainable way. This includes varying features of school-provided meal models and thus different food service models (e.g., what food options are offered, optional or universally provided, onsite or offsite food preparation) and sources of funding (e.g., parent paid, government funded,

charitable organisation funded)<sup>71</sup>, which can influence program participation, sustainability and impact. These programs may be guided by nutrition and food safety policies that dictate the foods to be provided to children, which are often prepared by a trained cook, chef, or team of kitchen staff<sup>74, 75</sup>. This model is offered universally in Japan, Sweden and Finland<sup>71, 76, 77</sup>. School-provided meals thus pose an alternative model to lunchbox provision, with growing recognition of a range of benefits of providing meals within schools.

### **1.5.1 Literature overview of school food outcomes**

Previous literature has reported outcomes associated with different school provision models, including for children, parents, schools and society. The following sections present a summary of the available literature, comparing the current lunchbox model, focusing on Australia, with similar and school-provided meal models internationally to contextualise and understand the successes and downfalls of our current school food system in Australia. This does not include examples undergoing a transition between food provision models, with this summarised in section 1.5.3. Information is structured according to the socio-ecological model, exploring the outcomes on inter-personal (child outcomes), intra-personal (parent considerations), settings and policy levels.

#### **1.5.1.1 Child outcomes**

##### **Nutrition**

School-provided meals provide opportunity for greater control of the foods all children are consuming, through provision of healthy meals on the school food menu. Peer-reviewed literature comparing school food provision models internationally has found children have greater vegetable provision and consumption when having a school-provided meals compared to lunchboxes<sup>38, 78, 79, 80, 81, 82, 83</sup>. This may be due to a hot meal providing greater opportunity for a variety of food items to be consumed, compared to a lunchbox model<sup>81</sup>. Lunchbox nutrition limitations are in part due to the eating environment and lack of facilities for refrigeration and reheating. This contributes to cooked wholegrains, cooked vegetables, and meats infrequently being provided in lunchboxes<sup>84</sup>, while these can be easily included in a cooked lunch meal. In schools where both school-provided meal and lunchbox options are available, the nutritional quality, variety and food group provision of school-provided meals are notably greater, as found in evidence from the US, Canada and the UK<sup>79, 81, 83, 85, 86</sup>. One study from the US found lunchboxes contained more sodium, fewer vegetables and less milk compared to school-provided meals from the National School Lunch Program<sup>2</sup>. Furthermore, a meta-analysis of British school-provided meals versus lunchboxes from 1990 to 2007 established pooled estimates using for nutrients across provision models, with 95% confidence intervals (CI)<sup>87</sup>. Analyses determined lunchboxes contained higher sugar (14.0g (95% CI 10.3, 17.7)), saturated fat (4.7g (95% CI 2.4, 7.1)) and sodium (357mg CI (95% CI 174, 539)) estimates than school-provided meals<sup>87</sup>. Consuming a healthy, school-provided meal has been associated with a decreased intake of unhealthy foods outside of school hours, attributed to the

school-provided meal being nutrient and fibre dense, increasing satiety<sup>88</sup>. Particularly, a systematic review found provision of universal free school-provided meals was positively associated with diet quality in children<sup>88</sup>.

However, many models of food provision within the school setting, including school-provided meals, Australian canteens, and à la carte purchases, still provide unhealthy choices that may not support healthy dietary behaviours and contribute to poor compliance with dietary guidelines and nutrition outcomes<sup>38, 79</sup>, further described in section 1.5.1.5. Some school-provided meal models internationally are misaligned with their national dietary guidelines, providing several serves of unhealthy choices<sup>38, 79, 81, 89</sup>, often attributed to student demand and reducing food costs. Food purchased from Australian canteens is also not aligned with national dietary guidelines. A study of select New South Wales primary schools found unhealthy items represented 72% and 76% of canteen purchases at recess and lunch respectively<sup>90</sup>, in part due to the lack of appropriate resourcing and high demand for unhealthy choices. A New Zealand study analysing 577 primary and secondary school canteen menus in 2016 found that of the top ten most common food and beverages available in the school food service, seven of these categories were 'occasional' items, while just three were 'every day'<sup>91</sup>. A US study investigated the à la carte purchases of students, alongside the National School Lunch Program, finding that of 728,584 purchases 17.5% were baked chips, 13.4% were sports drinks, 13.3% were chocolate chip cookies and 9.2% was pizza<sup>92</sup>. As such, this literature indicates appropriately resourced school-provided meal models may have greater capacity to provide nutritious choices compared to lunchboxes; however, limited resources and student demand can contribute to provision of unhealthy options, such as that seen in Australian canteens.

## **Attendance**

Providing a meal for children during school hours can support increased attendance, in comparison to lunchbox models. School-provided meal offerings can act as motivation for students to attend school<sup>88, 93</sup>. Additionally, consuming nutritious meals can reduce incidence of illness through improved diet quality, resulting in increased rates of school attendance<sup>88</sup>. A systematic review identified nine studies exploring relationships between attendance and provision of universal free school-provided meals in the US<sup>88</sup>. Five studies found positive associations between meal provision and attendance, while no associations were identified in four studies<sup>88</sup>. Additional research conducted internationally also found mixed results, for both school breakfast and lunch provision. While some studies found significant improvements, these were only observed in higher-risk populations, including students from minority populations or low-income backgrounds<sup>93, 94</sup>. In Chile, the primary goal of the school food programme is promoting school attendance, providing free meals to children experiencing food insecurity and living in poverty, who might otherwise unenroll from school<sup>95</sup>. In the Australian context, the Foodbank WA School Breakfast Program was perceived to improve class behaviour and attendance by program coordinators<sup>49</sup>. Although the

evidence is mixed, there is potential for school-provided meal models to contribute to improved attendance, particularly for higher-risk populations.

### **Academic performance**

The quality and quantity of food consumed by students can influence their academic performance. A systematic review of 23 articles from developed countries found food insecurity was associated with impaired academic performance<sup>96</sup>. This review identified food insecurity as a preventable and remediable threat to the health and academic development of children in all stages of childhood, posing the enhancement of public nutrition programs such as school-provided meals as a potential avenue of addressing the experience of food insecurity<sup>96</sup>. Additionally, a Canadian study found students reporting higher diet quality were significantly less likely to fail an academic assessment<sup>97</sup>.

Evidence indicates academic performance is improved by school feeding programmes<sup>98</sup> and universal free lunch provision<sup>88</sup>. This can be attributed to improved nutrition allowing for greater focus and improving student behaviour, as well as a potential increase in attendance<sup>88</sup>. A systematic review of 41 studies by Burrows and colleagues<sup>99</sup> found moderate associations between several profiles of dietary intake and academic achievement. These dietary patterns included regularly consuming breakfast, consuming fewer unhealthy choices, such as sweetened drinks, and higher overall diet quality<sup>99</sup>. Other specific dietary factors important to academic performance include fruit and vegetable consumption and dietary fat intake, as found in a 2003 Canadian study<sup>97</sup>. As such, school-provided meals provide a means to improve academic outcomes, through improving diet quality and reducing child hunger, in comparison to lunchbox models.

### **Behaviour**

Student behavioural improvements have also been attributed to school-provided meal programs. Following service of a free school-provided meal in a Norwegian trial, students felt “*better able to concentrate, had more energy, and improved learning*”, compared to lunchbox provision<sup>100</sup>. Furthermore, classroom behaviour, including incidence of disciplinary infractions, were improved from 2009 to 2019 following introduction of a ‘breakfast after the bell’ program in Arkansas, US, which provided students breakfast to eat in their classrooms<sup>101</sup>. The ‘breakfast after the bell’ program also addressed disparities in school discipline over the socio-economic gradient, with behaviour improvements more pronounced in minority children<sup>101</sup>. Free school-provided meals have also been identified as a mode of reducing misbehaviour, with a 35% reduction in physical fights for schools that adopted a school-provided meal program<sup>102</sup>. As such, consuming a diet low in unhealthy choices and high in core foods, enabled by school-provided meal provision, may contribute to improved performance and behaviour in school.



### **1.5.1.2 Parent considerations**

Children's dietary intake is influenced by parental dietary intake and food knowledge, due to the role of parents as primary food providers<sup>103</sup>. Previous school food programs have aimed to influence the dietary intake of children through parental education; however, parents have described the challenges of actioning information when the food system does not adequately enable healthy, accessible choices<sup>104</sup>. School-provided meals offer an alternative initiative that targets improving the food environment to support healthy food provision to children across Australia.

The lunchbox model presents several challenges for parents. A scoping review of seven qualitative articles, from Australia, UK and Canada, synthesised parental perceptions of their lunch packing habits for their school-aged children, including barriers to packing healthy lunches and the influence of the school lunch experience<sup>104</sup>. The review found that while parents recognise the importance of packing a healthy lunch, they faced challenges in actioning healthy food provision, including child preferences, limited time for eating lunch, adhering to school policies and food safety concerns<sup>104</sup>. Parents with busy lifestyles desired foods that were convenient to prepare, often opting for prepackaged foods, which were also highly acceptable for their child<sup>104</sup>. Cost was also a major concern for parents regarding lunchbox foods, perceiving healthy items as expensive and wanting food that would not be wasted<sup>104</sup>. Lunchtime was also described as being an experience, with parents wanting to ensure their child enjoyed the meal<sup>104</sup>. School-provided meal systems disperse the burden of food provision onto the broader community, including the school, rather than being solely on parents<sup>105</sup>. While this can notably reduce parent autonomy, stress and time burdens can be reduced, potentially creating greater capacity for family meals in the home<sup>106</sup>, <sup>107</sup>. Cost-considerate programs can also reduce financial burdens on parents, increasing household economic resources<sup>93</sup>. While school-provided meals can pose a beneficial alternative to lunchboxes for parents, parent perspectives may differ depending on the features of the model, needing further exploration to understand how parent needs can be met, and elements of autonomy can be maintained.

### **1.5.1.3 School setting**

An international systematic review of 43 school-based intervention studies found that programs targeting the school food environment appeared most effective in improving child outcomes<sup>34</sup>. This included availability of food, including meals or fruit and vegetables<sup>34</sup>. Dietary intake of children is impacted by social modelling and food environments<sup>21</sup>. As a result, marketing of unhealthy foods to children within the school environment is a concern of parents<sup>108</sup>. Unhealthy food marketing occurs through sponsorships, packaging, canteens and fundraising in the school setting, and can play a role in influencing the food interests of children<sup>108</sup>, therefore demonstrating the importance of creating a positive school food environment.

## **Food availability**

Lunchboxes often offer the same food items, due to the challenges of lunchbox provision within the school setting<sup>104</sup>. School settings often lack appropriate facilities for refrigeration and reheating of meals, resulting in parents providing shelf-stable packaged items<sup>109</sup> and can result in feelings of shame for families looking to provide cultural foods<sup>110</sup>. Contrastingly, school-provided meals can offer exposure to a greater variety of foods to all students during school hours, which can have an influential impact on lifelong food habits and preferences<sup>9</sup>. A 2005 study surveyed school menus, food service managers in public schools, and analysed dietary recalls of children in grades 1 to 12 in the US, concluding that school-provided meals can support an increase in consumption of core foods<sup>111</sup>. Findings indicated the potential to achieve health benefits by providing a greater variety in school-provided meals<sup>111</sup>.

Provision of a school-provided meal creates opportunity for exposure to a variety of culturally diverse cuisines, flavours, and unfamiliar foods. In Japan, one option is provided each day for school lunch, which Freedman described as a mode of supporting children's ability to eat everything<sup>112</sup>. Exposure plays an important role in development of children's food preferences, and in addressing the fear of unfamiliar foods, known as neophobia<sup>8</sup>. Through providing a school-provided meal menu rich in variety, students have earlier exposure to a range of healthy foods, enabling preference development and thus food choices that improve their diet quality<sup>113</sup>. Furthermore, consistency of dietary initiatives, such as ongoing school-provided meal programs, have better long-term impacts on improved dietary habits than short term initiatives, such as education-only programs, or occasional fruit and vegetable provision<sup>28, 114</sup>.

### ***1.5.1.4 Societal impacts***

#### **Broader social impact**

School-provided meals are increasingly recognised as an investment in populations, leading to a breadth of long-term societal benefits<sup>115</sup>. Being an initiative implemented in a wide-reaching setting, there is potential to influence a large proportion of the Australian child population, reaching across cultures, economic positions, education institutions and geography. School-provided meals have been associated with major multi-sectoral impacts, including those identified above, with these positive impacts anticipated to be observed in the broader Australian population. These benefits span health, development, social wellbeing, education, economic, equity and environmental sectors. Successfully delivered school-provided meal programs can provide these benefits, with impacts across socio-ecological levels, contributing to a net improvement in social, health and well-being outcomes long term<sup>116</sup>. These benefits were iterated in a social impact evaluation of the potential of a national universal school-provided meal program in Canada, identifying meals as providing crucial social support, while providing long-term benefits, acting as a valuable societal investment<sup>115</sup>.

## **Equity**

An important consideration of a school food provision system is equity. Currently, there are differences in food consumption due to socio-economic position, particularly evident in lunchbox systems and thus within Australia<sup>117</sup>. A UK study found young children living in food insecure households had greater consumption (established using Mann-Whitney U tests and statistical significance of  $p < 0.01$ ) of unhealthy choices, in comparison with children considered food secure<sup>118</sup>. This includes added sugars, soft drinks and crisps, with lower intake of fresh vegetables and wholemeal bread<sup>118</sup>. In Australia, young children from higher socio-economic background consumed diets closer to guidelines than children from a lower socio-economic position<sup>119</sup>. Diet quality index scores (DGI-CA scores) of Australian children were associated with socio-economic position, with varying associations across different age groups, and food insecurity negatively affects whole of diet quality<sup>120</sup>. Additionally, children from a socio-economic background of greater disadvantage have a higher intake of sodium than children from less disadvantaged backgrounds, with adjusted estimates indicating a statistically significant difference of 195 mg/day<sup>121</sup>. As rates of income inequality and other indicators of disadvantage have risen in Australia, with shrinking social security safety nets<sup>122</sup>, initiatives should strive to close this gap, including through accessible and equal food availability and provision.

Providing meals during school ensures all children have access to a nutritious meal in a supportive food environment across every school day, regardless of socio-economic position. Results from an impact evaluation of a school-based food aid program in areas of low socio-economic position in Greece found a 5.1% reduction in households experiencing acute food insecurity following program participation<sup>123</sup>. Evidence from a Norwegian free school-provided meal trial found both students and teachers identified receiving school-provided meals as an opportunity to address social and health inequalities, compared to lunchboxes<sup>124</sup>. This also contributes to reducing nutrition disparities across socio-economic positions through ensuring all children are given a healthy, balanced meal in school, aligned with nutrition guidelines.

Demand for food relief in Australia, including school breakfast programs, has been growing steadily<sup>51</sup>. Currently these programs are experiencing the major burden of school food relief and are not capable of addressing the national food insecurity crisis. An estimated 15% of Australian children attend school without food<sup>125</sup>. As a result, food relief programs designed to address food insecurity do not have appropriate scope and resources to address the widespread food inadequacies across Australia<sup>51</sup>. Only 20% of the most food insecure youth in Australia participate in school lunch programs<sup>126</sup>, indicating the food relief sector does not have capacity to reach all children in need, evidencing a need for a reassessment of system structure and funding. While school food provision would not resolve systemic food insecurity, it can improve food access and equity for students. The approach to food relief in Australian schools should therefore be

reconsidered to ensure food insecure students receive equitable support, reducing burdens on charitable organisations and families.

#### **1.5.1.5 Policy**

To influence the food children are consuming during school hours, many jurisdictions implement policy or guidelines; however, these vary greatly across different school food models. A systematic review of stakeholder views on the primary school role in obesity prevention found developing healthy food policy informing the foods available and integrating healthy eating messages within the curriculum were considered important<sup>28</sup>. Furthermore, a literature summary of the impacts of the school food environment in the US found that successful policies consider the whole school food environment to positively impact health and wellbeing<sup>127</sup>.

While policy and guidelines help to inform the foods available during school, these are not without their limitations. In lunchbox models, implementation of policy has had poor parental acceptability and limited impact. An international scoping review of seven studies on packing lunches discussed the influence of school food regulations on parents' lunchbox packing habits<sup>104</sup>. The regulations commonly imposed in schools include healthy eating, allergen, and nude-food (e.g., food without packaging to reduce waste) policies<sup>104</sup>. The results of the review were reflective of those in Australian literature, finding parents were defiant of school rules, describing that food provision was their choice<sup>66, 104</sup>. This was further explored in the contemporary Australian context by Tanner and colleagues<sup>110</sup>, finding school food policies and rules resulted in negative effects for families and children. Parents referred to nude-food and healthy food policies, resulting in lunchbox surveillance by school staff, and the potential for "social backlash" and food guilt for children<sup>110</sup>.

Despite the existence of canteen guidelines, the food provided in Australian canteens is not aligned with recommendations. The guidelines are not well enforced, with no monitoring of guideline implementation contributing to poor adoption and compliance<sup>43</sup>. A study of canteen menus found that of the 24 canteens assessed, none complied with the National Healthy School Canteen Guidelines<sup>43</sup>. Analyses determined 57% and 20% of menu items were classified as amber and red respectively, using the traffic light classifications (i.e., sometimes and unhealthy choices)<sup>43</sup>. A 2017 study concluded that despite government pressure to improve the nutritional value of food sold in Australian canteens, there were little changes in the foods sold over the previous 10 years<sup>43</sup>. Findings of an Australian systematic review also found poor guideline compliance, citing demand from parents and children limited the ability of the canteens to remove red foods (i.e., unhealthy choices) from their menus<sup>59</sup>. Furthermore, a New Zealand study, where a similar school food system is used to Australia, found less than half of 819 participating primary and secondary schools had a written food and nutrition policy<sup>91</sup>. Analyses found there was no significant relationship between having a school food nutrition policy and offering more core food items on food service menus in primary or secondary school canteens, indicating poor policy compliance or lack of influence on food provision<sup>91</sup>.

In school-provided meal models, policy has been posed as having potential to improve healthy food provision, however compliance can be mixed, with historical challenges with implementing and following nutrition guidelines internationally<sup>128</sup>. The greatest benefits from a school-provided meal are achieved when a monitored healthy school food environment is created. Findings of a systematic review and meta-analysis on the effectiveness of school food environment policies on children's dietary behaviours found policy was effective in improving dietary behaviours<sup>129</sup>. Specifically, school-provided meal standards increased fruit intake by 0.76 servings/d, reducing total fat, saturated fat, and sodium<sup>129</sup>. A systematic review of 18 studies found nutrition guidelines for school-provided meals and snacks increased fruit and vegetable availability and reduced total and saturated fat intake<sup>130</sup>. Welker and colleagues<sup>127</sup> identified that school food policies and programs can improve the dietary intake of children, and established policy should strive to increase availability and consumption of healthy foods in school-provided meal programs. This is consistent with a cross-sectional study of data from 2004 and 2011 in English secondary schools, finding the nutritional quality of school-provided meals was notably improved through implementation of guidelines and food policy<sup>131</sup>. Regardless, some school-provided meal models are misaligned with their national dietary guidelines, providing several serves of unhealthy choices<sup>38, 81</sup>. Many UK schools provide several serves of unhealthy choices<sup>79, 89</sup>, suggesting menus may be misaligned with recommendations, and have poor monitoring procedures in place<sup>41</sup>. The lack of alignment with recommendations in school-provided meal models signify additional supports and ongoing monitoring may be required to improve compliance and menu nutritional quality<sup>74</sup>.

#### **1.5.1.6 Summary of school food provision model considerations**

Currently the school food system in Australia is under strain, contributing to interest in school-provided meals as a form of coordinated societal action. School lunchbox and canteen initiatives in Australia have been tried and tested, with limited widespread improvements observed over decades. There is potential to consider a new direction in improving the nutrition of children during school hours, through exploring a school-provided meal system. Peer reviewed international literature reports the benefits of addressing the whole school food environment, including improving food availability<sup>132</sup>. Health promotion initiatives in schools involving exposure and provision of healthy foods have been associated with improvements to dietary intake and supported development of healthy food preferences<sup>114, 129</sup>. Further benefits are achieved when food provision occurs alongside other health promotion initiatives, such as education on the nutrition of food provided<sup>114, 133</sup>. Adopting a multi-faceted approach, such as through a school-provided meal system could contribute to an improvement in the Australian school food environment and improve public health impact. This approach considers the school with a socio-ecological lens, recognising the many considerations that have not been appropriately addressed across previous Australian school food initiatives.

## 1.5.2 School food model transformation efforts internationally

The evidence indicates the potential benefits that can be achieved across a range of sectors, including nutrition, costs, education, attendance and equity, in offering a school-provided meal model in place of lunchbox systems. Several countries have recognised this potential of school-provided meals and experienced limited success of initiatives within lunchbox systems, comparable to Australia. This has contributed to transformation efforts in jurisdictions that have traditionally relied on food provision from home. These transformation efforts exist in New Zealand, Canada, the Netherlands and Denmark, recently adopting or trialling a school-provided meal model<sup>134, 135, 136, 137, 138</sup>. Of the programs that have implemented and evaluated the success of the trial program, there have been measured benefits in nutrition, equality and education, as well as stakeholder acceptability<sup>134, 139</sup>.

New Zealand initiated a government-sponsored healthy school lunch program in 2019, called Ka Ora, Ka Ako, meaning to be satisfied with food and to learn<sup>136, 139</sup>. The program aims to provide lunches to learners in schools who are in need of the greatest support, striving to support development, health and wellbeing, while removing barriers to education participation and achievement<sup>136</sup>. The program has grown since its launch, now servicing 40% of the country's schools. The pilot evaluation found benefits in changing the foods available and consumed by the average primary and intermediate learner, with increased satiety for the learners experiencing the greatest level of disadvantage<sup>139</sup>. Wellbeing was improved, with students experiencing food insecurity having greater gains in mental wellbeing<sup>139</sup>. Food provided is guided by nutrition standards. Ka Ora, Ka Ako has undergone challenges and major changes since its launch, under the responsibility of different government leaders, including recent changes of supply pathways<sup>136</sup>, indicating the need for close consideration of feasibility in model transformation.

Within Canada, the National School Food Program was launched as a result of widespread recognition of the potential impact, stakeholder interest in transformation of the school food system and ongoing research to inform action. This launch led to \$1 billion CAD in funding over five years committed to the program in 2024, to support program establishment and maintenance. Key benefits on the National Government website include that school food programs help to: “*reduce hunger, improve health and learning outcomes, save families money on groceries, support local economies, promote sustainability*” (p.1.)<sup>138</sup>. Canada's School Food Policy was released in 2024, describing the vision for school food programs within Canada, including the guiding principles and objectives to support roll out of the national program<sup>137</sup>. The Coalition for Healthy School Food is the largest school food network in Canada, bringing together organisations and endorsers to advocate for the program, contributing to stakeholder voices guiding the way for school food actions<sup>140</sup>.

While ad hoc school food programs have existed in Canada for decades, no national program or consistent action existed<sup>140</sup>. A systematic review of school food programs in Canada, which

involved comprehensive and multi-strategy programs, found that all programs had a positive influence on children's dietary behaviours<sup>133</sup>. All programs involved food provision, with the potential addition of food-related education or changes to the food environment. The programs that took a comprehensive, multi-strategy approach showed the greatest success in improving children's eating habits<sup>133</sup>. Research strengthened the economic rationale for program investment, outlining the anticipated impacts of a universal free school-provided meal program<sup>115</sup>. Benefits outlined included a return on investment, reduced household budgets, improved economies and employment opportunities, increased women's capacity to participate in the paid workforce, increased education and lifetime earning potential of students, and providing health and food security benefits<sup>115</sup>. This growing evidence indicated the need for consistent, ongoing food provision programs to be implemented to allow for improved multi-sectoral outcomes.

School-provided meal programs are also emerging across other high-income countries. This includes the Healthy School Lunch project in The Netherlands, measuring food and nutrition outcomes of healthy school lunch provision<sup>135</sup>. In Denmark, the OPUS School Meal Study investigated the effects of school-provided meals on intake of food and nutrients<sup>134</sup>. Furthermore, the need for school-provided meal offerings in low or middle income countries is well recognised and described by the World Food Programme, providing an important avenue to ensure children have access to food and their health, development and wellbeing outcomes are optimised<sup>70, 141</sup>. The adoption of school-provided meal programs is fast growing, with international transformation efforts showing promising benefits and high stakeholder acceptance.

### **1.5.3 Australian policy context**

Over the period of this thesis school-provided meals have increasingly featured on government agendas across the eight Australian jurisdictions, fuelled by growing international and local evidence on the interest and potential impacts. This reflects a shift in the Overton policy window of discourse, being the range of ideas that are considered politically acceptable at a time. Such a shift may have been amplified by the international transformations and post COVID-19 societal implications. Increasingly, there is public and political discourse about school-provided meals in Australia, complicated by differing political agendas<sup>105</sup>. Proposed programs often have shifting priorities and lack sufficient evidence on how they will be implemented. The Hungry for Change report was tabled in 2023 in Western Australian Parliament, addressing food insecurity among children, with school-provided meals posed as an avenue to address this<sup>142</sup>. In 2022, the South Australian Commissioner for Children and Young People called for schools to provide free lunches to address the experience of food insecurity<sup>143</sup>. South Australian state government funding currently supports school breakfast and lunch food relief programs<sup>143</sup>. In 2025, a Parliamentary Inquiry commenced into "the prevalence and effectiveness of programs in preschools and schools to ensure children and young people don't go hungry during the day" in South Australia<sup>144</sup>. Further election pledges have been made to implement school-provided meals in different jurisdictions by

both major political parties (Labor in Queensland, 2024; Liberal in Victoria, 2022)<sup>145, 146</sup>. The Australian left-leaning party “The Greens” also pledged for a national free school-provided meals in 2025<sup>147</sup>, as well as within South Australia in 2022, Queensland in 2024 and Western Australia in 2025<sup>148, 149, 150</sup>. Bipartisan support was received for the School Lunch Program received from Labor and Liberal parties within the 2024 Tasmanian state elections, run in partnership with School Food Matters<sup>151</sup>, fuelled by pilot evaluation findings, discussed in 1.5.4. Additionally, government financial support has been provided to programs in the Northern Territory and Australian Capital Territory<sup>152, 153</sup>. As such, there has been a shifting political agenda around school-provided meals. However, policy momentum is inconsistent and vulnerable to political cycles. Thus, while there is currently no clear trajectory for the future of further state/territory-wide or national programs, strengthening the evidence is crucial to ensure that future policy decisions and political agendas are grounded in robust data and aligned with population needs.

#### **1.5.4 Australian school-provided meal pilots**

The public interest within Australia is further demonstrated by the growing prevalence of school-provided lunch trial programs. Such programs have been developed and tested across numerous Australian jurisdictions, demonstrating how a program can be implemented within specific regions, with varied aims and program designs. School Food Matters (previously the Tasmanian Canteen Association) has recognised the potential impact of school-provided meals, leading the introduction of a school-provided meal offering in Tasmanian schools. In 2020 a pilot program in three schools involved certain classrooms of students receiving school-provided meals daily across one term, which were prepared in the schools’ canteen facilities by canteen staff<sup>154</sup>. These meals were provided to children at no cost, with key outcomes assessed at program completion. Results from the pilot program demonstrated that school-provided meals improved child attendance, academic performance and attention, and were accepted by parents and other stakeholders<sup>154</sup>. Parents reported enjoying the program, feeling fewer burdens associated with food provision. As a result of the program success, the pilot was granted further funding from the Tasmanian Government and rolled out across 30 schools in 2022-23<sup>151</sup>, providing free meals to a minimum of one classroom of students for at least one day weekly. This included different school food service models used in different schools, including varied frequency and reach of programs, and food prepared offsite or within a remodelled school facility, including canteens, depending on the school resourcing<sup>151</sup>. The evaluation of the expanded program indicated there was strong support and enthusiasm for the program, with over 250,000 meals provided across 2022 and 2023<sup>151</sup>. Benefits were observed, including reduced food waste, food access, health promotion, food exposure, and improved classroom behaviour<sup>151</sup>. Challenges including catering for allergies and dietary requirements, and implementation difficulties were acknowledged in the evaluation report of the 2022-23 program, with strategies identified to support future improvements<sup>151</sup>. Evaluation findings and strong public



support contributed to further government commitments to continue the program in 2024 and expand to a total of 60 schools in 2025<sup>155</sup>.

In Northern Territory, the School Nutrition Project was introduced to improve school attendance and engagement by providing meals to children in school and provide employment opportunities for local Aboriginal and Torres Strait Islander people<sup>152</sup>. The cost of meals was met by parents through income management contributions and assistance for other costs provided by the Australian Government<sup>156</sup>. A 2017 report described the findings that the School Nutrition Project was perceived as a valuable program and was the main source of food for many of those attending school<sup>152</sup>. The benefits were also found to be equal for all children. Challenges included ensuring parent contributions were made and received to cover the costs, maintaining compliance with the supporting nutrition policy and guidelines and ensuring the program was appropriate for the community<sup>152</sup>.

Individual schools have also introduced a school-provided meal offering, with programs implemented with different purposes and across schools of different socio-economic profiles<sup>5</sup>. This has included expansions of the canteen offering to reach across the entire school or introducing a new food service model. From personal experience collaborating with schools in their introduction to a school-provided meal during PhD candidature, individual schools have cited various reasons, including food education and exposure opportunities, food relief, fostering community connection and wellbeing and a combination of potential benefits. This further demonstrated the multi-sectoral social impact potential from school-provided meals, with benefits typically achieved beyond the primary intended impact. Schools face numerous challenges in developing programs, including establishing a viable funding model, which must be considered in the design of future programs. Additionally, recent growth and increased funding has been committed to food relief programs offering lunches, recognising the need for school food offerings, particularly to address experiences of food insecurity<sup>48</sup>.

These pilot programs in Australia provide examples of how school-provided meals can be feasibly delivered, using a range of different approaches (e.g., canteen transformation or introducing a new model) and food service models (e.g., onsite or offsite preparation). However, the exploration of expanding these programs or introducing school-provided meals across Australia should be a collaborative process alongside key stakeholders, to ensure actions are aligned with stakeholder needs and the broader Australian context, improving acceptability and therefore program success. Additionally, key challenges, including funding models, should be appropriately considered to establish financially sustainable models that can be feasibly implemented in Australian schools.

## 1.6 A SCHOOL-PROVIDED MEAL MODEL FOR AUSTRALIA

Community actions have indicated a growing stakeholder interest in the transformation of the Australian school food system, alongside emerging literature on the benefits of a school food program on children, families, and schools<sup>151, 152, 156</sup>. The population interest is further evidenced by the growing demand for food relief in Australian schools<sup>46, 51</sup> and increasing election promises<sup>145, 146, 147, 148, 149</sup>. Therefore, there is a growing movement advocating for the re-imagining the Australian school food model<sup>142, 151</sup>. However, there is no clear roadmap to such a transformation in Australia, with research needed to understand the feasibility and acceptability of transforming the school food service.

### 1.6.1 Australian stakeholder perspectives

Understanding stakeholder perspectives is valuable in informing all public health initiatives<sup>157</sup>. In the Australian school food system, a diverse set of stakeholders play influential roles in the foods available in schools, including parents, children, school staff and communities. These stakeholders all play a critical role in program acceptability and feasibility. While evidence is limited, few studies to date have indicated stakeholders are interested in the potential introduction of a school-provided meal program in Australia, as an alternative to the current school food system. A 2020 study engaged stakeholders across the education, health services, social services, non-government/not for profit and food industry, service or retail sectors in workshops to discuss alternative food provision models in Australian schools<sup>158</sup>. These stakeholders identified and ranked school lunch prepared onsite as having the highest impact and achievability of all identified food provision models<sup>158</sup>. The stakeholders described this model as food that is prepared onsite at the school by a team of kitchen staff/cooks, consumed by children in a sit-down meal<sup>158</sup>. Consultation with all stakeholders, including students and parents, was identified as a facilitator to the potential school-provided meal offering<sup>158</sup>.

Children and parents are key stakeholders in the school food system, as end-users of the system. Additionally, parents are one of the largest stakeholder groups in school food systems, playing a central role as the primary food providers in Australia, including financially resourcing current school food provision. Particularly, parental responsibility is substantial for children in primary school, who have less food autonomy for deciding on, purchasing or preparing their own foods, compared to students in secondary school. Capturing perspectives of parents therefore allows them to consider the needs and preferences of their children. Although parent influence in initiating systematic school food change is limited, they are influential in the success of school food initiatives, with parent acceptability influencing program uptake. Therefore, parent perspectives should be closely considered in school food initiatives.

Parent interest in school-provided meal systems has been described in three Australian studies, with interest varying from 53-86% depending on how the system is described<sup>159, 160, 161</sup>. Interest in

school-provided meals was associated with socio-demographic characteristics in one study, including higher interest from non-English-speaking parents, and parents with a lower education level<sup>161</sup>. Interest was cited by parents as being due to convenience, creating a positive school food environment, variability in food provided and food security<sup>159</sup>. Parent concerns in another study included health concerns, responsibility, equity not equality, preferences and conditions, and cost<sup>161</sup>. Furthermore, the final study found parents from Victoria, Australia expected meals to be healthy, made from whole food, catering to dietary and cultural needs, and accompanied by sufficient eating time and were most commonly willing to pay \$5-\$6 per child per day, or less<sup>160</sup>.

While these studies indicate Australian parents are interested in a potential school-provided meal model, these studies are not without limitations. This existing evidence does not comprehensively describe the reasons for parent interest, including what a system would need to look offer to align with the different values of all Australian parents. Particularly, parent values are not well explored, including willingness to pay, beyond small, unrepresentative samples, meaning the current evidence is insufficient to inform the acceptability of a transformation to school food and thus contribute to the design of a system. The studies are limited by the adopted methods, with survey questions exploring preferences at face value, which may not consider unconscious values, or lacking comprehensive understanding of the reasons for parent interest. Varied question framing also prevents an understanding of what features of a system may increase or decrease parent interest (e.g., free and universal meals may not be desired by all parents). Finally, while studies indicate parents of different socio-demographics have different interests in a potential school-provided meal model, there is limited evidence to guide exactly how a system could align with the different needs across socio-demographics. As such, while the emerging evidence demonstrates interest, within the context of a growing demand and potential benefits, further evidence is needed to understand how an acceptable school-provided meal could be offered within Australia.

## 1.7 CHAPTER SUMMARY AND KNOWLEDGE GAPS

Health promotion efforts are needed in Australia to impactfully improve the health, growth and development outcomes of children. This chapter found that the dietary intake of Australian children is misaligned with guidelines, across the whole day and during school hours. School is a key avenue for health promotion, with reach to children across Australia in an influential education setting; however, previous tried and tested efforts have not successfully utilised this setting and improved children's health and development outcomes. As such, action needs to think outside the box, considering more comprehensive changes to the school food system to address the challenges and optimise the health promotion opportunities. While greater outcomes can be achieved with offering a school-provided meal model, over a lunchbox and canteen system, the acceptability and feasibility of such a model has not been well explored in the Australian context.

School-provided meal pilot programs have shown positive preliminary outcomes, aligned with international evidence on school-provided meal benefits. However, the perspectives of key stakeholders, including parents, on adopting a school-provided meal system across Australia are still not well understood. Understanding the interest and perspectives of parents as consumers and stakeholders is critical in informing the acceptability and success of school food initiatives, particularly to maintain elements of parent autonomy. The limited literature discussing Australian stakeholder perspectives on school-provided meals suggests there is an appetite for introduction of such a program, depending on how it is designed and delivered. However, parent interests and values in a transformed school food system are not comprehensively understood, with limited studies focusing on parents as a key stakeholder population or comprehensively exploring parent values beyond preliminary interest in a program. As a result, parent perspectives cannot be adequately integrated into the potential design of a system, with the limited comprehensive evidence contributing to an inadequate understanding of parent values and perspectives, critical in acceptability. Therefore, this research sought to investigate the potential transformation of the Australian school food system and fill initial knowledge gaps, needed to inform the design of an acceptable and feasible school-provided meal system.

In understanding perspectives across the Australian parent population, it is critical to recognise the potential of differing priorities across socio-demographics to achieve an equitable system. While initial findings suggest varied perspectives or experiences across socio-demographic groups, little evidence has comprehensively explored how a system would need to differ to meet the needs of the diverse Australian parent population. Additionally, the limited evidence has focused on small, unrepresentative samples, which may not reflect the differing needs of the diverse Australian population and understand the various challenges faced within a school food system. Understanding how parent needs may differ will enable the design of a parent accepted school-provided meal system. Creating new knowledge will reduce this evidence gap, recognising differing family needs across socio-demographic groups and thus ensuring the model strives to reduce inequities influencing Australian children, particularly for nutrition, education and attendance.

## 1.8 THESIS AIM AND OBJECTIVES

The purpose of this thesis is to amplify parent voices in the growing school-provided meal conversations, ensuring their perspectives are used to inform action and considered in system design. This thesis therefore generates an original contribution to knowledge in understanding the perspectives of parents, as key stakeholders, in a school food system. Thesis studies were designed and conducted iteratively, in response to previous research findings, to generate a comprehensive and complementary body of research.

While secondary schools are an important focus for future research, it is important to conduct research with children and young people themselves to understand the potential in this setting.

Additionally, shifts in school structure can occur across primary and secondary schools, meaning the different food provision setting within secondary schools could not be accurately captured within the scope of this thesis. Therefore, primary schools are the sole focus of this thesis, being a key stage for habit development where parents are responsible as key food provider and school food system stakeholder.

To ensure the findings of this thesis are realistic and can be feasibly applied to inform school food initiatives, a broader socio-ecological lens is applied. This recognises the various considerations for the Australian context, within different schools, for individual families and for students, noting the feasibility challenges faced in pilot programs. A socio-ecological lens considers the complexity of food provision, and the multi-faceted considerations needed in a school-provided meal system. Additionally, an equity lens is applied throughout to inform methods and analyses, including considering perspectives across socio-demographic contexts such as household income, socio-economic position, living location, education and employment status.

Overall Thesis Aim: To examine parent/caregiver perspectives of a school-provided meal system in the Australian context.

To achieve the thesis aim there are two overarching research questions:

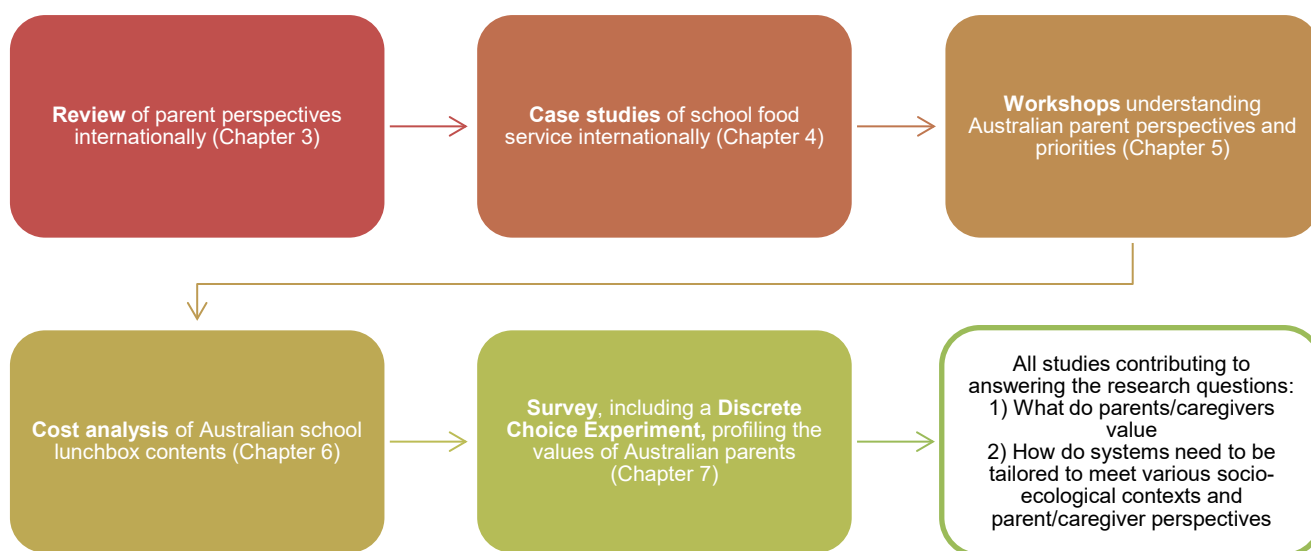
1. What do parents/caregivers value in an Australian school-provided meal system?
2. How do school-provided meal systems need to be tailored to meet various socio-ecological contexts and parent/caregiver perspectives?

## CHAPTER 2. THEORETICAL FRAMEWORKS

This chapter provides detailed summaries of the theoretical frameworks that guide this PhD project. This thesis applied two theoretical frameworks to inform study methods. These were the socio-ecological framework<sup>16</sup> and the Consumer and Community Engagement Framework<sup>162</sup>, used in combination to consider the complexity of school food for parents. The Consumer and Community Engagement Framework was also systematically applied through the guidance of a school food advisory group, with the conceptualisation and methods described. Additionally, this chapter provides a description of the thesis structure and methods used to address the thesis aim and research questions.

### 2.1 OVERVIEW OF THESIS STRUCTURE AND METHODS

The five studies included in this thesis to address the thesis aim and two research questions are informed by the overarching frameworks. Studies each utilised qualitative, quantitative and multi-methods to address individual research aims, being analysed and interpreted as stand-alone pieces of research, each forming a unique contribution to the literature. Studies therefore include an introduction and discussion, contextualising relevant content to the study aims. Additionally, each study iteratively informs the methods and interpretations of the consecutive studies. The studies included in this thesis (Figure 2-1) are reported in Chapters 3-7 and consist of a literature review, observation of school food service systems internationally using case studies, Nominal Group Technique workshops, analyses of lunchbox costs, and a survey, including a Discrete Choice Experiment method. Each study chapter also contains a chapter context section, positioning the research within the thesis. Findings across all studies are all collated and discussed within the context of current literature to address the thesis aim in Chapter 8.



**Figure 2-1: Summary of thesis studies, that in combination address the overall thesis aim**

## **Researcher positionality**

I am a white female English speaker with no children; therefore, did not approach this research with personal experience of parenting or cultural adversity. My professional background influencing the research approach includes experience in public health and dietetics, conduct of research exploring school food in Australia and training in community nutrition, hospitality and food service.

In relevant chapters (i.e., when qualitative methods are used), positionality has been stated and the strategies used to mitigate the impacts of personal positioning have been described. These statements also include any co-authors who were involved in the research, as their perspectives on research conduct and interpretation may influence the work presented in this thesis.

## **2.2 THEORETICAL FRAMEWORKS**

### **2.2.1 Socio-ecological framework for nutrition and physical activity**

Many different models are used to understand the complex influences on children's food intake. One method of understanding and organising these factors is the socio-ecological framework for nutrition and physical activity (Figure 2-2)<sup>16</sup>. This framework posits that the dietary intake of children is at the centre of influences, ranging from their individual dietary requirements to the food availability within their country. This framework provides a model to organise the complex and interrelated factors that influence food provision and dietary behaviours for Australian children<sup>16</sup>.

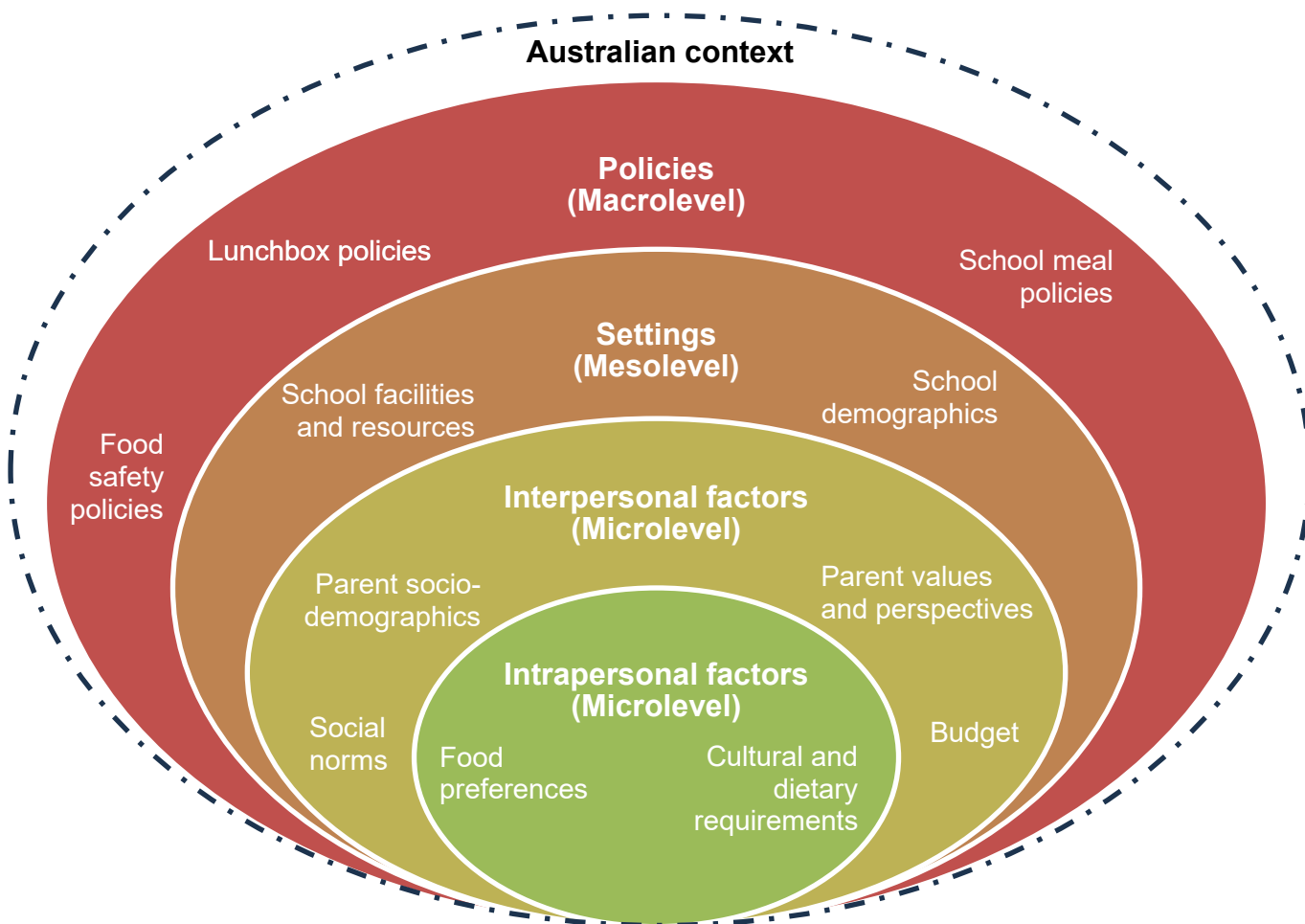
The socio-ecological framework for nutrition and physical activity suggests the benefit of considering initiatives in the broader environment, such as the meso- and macro- levels, to create the greatest opportunity for behaviour change. Factors on the settings level (e.g., schools, sporting facilities), which are informed by policy and country contexts, are influenced in a bi-directional relationship by factors on the intrapersonal (e.g., knowledge, gender) and interpersonal levels (e.g., family situation, caregivers). In the context of this thesis, this demonstrates the large reach of school-based initiatives on the settings level, with opportunity for widespread impact on a population. However, the intra- and inter-personal levels for children and parents must be factored into the initiative design to ensure population suitability and impact. Therefore, this framework acknowledges the potential of considering the implementation of school food initiatives on a settings basis, while recognising the need to provide support and consideration across each level to optimise user acceptability<sup>16</sup>.

The socio-ecological framework has been successfully used for understanding food related barriers and facilitators within the school setting, considering the influences on individual behaviour and positioning children within the school environment<sup>163</sup>. Examples of this include a scoping review of teacher perspectives on food and nutrition education in primary schools, mapped to the

socio-ecological framework<sup>164</sup>, case studies exploring school food programs across different jurisdictions<sup>165</sup> and a systematic review describing the factors influencing school-provided meal consumption on the different socio-ecological levels<sup>166</sup>. Previous school food initiatives commonly used in Australia, such as parent education and rules around appropriate lunchbox foods, have not adequately considered all levels within the socio-ecological framework<sup>165</sup>. As such, these settings-based initiatives lacked consideration of the differences between families that impact how the program may be experienced or lack adequate policy support to ensure the initiative is maintained and regulated; this contributes to a lower uptake, acceptability and impact of the initiative. Moore and colleagues<sup>165</sup> concluded that socio-ecological thinking should be applied to support comprehensive initiatives addressing the dietary intake of school aged children. Considering the factors across the socio-ecological levels and considering these within the initiative design, including through strategies such as stakeholder consolidation, can increase effectiveness, acceptability, adoption and maintenance<sup>165</sup>.

As described by Cohen and colleagues<sup>166</sup>, intake of school-provided meals is influenced by multiple intersecting factors across socio-ecological levels. The influence of these factors indicates that, for a school-provided meal program to be successful, a system cannot be uniform, requiring tailoring to meet the varying needs of students, parents, schools, and countries. A socio-ecological lens is therefore applied across this thesis, to examine the differences and considerations needed across the different levels and contexts to understand an acceptable and feasible school-provided meal system.





**Figure 2-2: Socio-ecological framework for nutrition and physical activity, including key influences on school food intake identified in the literature**

Framework adapted from von Philipsborn, Stratil<sup>16</sup> and the Center for Disease Control and Prevention (CDC)<sup>167</sup>

### 2.2.2 Consumer and Community Engagement Framework for Research

To conduct research that is consumer-centred, it is best research practice to engage stakeholders<sup>157</sup>. This includes engaging stakeholders to identify and prioritise needs and inform research directions<sup>157</sup>. Therefore, to ensure stakeholder consultation was implemented throughout all stages of this thesis, research was informed by the Consumer and Community Engagement Framework for Research, developed by New South Wales Health<sup>162</sup>.

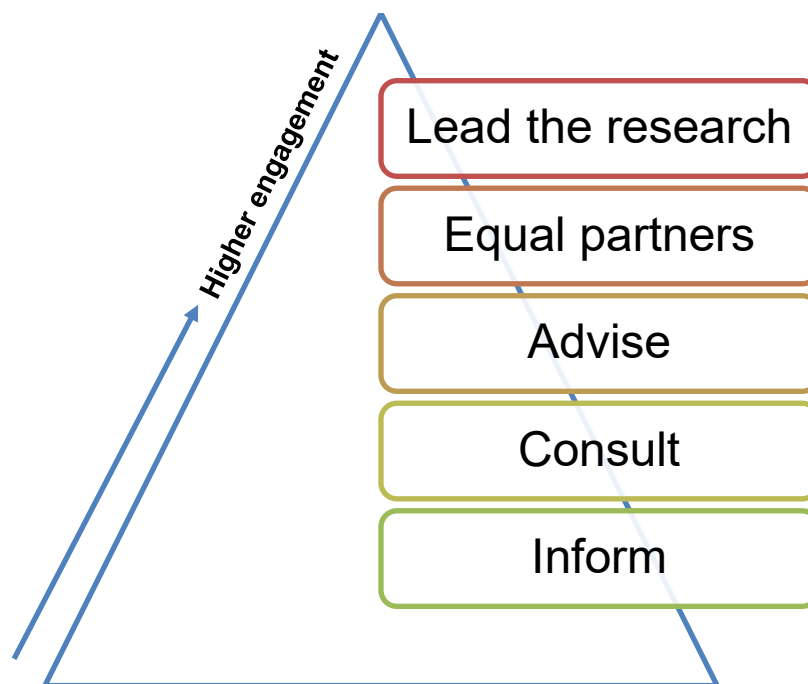
This framework was developed for researchers to provide guidance for engaging with consumers and community representatives. The framework allows research to be conducted in collaboration with consumers, rather than for consumers, using lived experience to inform the research methods and study intentions. This framework is aligned with national guidance on engaging stakeholders in research<sup>168</sup>. While other frameworks describe similar processes, this framework was considered

the most aligned with the thesis aim and was the most relevant framework at thesis commencement.

Use of a consumer engagement framework in this project strived to actively engage consumers in a school food system, with collaboration used to shape priorities. Engagement with consumers allowed for their voice to be heard, and ensured the research conducted was relevant to the Australian school community and used co-design principles to understand the needs for a potential school-provided meal system in Australia. This framework also allowed different parent needs to be considered, applying an equity lens to the research conduct.

Several levels of engagement of this framework (Figure 2-3) were adopted throughout study stages in this thesis, as aligned with recommendations<sup>162</sup>. Consumers advised on best practice for acceptable, feasible and realistic research methods and findings; this stage ensured consumer concerns and issues were directly considered and reflected in research, in collaboration with the researcher. To achieve this, a range of consumers were recruited to participate in an advisory group of school food stakeholders to inform the research, described below.

Parents were also consulted on their perspectives as participants in the data collection phases. Parents contributed to research findings, informing a prospective school-provided meal model. These included studies described in Chapters 3, 5 and 7, which are used to understand the parent needs in a school food system and enable recommendations for policymakers and guiding future research.



**Figure 2-3: Levels of Engagement identified in the Consumer and Community Engagement Framework for Research**

Levels of engagement figure adapted from New South Wales Health<sup>162</sup>

Throughout this research the principles of the 'consult' level were applied to engage with a range of other stakeholders of school food systems, with stakeholders informed by the stakeholder mapping process (Table 2-1). Informal engagement with stakeholders is a valuable strategy to remain in touch with stakeholder considerations, needs and priorities<sup>162</sup>. This can ensure that the research conducted aligns with the needs of the broader community and will fill an appropriate research gap. This engagement included participation in the Home Economics Institute of Australia South Australia Branch Committee, engaging with Home Economics teachers across South Australia regularly and across Australia at national events. Additionally, supporting local schools with their school-provided meal pilot programs and communicating with teachers, chefs, students and parents has provided an opportunity to see a program in action and understand the feasibility and key considerations for those stakeholders that needed to be addressed in the research. International and interstate visits, local meetings and conferences also allowed for engagement with researchers, school food program staff, government officials, non-government organisation staff and food system staff. Key activities relating to the thesis are identified in Appendix 9.1.

#### **2.2.2.1 *Advisory group formation and utilisation***

##### **Rationale**

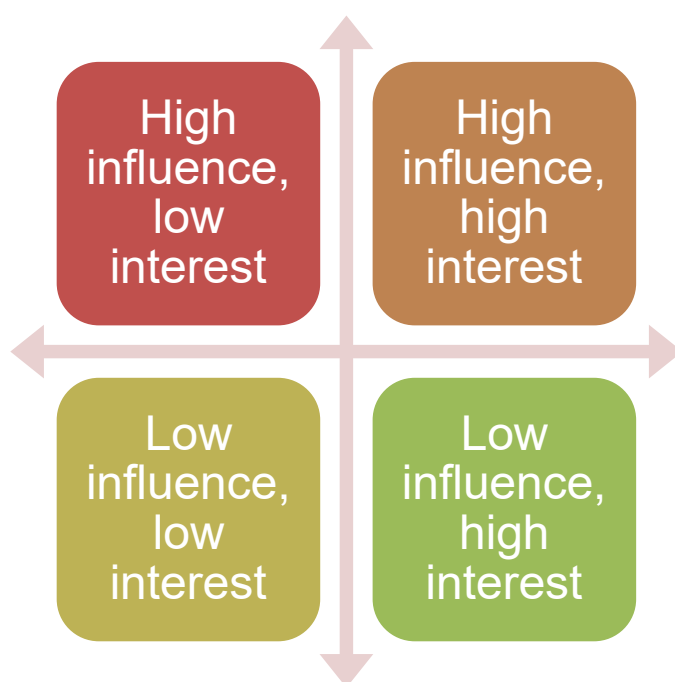
Formation of an advisory group of school food stakeholders, using the Consumer and Community Engagement Framework for Research, allowed consumer perspectives to directly inform this thesis<sup>162</sup>. Forming an advisory group involves engaging a small group of consumers for discussion of research methods, results and outcomes. Advisory groups are a feasible, cost-effective method of achieving collaboration and consultation, aligned with the engagement framework<sup>162</sup>. Furthermore, this advisory group provided alternative perspectives that may not be otherwise captured or understood by the researchers, allowing me to recognise the influence of my positioning on the research. As a result, the research used lived experience to inform the methods and study intentions, communication and result interpretation, and ensured the research spoke to a feasible and realistic potential school-provided meal model<sup>162, 169</sup>.

##### **Stakeholder mapping**

Best practice recommendations suggest initially mapping stakeholders to identify the consumers to include in engagement<sup>162</sup>. For school food in Australia, no systematic stakeholder mapping was available to describe the interest and influence of stakeholders over diverse sectors, necessary to ensure the role of key consumers is well understood. Completing stakeholder mapping was therefore considered critical in enacting the Consumer and Community Engagement Framework for Research.

The Community Tool Box framework for stakeholder mapping was used to understand stakeholder roles, influence and interest (Figure 2-4)<sup>170</sup>. Interest meaning it would be of interest to them as a

stakeholder if school food systems changed, with potential for positive or negative interest. Common reasons for stakeholder interest in an initiative includes economics, social change, time, work and environment. Identifying and involving stakeholders can play a considerable role in the success of an effort. Through engaging stakeholders and the nature of their interest, it provides opportunity to address their concerns and enables demonstration of the potential benefits of an effort.



**Figure 2-4 Stakeholder mapping framework**

Adapted from The Community Tool Box by the Center for Community Health and Development<sup>170</sup>

Stakeholder categories are used to describe the role of the stakeholder within the system<sup>171</sup>. The categories used for this mapping included recipients, supporters, funders/commissioners/endorsers, deliverers, managers and experts/researchers (Table 2-1), informed by previous mapping projects<sup>171</sup>. Mapping considered international and local literature, contextualised within the Australian school food system<sup>5</sup>. The mapping indicated numerous influential stakeholders who should be consulted in the project. While many stakeholders would be interested in an action, the direction of interest of many stakeholders is unknown, including influential stakeholders, demonstrating a need for engagement. Particularly, stakeholders within the intrapersonal, interpersonal and settings levels are key for consultation as recipients, supporters, deliverers and managers, thus being integral in a potential school-provided meal model and playing a role in system functioning, adoption and acceptability.

**Table 2-1: Australian school food stakeholder mapping**

<b>Stakeholder role</b>	<b>Sector</b>	<b>Stakeholder category</b>	<b>Level of interest</b> (high/low/unclear)	<b>Level of influence</b> (high/low/unclear)
<b>Intrapersonal</b>				
Students (primary school)	Retail and consumer	Recipient	High	Low
Students (secondary school)	Retail and consumer	Recipient	High	High
<b>Interpersonal</b>				
Parents/caregivers (primary school)	Retail and consumer	Supporter	High	High
Parents/caregivers (secondary school)	Retail and consumer	Supporter	High	High
<b>Settings (school)</b>				
Teachers	Education and Training	Deliverer	High	Low
Principals	Education and Training	Manager	High	High
School board members	Education and Training	Manager	High	High
Donors to Schools	Retail and consumer	Funder / Commissioner/ Endorser	Unclear	High
Canteen staff / school boarding kitchen staff	Accommodation and food services	Deliverer	High	Low
Canteen associations	Accommodation and food services	Manager	High	High
Catering providers/hospitality	Accommodation and food services	Deliverer	High	Low
Charities	Social services	Funder / Commissioner/ Endorser	Unclear	Unclear
Charitable food/education programs	Education and Training	Deliverer	High	High
Private food/education programs	Education and Training	Deliverer	High	Low
<b>Policy (food supply and system)</b>				
Food growers	Agriculture	Deliverer	Unclear	Low
Food suppliers/wholesales	Wholesale trade	Deliverer	Unclear	Low
Food retailers	Retail and consumer	Deliverer	Unclear	Low
Non-government organisations	Social services			
Health agencies	Health care and social assistance	Funder / Commissioner/ Endorser	Unclear	High
Environmental agencies	Other services	Funder / Commissioner/ Endorser	Unclear	High
Health professionals/dietitians	Health care and social assistance	Expert / Researcher	High	Low
Researchers	Professional, Scientific and Technical Services	Expert / Researcher	High	Low
International health bodies	Professional, Scientific and Technical Services	Expert / Researcher	High	High
<b>Policy (Australian Government)</b>				
Department of Health	Public Administration and Safety	Funder / Commissioner/ Endorser	Unclear	High
Department of Education, Skills and Employment	Public Administration and Safety	Funder / Commissioner/ Endorser	Unclear	High
Department of Social Services	Public Administration and Safety	Funder / Commissioner/ Endorser	Unclear	High
Department of Industry, Science, Energy and Resources	Public Administration and Safety			

<b>Stakeholder role</b>	<b>Sector</b>	<b>Stakeholder category</b>	<b>Level of interest</b> (high/low/unclear)	<b>Level of influence</b> (high/low/unclear)
Australian Institute of Health and Welfare	Public Administration and Safety	Funder / Commissioner/ Endorser	Unclear	High
Services Australia	Public Administration and Safety	Funder / Commissioner/ Endorser	Unclear	High
Food Standards Australia New Zealand	Public Administration and Safety	Deliverer		
<b>Policy (State and Territory Government)</b>				
Departments of Health	Public Administration and Safety	Funder / Commissioner/ Endorser	Unclear	High
Departments of/for Education	Public Administration and Safety	Funder / Commissioner/ Endorser	Unclear	High
Department of Human Services/ Department of Families (SA), Fairness and Housing (Vic) etc.	Public Administration and Safety	Funder / Commissioner/ Endorser	Unclear	High
<b>Policy (Local Government)</b>	Public Administration and Safety	Funder / Commissioner/ Endorser	Unclear	High

Stakeholders are mapped according to the socio-ecological levels

Level of interest and influence informed by the Community Tool Box framework for stakeholder mapping (Figure 2-4)<sup>170</sup>

## Advisory group formation

The stakeholder mapping process identified parents/caregivers, teachers, canteen/tuckshop employees/volunteers, school staff, food relief providers and school principals as key consumers who could be included in this advisory group. Advisory group members could represent multiple stakeholder groups (e.g., parent/caregiver and teacher) and therefore provide valuable perspectives from a range of relevant experiences. The recruitment process aimed to identify a range of stakeholders from these groups, including stakeholders of diverse socio-demographic backgrounds, to capture a range of experiences. Stakeholders from these groups were recruited through a flyer distributed on social media<sup>172</sup>. Members could be included from across Australia, enabled by the virtual nature of the meetings. Recruitment also aimed to identify and exclude members with a nutrition background or research experience, to provide a range of experiences different from that of the PhD candidate. Best practice suggests two or more members, to ensure a range of perspectives are captured and allow members to feel comfortable and facilitate discussion<sup>162</sup>. Three members were therefore recruited, accounting for non-attendance.

Interested stakeholders completed an online questionnaire advertised via Facebook™ where they identified their reasons for interest and role/previous roles. From these responses, a diverse range of key respondents were identified, which allowed for a range of stakeholders from diverse living locations. This was followed by a phone call discussion, where the purpose of the advisory group and thesis aim were explained in further detail and respondent role further investigated.

Stakeholders with various relevant experiences, who were willing and eligible were then welcomed

to the advisory group. Over the duration of the PhD, one participant withdrew from the advisory group and a new member was recruited using the same process.

### **Advisory group utilisation**

The members of the advisory group were engaged through virtual meetings and email communications to consult on the PhD project. The initial meeting was organised with all members, prior to the confirmation of candidature/proposal submission, to consult on the project methods and plans. This played a key role in determining the age of children considered in this thesis. Further meetings occurred across key data analysis/planning stages of the thesis, used to inform methods and ensure the study objectives are realistic, feasible and are of interest to the consumers. At the beginning of each chapter a brief summary is provided on how the advisors were consulted and how their input was integrated into the study.

Prior to all meetings an agenda was distributed, including considerations for the members to prepare for the meeting. This included a summary of what has occurred since the previous meeting, acting as an engaging and broad update. The meetings were hosted by the PhD candidate, who ensured the meetings remained on time and all discussion points are covered. If members had additional points to add following the meeting, they were invited to share any additional comments via email, which were considered alongside the meeting content. Following all meetings, members were reimbursed for their time and in acknowledgement of their expertise, aligned with university recommendations, including preparation time for the meeting.

## **CHAPTER 3. GLOBAL PARENT PERSPECTIVES ON SCHOOL FOOD: A MIXED PAPERS NARRATIVE REVIEW**

### **3.1 CHAPTER CONTEXT**

This chapter describes a narrative review of international literature, exploring parent perspectives on school food provision models. This study was conducted following identification of an evidence gap, with a lack of reviews identifying and synthesising what parents think about school food internationally. Therefore, this study strived to generate new knowledge, understanding the important features of school food systems and examining parent perspectives of these. This comprehensive study using a narrative review approach and systematic search enabled a broad understanding of the parent perspective across different school food provision models internationally, including school-provided meals, lunchboxes and canteens. This provided key foundational knowledge for the consecutive thesis studies, particularly understanding the features of consideration to parents.

The advisory group of school food stakeholders provided input on the interpretation of the findings. In an advisory group meeting, the members contributed to interpretation of the preliminary list of features, assisting to define the features and ensuring phrasing was appropriate for a range of stakeholders to understand. Key results were presented to advisory group members for open discussion. The findings of interest helped to shape the key points discussed within this chapter, ensuring the findings reflected the perspectives of parents.

A version of this chapter has been peer-reviewed and published (Appendix 9.2) in *Nutrition & Dietetics*<sup>173</sup>. This chapter was used to prepare the publication, therefore there is direct overlap in content and phrasing. The chapter and publication work were conceptualised and led by the PhD candidate, who was responsible for the research design, data analysis and writing. Supervision from PhD supervisors, including intellectual guidance and analysis support contributed <10% of work conducted and are co-authors on the publication.



## 3.2 CHAPTER ABSTRACT

### **Purpose**

The way food is provided in schools internationally varies greatly, with impacts on child health, growth, development, education, knowledge and nutrition outcomes. What parents think about school food internationally is not well understood. This review synthesised what parents/caregivers identify as the key features of school food provision models and their perspectives of these programs globally.

### **Methods**

A mixed papers review was undertaken with a systematic search and screening of three databases. Eligible studies captured parents/caregiver perspectives across all school food models. Study findings were extracted using Bayesian methods to translate quantitative findings into qualitative data. Data was deductively categorised to identify features of school food, and separately themed to identify parent perspectives.

### **Findings**

Twenty-six eligible studies were identified from 11 countries. Fifteen features were identified, including cost, time, effort and convenience, child preferences, nutrition, policy and messaging, eating environment and food education. Parent perspective themes were: child is the priority, lunchbox procurement, preparation and provision is challenging, school-provided meals have strengths and limitations, and parents acknowledge they are central to feeding. An overarching theme was that compromises must be made to meet the needs of family members, when parents make decisions on school food.

### **Conclusions**

This review found that globally parents perceive benefits and challenges of school food, regardless of provision model, with a range of features that influence parent acceptability. Considering parent perspectives when developing or changing school food provision models is likely to increase caregiver acceptability, supporting children to engage with health promotion efforts.

## 3.3 INTRODUCTION

Food choices are established during childhood and adolescence and play a role in supporting growth, health and development<sup>9</sup>. Schools create a unique health promotion setting, with reach to most children internationally regardless of socio-economic and cultural circumstance, spanning key developmental years<sup>20</sup>. The opportunity for health promotion is facilitated by school being a key setting where children eat and can learn about food. The importance of schools in health promotion has been identified by school stakeholders<sup>28</sup>. Schools also have potential to act as a social safety

net, ensuring all children have equitable access to nutritious food. The potential of schools has been recognised in previous initiatives, utilising this setting to influence children's food behaviours and knowledge<sup>29, 30, 31, 32, 33</sup>. Food availability is influential on the formation of dietary habits<sup>73</sup>, with healthy food exposure and provision during school being associated with improvements to dietary intake and healthy food preferences<sup>114, 129</sup>. Furthermore, implementing other health promotion initiatives alongside food provision can optimise the initiative success, such as embedding relevant nutrition education within the curriculum<sup>114, 133</sup>.

Internationally, different provision models exist for providing food to children during school hours. The most common models include home packed, school canteen, school-provided, or a combination of these models, all of which create different school food environments and influence outcomes for children's health, knowledge and development<sup>41, 71, 126, 133</sup>. A home packed model relies on food being prepared for the child at home and brought to school. Food provided in a home packed model is often referred to as a 'lunchbox' or 'packed lunch'. A lunchbox model places responsibility on parents to purchase and pay for suitable food, and packing food, or ensuring food is packed by the child<sup>174, 175</sup>. This model enables parents to have control over the foods available to the child during school, with ability to cater to food preferences and allergies<sup>176</sup>. Some schools that use a lunchbox model also offer options for purchase from a canteen/tuckshop or similar catering facility<sup>71</sup>. These offerings can be ad-hoc and presence varies greatly between schools, therefore have been classified separately to school-provided meal models. School-provided meal models, which offer children a meal each school day, exist in many countries with the aim of reducing incidence of food insecurity and acting as a food provision safety net<sup>177</sup>. School-provided meal models are widely recognised as beneficial in improving nutrition and reducing incidence of food insecurity by international organisations, including the World Health Organisation, World Food Program and the School Meals Coalition<sup>20, 72</sup>.

A school-provided meal model can be designed to meet the needs of schools, nutrition guidelines and families in a financially viable/sustainable way<sup>71, 178</sup>. This includes varying features of school-provided meal models (e.g., optional or universal school-provided meals), integration with classroom health education and sources of funding (e.g., parent paid, government funded, charitable organisation funded)<sup>71</sup>, which can influence program participation, sustainability and impact. Increasingly, countries such as Australia, Canada and New Zealand, which traditionally relied on a lunchbox model, have been exploring and piloting transitions to adopt a school-provided meal model<sup>5, 137, 151, 179</sup>. These transitions have been driven in part by the challenges experienced by parents, with an increasing presence of mothers engaged in the workforce and the rising cost of living resulting in limited time, money and increased burden of packing the lunchbox.

While school food provision models differ in which stakeholder is responsible, parents are one of the largest stakeholder groups in school food systems, acting as key decision makers<sup>162</sup>. While children act as the beneficiary of the school food system, consuming school food, parents influence

this experience through decisions on meal participation, food provision and funding meal expenses. However, little is currently known about the aspects most important to parents across varied school food models. Limited previous reviews have focused on lunchbox or school-provided meal models in isolation<sup>104</sup>, with no reviews discussing international parent perspectives across a range of school food models, including the perspectives of parents on a potential shift from a lunchbox model to a school-provided meal model.

To ensure school food systems are appropriately tailored to the needs of parents as food decision makers and best supporting children's health and development, parent voices must be heard. Particularly, understanding the features of school food systems that are important to parents can help guide food service staff, practitioners and policy makers on the key components to create an acceptable system. Pinpointing these important features can inform the critical co-design points to meet the needs of families when undergoing improvements or transitions to school food services. Further, broadly understanding parent perspectives, particularly by exploring parent experiences and views on school food internationally, provides valuable insight into the complex influences on parent acceptability. For regions exploring a transition between food provision models, such as Australia, these perspectives can be used to guide consumer-informed programs. Therefore, the aim of this review was to identify features of importance to parents across school food provision models and their perspectives relating to school food. Capturing the review questions: What do parents identify as the key features of school food provision models? And what are parents' perspectives of school food?

### 3.4 METHODS

#### 3.4.1 Study design and methodology

A narrative review using a systematic search was selected as it provides scope to identify and synthesise what parents think about school food, including across different school food provision models, and what features of school food models they consider important. A mixed papers review method was used to capture a wide range of research designs, including qualitative, quantitative and mixed-methods papers<sup>180</sup>. This involved use of a convergent integrated methodological approach, involving data transformation, to combine quantitative and qualitative data aligned with JBI Manual for Evidence Synthesis 2024<sup>181</sup>. Diverse evidence was therefore eligible for inclusion, maximising the findings in comparison with single method reviews<sup>182</sup>. Although this study employs systematic search methods and reporting, it is framed as a narrative review due to the narrative synthesis approach. This framing is further justified by methodological limitations, including the review's divergence from Cochrane recommendations for systematic reviews<sup>183</sup>, including the use of a single screener and lack of prior protocol registration, introducing potential bias. The reporting of this study is informed by Preferred Reporting Items for Systematic reviews and Meta-Analyses

reporting guidelines where possible (PRISMA) (See Appendix, Table 9-1)<sup>184</sup>. Ethics approval was not required for this review. The Consumer and Community Engagement Framework for Research guided this review by valuing the perspectives of parents as key stakeholders<sup>162</sup>, in addition to the socio-ecological framework for nutrition and physical activity that recognises the reciprocal influence of systems on perspectives and nutrition of children and their families<sup>16</sup>.

### **3.4.2 Positionality statement**

The research team involved in this study included expertise in public health (PhD candidate, BJJ, RKG), school food (PhD candidate, BJJ, RKG), and experience in the Australian primary school system as a parent (RKG). The research team met regularly to support the PhD candidate to engage in reflexive practice, collaboratively review each research stage, and use consensus methods to mitigate the influence of researcher biases. All research was also conducted in consultation with the advisory group of school food stakeholders to ensure research conduct was aligned with population needs. The advisory group contributed to the naming and defining of features, as well as synthesising key areas of interest for discussion.

### **3.4.3 Search strategy**

The search terms used were developed through identification of key words in relevant literature and test searching. The searches aimed to identify literature on parent perspectives and the cost of school food to families internationally. Papers focusing on school food cost were identified to inform findings described in Chapter 6, therefore were excluded during screening and results are not captured in this chapter.

A systematic search was performed on 23<sup>rd</sup> May 2022, in Scopus, Web of Science and PubMed databases, following a series of test searches. The search was repeated on 23<sup>rd</sup> Jan 2024 to capture recent publications. No date limits were applied in the search to capture all available literature; however, studies older than 25 years were excluded in the screening process, to capture more contemporary perspectives. See Table 3-1 for example search strategy.

**Table 3-1: Logic grid of search terms and strategy**

<b>School food</b>		<b>(Cost)</b>		<b>(Parents)</b>		<b>Attributes)</b>
School food Lunchbox Canteen School lunch Packed lunch Packed food	AND	Cost Price Affordability Fee Charge	OR	Parents Stakeholders Families Caregivers Mothers Fathers	AND	Attributes Perspectives Think/thoughts Aspects Belief Find important Traits Features Characteristics Qualities

Search strategy example for Web of Science:

```
((("school food") OR (lunchbox) OR (canteen) OR ("school lunch") OR ("school meal") OR
("packed lunch") OR ("packed food")) AND ( ( cost OR price OR affordability OR fee OR
charge ) OR ( ( parents OR stakeholders OR families OR caregivers OR mothers OR fathers
) AND ( attributes OR perspectives OR think OR thoughts OR aspects OR belief OR find
OR important OR traits OR features OR characteristics OR qualities ) ) ) ) ) )
```

### 3.4.4 Inclusion and exclusion criteria

Papers were eligible if they investigated perspectives of parents and/or caregivers on food provided or consumed by school aged children during school time, published in English language (Table 3-2). School aged children was defined as children attending primary, middle or high school (or alternatives) typically aged between 4-18 years. These school stages were all captured to broaden the review scope and ensure a range of parent perspectives were captured. Papers focusing on interventions responding to COVID-19 changes were excluded as they did not reflect typical school functioning.

### 3.4.5 Study selection

All search results were imported into Covidence systematic review software (Veritas Health Innovation Ltd, Melbourne) where duplicates were removed. Title and abstract screening, and full text review was completed by the PhD candidate, using the pre-defined selection criteria in Table 3-2 and a sub-set of ~15% of results were checked by a second reviewer/PhD supervisor (BJJ).

**Table 3-2: PICOS eligibility criteria of studies**

	<i>Inclusion criteria</i>	<i>Exclusion criteria</i>
<b>Population</b>	<ul style="list-style-type: none"> <li>• School aged children (i.e., 4 to 18 years old) internationally</li> <li>• Primary school aged children</li> <li>• Secondary school aged children</li> </ul>	<ul style="list-style-type: none"> <li>• Preschool / kindergarten</li> <li>• Long day care aged children</li> <li>• College students (i.e., 19yo+)</li> <li>• Specific populations e.g., T2DM</li> </ul>
<b>Exposure</b>	<ul style="list-style-type: none"> <li>• School hours</li> </ul>	<ul style="list-style-type: none"> <li>• Nutrition education programs</li> <li>• Impacts of COVID-19/interventions to address impacts of COVID-19</li> </ul>
<b>Comparison</b>	<ul style="list-style-type: none"> <li>• None required</li> <li>• Both groups will be considered eligible if comparison is: <ul style="list-style-type: none"> <li>○ Across food provision models</li> <li>○ Between SEP</li> <li>○ Between nutritional quality/classifications</li> <li>○ Across school types</li> </ul> </li> </ul>	
<b>Outcome</b>	<ul style="list-style-type: none"> <li>• Parent perspectives on school food, including school-provided meal, packed lunch or food environments</li> </ul>	<ul style="list-style-type: none"> <li>• Exclude studies that only measure change in perspectives, perspectives on a research intervention etc.</li> <li>• Other stakeholder (non-parent/caregiver) perspectives</li> <li>• Focus on only one food, food group or meal type (e.g., milk)</li> </ul>
<b>Study design</b>	<ul style="list-style-type: none"> <li>• Cross sectional data</li> <li>• Qualitative studies</li> <li>• Observational studies</li> <li>• Baseline data of intervention studies</li> </ul>	<ul style="list-style-type: none"> <li>• Protocols</li> <li>• Pre-post interventions</li> <li>• RCTs, cluster and cross-over, non-randomised controlled trial, stepped wedge with no baseline data reported</li> </ul>
<b>Other</b>	<ul style="list-style-type: none"> <li>• English</li> <li>• Past 25 years</li> </ul>	<ul style="list-style-type: none"> <li>• Abstract only publications</li> <li>• Non-human studies</li> <li>• Grey literature</li> <li>• Non-primary studies</li> </ul>

### 3.4.6 Data extraction

Included studies were extracted into a pre-structured Microsoft Excel spreadsheet by the PhD candidate and checked by a second reviewer (BJJ). The extraction spreadsheet was developed and piloted with several studies to ensure brevity. Items extracted included study characteristics, such as primary aim, study type, participants, measures, outcomes, limitations and results. The school food provision model was identified and categorised as a lunchbox, school-provided meal or canteen model, to align with the reporting within papers and enable exploration of hypothesised differences across these models. To answer the research questions, all results relating to school food systems as experienced or described by parents were extracted. Extracted findings included qualitative data, which consisted of themes, thematic descriptions, quotes and descriptions of quotes, and quantitative data, including agreement scales, voting on barriers/facilitators and other parent responses to survey questions. Summaries of findings provided by the authors were also

extracted, where original results were not presented. Only findings that were attributed to parent participants were extracted. Extracted data was duplicated, creating a 'features' dataset and a 'perspectives' dataset, used for each analysis method. Following analysis, the results were cross-referenced to ensure terminology was consistent.

### **3.4.7 Data analysis**

To address the first research question, a deductive categorisation process occurred to identify the specific features of school food models that parents referred to across studies, with new features identified iteratively. Deductive categorisation was used as existing knowledge and understanding influenced the feature names and definitions. This question strived to understand what creates a school food system, with features defined as the aspects of systems that were influential in the functioning or experience of a system. Features were discussed with the advisory group, with adjustments made to ensure language and phrasing of features were appropriate. The final list of features was organised and defined separately by the PhD candidate and a second reviewer (PhD candidate, BJJ) who reached consensus in collaboration with a third reviewer (RKG).

Analysis of the second research question was guided by a thematic analysis process of the extracted data, following data transformation. This question strived to understand the perspectives of parents on school food broadly. Extracted quantitative results were collated according to the Bayesian methods, attributing a qualitative description to translate quantitative data<sup>182</sup>. This allowed for all data types to equally inform the analysis in a mutually compatible format and conduct an integrated synthesis<sup>181, 182</sup>. Translations were formed using the available quantitative results, for example, considering percentage agreement and standard deviation to understand the presence of mixed perspectives. Translation was also facilitated by qualitative evidence in mixed-methods studies and author interpretations in the included studies, which was considered to be an appropriate interpretation due to familiarity with the results. All findings in qualitative format were collated for data familiarisation and inductive data coding processes, using an iteratively developed data codebook (Table 3-5). Codes were grouped into initial themes, which were refined and named in a collaborative process between authors. Cross-referencing between the perspectives and features found that the features were the key driving force behind many parent perspectives, therefore feature terms are used in the presentation of themed findings.

### **3.4.8 Quality assessment**

The PhD candidate rated study quality using the AXIS critical appraisal tool, designed for use for cross-sectional studies<sup>185</sup>. This tool was chosen as it measures a range of potential limitations and cross-sectional study design methods, for quantitative and qualitative studies. This allowed identification of the quality of study reporting and thus provided an indication of study quality, based on the responses to AXIS checklist items. In addition to the completion of the criteria

checklist, comments were made about any further analyses of the study quality, such as bias or representation.

## 3.5 RESULTS

### 3.5.1 Eligible studies

From a total of 2480 records, 26 papers were eligible, reporting on 24 studies (Figure 3-1). Two of these papers were identified through reference list searching of included papers and previous school food reviews.

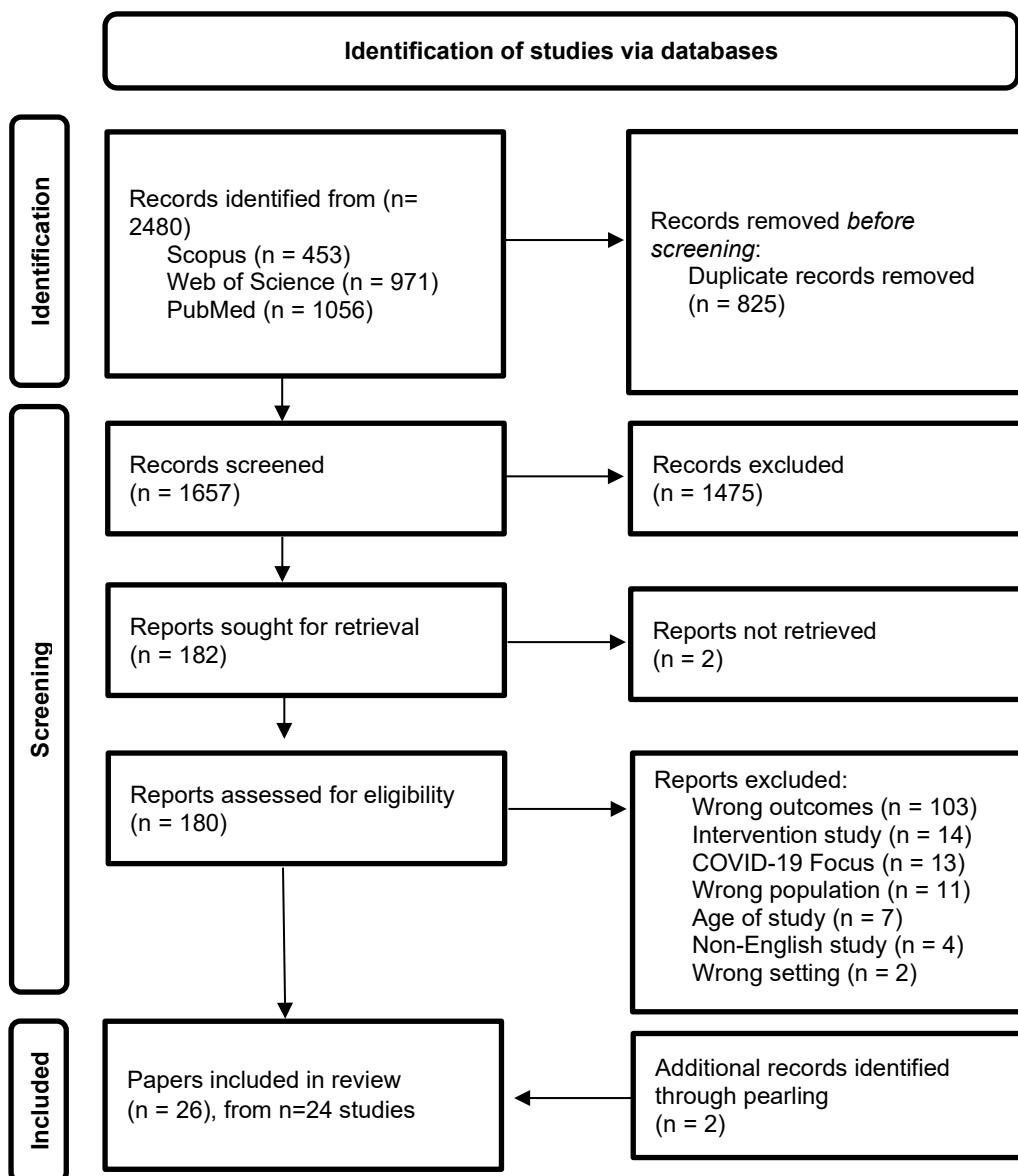


Figure 3-1: PRISMA flow diagram of parent perspectives of school food study selection



### **3.5.2 Study characteristics**

The characteristics of the included studies are presented in Table 3-3, with 13 qualitative, five quantitative and six mixed methods studies. Studies were from Australia (n=6), US (n=5), UK (n=3), Canada (n=2) and New Zealand (n=2), with the remaining studies from the Netherlands, Germany, Greece, South Africa, Uruguay and India. Studies described a range of school food models, including lunchbox provision, combination models, and school-provided meal models, with results capturing perspectives on lunchbox (n=19), canteen (n=5) and school-provided meal models (n=9), including the potential transformation between models (n=3).

While most studies were of adequate quality, some studies did not contain comprehensive reporting of study methods, when assessed against the AXIS criteria (See Appendix Table 9-2). Ethical approval was not reported in three studies, with sampling strategies being unclear or not representative of an appropriate population in six studies. Furthermore, three studies did not acknowledge study limitations. However, all studies reported results for described methods and no conflicts of interest were reported. In the context of this review, methodological limitations include the risk of reporting bias from the original authors influencing the present interpretation, and limited sample size reducing representativeness, due to the inclusion of pilot studies.

**Table 3-3: Summary of characteristics and aims of included parent perspective studies**

<b>Study Country</b>	<b>Study design, population and methods</b>	<b>Aim/ Research question</b>	<b>School food provision model explored*</b>
<b>Lunchbox predominant models</b>			
<i>Alcaire et al., 2021</i> <i>Uruguay</i> <sup>186</sup>	Cross-sectional qualitative study Children attending public and private schools, unrelated Mothers from social media who have school-aged children Projective techniques on children's conceptualization of snacking in school, and children and mothers' barriers and facilitators for healthy snacking, 2018 n=1183 mothers	1) Explore children's conceptualization of school snacking 2) To identify children and mothers' perceived barriers and facilitators to healthy snacking in the school environment.	Lunchbox and canteen
<i>Aydin et al., 2021</i> <i>Australia</i> <sup>187</sup> †	Cross-sectional mixed-methods study, results reported across in two publications Parents of children attending primary school Online survey on perspectives on food and nutrition in schools, closed and open-ended question on school-provided meals, 2021 n=787	1) To identify the FNE topics that parents consider should be taught 2) To explore their ideas to improve the current status of FNE in the school curriculum and examine the likely predictors of the perceived importance of these FNE topics.	Lunchbox and canteen
<i>Aydin et al., 2023</i> <i>Australia</i> <sup>161</sup> †	Cross-sectional mixed-methods study, results reported across in two publications Parents of children attending primary school Online survey on perspectives on food and nutrition in schools, closed and open-ended question on school-provided meals, 2021 n=787	1) To explore Australian primary school parents' views of the provision of free lunches at schools and, particularly, the barriers to it. 2) To investigate the associations between parents' demographic and personal characteristics and their views regarding free universal school lunches.	Lunchbox and school-provided meal potential
<i>Bathgate &amp; Begley, 2011</i> <i>Australia</i> <sup>109</sup>	Cross-sectional qualitative study Parents and guardians of young children (aged five to seven years) attending low SES schools in metropolitan Perth Focus groups on perspectives on packing lunches, 2005-2006 n=58	1) To describe the factors affecting school food selection by parents of young children attending low SES schools in Perth and recommend the features of resources parents need to make healthier choices.	Lunchbox
<i>Burton et al., 2022</i> <i>Australia</i> <sup>39</sup> ‡	Cross-sectional mixed-methods study, results reported across in two publications Parents/primary caregivers of primary school-aged children and primary school teachers from Government, Catholic and Independent schools Online closed and open-ended survey for teacher or parent on eating duration, lunch supervision, school food environment, including food provision venues and policies, 2019-2020 n=402 Parents n= 123 Teachers	1) To gain an understanding from teachers and parents about the amount of time children are given to eat their lunch and whether they believed that it was sufficient. 2) To understand the views of teachers and parents regarding schools' responsibilities for monitoring school lunch boxes and role-modelling positive eating behaviours.	Lunchbox and canteen
<i>Casado &amp; Rundle-Thiele, 2015</i> <i>Australia</i> <sup>175</sup>	Cross-sectional qualitative study Carers/guardians of primary-school-aged children in Queensland Online survey on barriers and benefits of lunchbox packing and contents, 2014 n=876	1) To investigate children's school lunchboxes and explore the influence of carer's perceived benefits and barriers towards healthy eating on the food contents packed for lunch.	Lunchbox

<b>Study Country</b>	<b>Study design, population and methods</b>	<b>Aim/ Research question</b>	<b>School food provision model explored*</b>
<i>Gupta et al., 2023</i> <i>Canada</i> <sup>188</sup>	Cross-sectional quantitative study Parents/caregivers of children attending a Saskatoon Public School Division elementary school in grades 1 to 8 Online questionnaire including attitudes and willingness to pay for school food programs, 2019 n=510	1) To elicit parental willingness to participate and pay for a universally offered SFP as well as factors that determine their decision.	School-provided meal potential
<i>Hansen et al., 2023</i> <i>South Africa</i> <sup>189</sup>	Cross-sectional quantitative study Caregivers of learners, aged 6-12 years, from Quintile 5 public or independent schools in Bloemfontein Questionnaire on nutritional knowledge, attitudes towards food and practices of the learners and/or caregivers, year of data collection not stated n=1286	1) To investigate sociodemographic variables (SDV) and caregivers' attitudes that impact on healthy eating and the provision of healthy breakfast and school lunchboxes.	Lunchbox
<i>Hawthorne et al., 2018</i> <i>Canada</i> <sup>174</sup>	Cross-sectional mixed-methods study Parents and students from 19 Elementary schools, London, Ontario Parents responsible for packing lunches completed a survey and classroom observation of packed foods to explore lunch-packing behaviours, barriers and facilitators, 2011-2013 n=321 parent-child dyads	1) To compare parents' reported behaviours regarding the food they pack in their child's lunches with what was actually packed. 2) To explore parents' self-identified barriers and facilitators to providing a packed school lunch for their child.	Lunchbox
<i>Maher et al., 2020</i> <i>Australia</i> <sup>67</sup>	Cross-sectional qualitative study Families with a primary aged school child between 5-12 years in Victoria Two interviews with each family, including children and parents on school food messages, year of data collection not stated n=50	1) To understand and analyse the inextricable connections between family relationship and food practices as they intersected with the messages children were taking away from health and food experiences and programmes within schools.	Lunchbox
<i>Nanayakkara, Booth, et al., 2024</i> <i>Australia</i> <sup>190</sup> ‡	Cross-sectional mixed-methods study, results reported across in two publications Parents/primary caregivers of primary school-aged children and primary school teachers from Government, Catholic and Independent schools Online closed and open-ended survey for teacher or parent on eating duration, lunch supervision, school food environment, including food provision venues and policies, 2019-2020 n=402 Parents n= 123 Teachers	1) To gain an understanding from parents and teachers about the types of food provision practices and venues, and the food-related policies and rules operating in primary schools in Australia. 2) To investigate the differences in the types of food provision practices and venues, and the policies and rules based on the location of schools (urban vs rural) and type of school (government vs non-government).	Lunchbox and canteen
<i>Nanayakkara, Margerison, et al., 2024</i> <i>Australia</i> <sup>191</sup>	Cross-sectional quantitative study Parents with a child attending primary school in Victoria Online survey exploring lunch provision practices, perceptions of the healthiness of school lunches, and barriers to providing healthy school lunches n=359	1) To explore Victorian parents' perceptions of their current practices and barriers in providing school lunches for their primary school children.	Lunchbox
<i>Rathi et al., 2018</i> <i>India</i>	Cross-sectional mixed-methods study Parents of year 9 students and Biology and Home Science teachers from five private English-speaking schools in Kolkata	1) To examine the perspectives of teachers and parents about the current school food environments and their	Lunchbox

<b>Study Country</b>	<b>Study design, population and methods</b>	<b>Aim/ Research question</b>	<b>School food provision model explored*</b>
<sup>192</sup>	School Food Landscape Questionnaire (SFLQ) included closed and open-ended questions to measure the food and nutrition situation in schools, 2016 n=280 parents n=32 teachers	views of possible future healthy school food environments and policies.	
<i>Rongen et al., 2023</i> <i>Netherlands</i> <sup>193</sup>	Cross-sectional qualitative study Parents, principals, teachers and children at primary schools in Amsterdam and Ede Interviews and focus groups on perceptions of current system and potential school-provided meal model, 2017, part of "the Healthy School lunch" project n=9 Principals n=15 Teachers n=33 Parents n=197 Children 5-12 years	1) To explore the perceptions of children, parents and school staff towards both the current school lunch system and the development and implementation of school lunch provision within primary schools in the Netherlands.	Lunchbox and school-provided meal potential
<i>Teevale et al., 2012</i> <i>New Zealand</i> <sup>194</sup>	Cross-sectional mixed-methods study Students who participated in the Obesity Prevention in Communities (OPIC) project Parents completed a quantitative questionnaire on school lunch habits, 2005-2006 n=4216 OPIC participants randomly selected for qualitative interviews on school lunch provision habits and perspectives, students and parents included n=68 (33 students, 35 parents from 30 households)	1) To investigate the school lunch food habits of socio-economically deprived groups of Pacific adolescents by weight status (i.e., obesity and healthy weight adolescents).	Lunchbox and canteen
<i>Watson-Mackie et al., 2023</i> <i>Australia</i> <sup>65</sup>	Cross-sectional qualitative study Parents/caregivers of primary school students in Victoria Semi-structured interviews on lunchbox preparation and food choice views, 2021 n=10 Mothers	1) To explore parental experiences of packing lunchboxes for their children, information schools provide on lunchbox preparation and consider the potential barriers some mothers experienced that impacted their ability to pack lunchboxes they consider healthy.	Lunchbox
<b>Combination models (i.e., concurrent optional school-provided meal and lunchbox)</b>			
<i>Cappellini et al., 2018</i> <i>United Kingdom</i> <sup>195</sup>	Cross-sectional qualitative study Mothers of primary school children aged 9-11 from two primary schools in Surrey and West London Photo-elicitation interviews, including two interviews and focus groups to discuss lunchbox packing behaviours and perceptions, year of data collection not stated n=30	1) To explore mothers' practices and perceptions regarding preparing lunchboxes for their children.	Lunchbox
<i>Ensaft et al., 2018</i> <i>United Kingdom</i>	Cross-sectional qualitative study Parents of children attending four primary schools in an urban local authority, who provide packed lunch on most days of the week Focus groups on packed lunch practices, 2014-2015	1) To explore parents' perceptions and practices related to packed lunches, their experience of providing a packed lunch, and the role of children in these.	Lunchbox

<b>Study Country</b>	<b>Study design, population and methods</b>	<b>Aim/ Research question</b>	<b>School food provision model explored*</b>
<sup>196</sup>	n=20		
<i>Harman &amp; Cappellini, 2015</i> <i>United Kingdom</i> <sup>197</sup>	Cross-sectional qualitative study Mothers of children aged between 9 and 11 years old from one primary school in Surrey Photo-elicitation interviews, including two interviews and a focus group, on lunchbox discourses, 2013 n=11 mothers	1) To discuss the different discourses at play within the discussion of lunchboxes including being a good (middle class) mother; negotiating home food in school; and responding to children's requests.	Lunchbox
<i>Lindquist et al., 2021</i> <i>United States</i> <sup>176</sup>	Cross-sectional qualitative study Parents of elementary school aged children, Mississippi Focus groups on motivations for packing lunches, 2018-2019 n=27	1) To learn more about motivations for packing lunches, barriers to child involvement, and possible resources to encourage parents to involve children in packing their lunches.	Lunchbox
<i>Meier et al., 2020</i> <i>United States</i> <sup>198</sup>	Cross-sectional quantitative study Six rural Midwestern schools Parents of middle school students completed an online survey on lunchbox and school-provided meal use and perceptions, 2016-2017 n=576	1) To explore parents' perceptions of the NSLP 2) Understand if parent perceptions of school lunch vary by their children's participation in the Free and Reduced-Price School Meals program.	School-provided meal and lunchbox
<i>Obeng-Gyasi et al., 2020</i> <i>United States</i> <sup>199</sup>	Cross-sectional mixed-methods study Parents in Indiana, US of school children, who are immigrants Closed and open-ended questions on food and school lunch choices, 2017 n=52	1) To examine food choices among immigrant families with school-aged children who live in Indiana, including immigrant parents' reasons for allowing their children to eat school lunch and the role that the schools can play in satisfying the nutritional needs of the children.	School-provided meal and lunchbox
<i>O'Donnell et al., 2022</i> <i>United States</i> <sup>200</sup>	Cross-sectional qualitative study Students of colour and their caregivers across four midwestern high schools Student focus groups and caregiver interviews, 2019 n=47 Students n=24 Caregivers	1) To use qualitative research methods to assess facilitators and barriers to participating in the school-provided meal program among high school adolescents of color.	School-provided meal
<i>Sobek et al., 2021</i> <i>Germany</i> <sup>201</sup>	Cross-sectional quantitative study 34 public and private schools in Leipzig Data from Leipzig School Nutrition Study Survey completed by parents of grade 4, 6, 7 and 8 students on school-provided meal perspectives, 2018-2019 n=1037	1) To investigate the current utilization rates of school lunch in a German city and the associated factors, including both the parents' and the students' perspectives. 2) To investigate associations between school lunch participation and students' weight status.	School-provided meal
<b>School-provided meal trials or pilot trials</b> ( <i>school-provided meals provided as an intervention pilot program or trial</i> )			
<i>Dalma et al., 2016</i> <i>Greece</i> <sup>202</sup>	Cross-sectional qualitative study Parents of children attending 14 elementary and secondary public schools in low socio-economic status regions which received the DIATROFI programme Focus groups on perceptions following a school feeding programme, 2013 n=22 parents of elementary school students n=22 parents of junior high school students	1) To qualitatively identify the perceptions of both parents and students towards healthy eating and related barriers and their experience of a school feeding programme.	School-provided meal

<b>Study Country</b>	<b>Study design, population and methods</b>	<b>Aim/ Research question</b>	<b>School food provision model explored*</b>
<i>McKelvie- Sebilleau et al., 2023</i> New Zealand <sup>203</sup>	Cross-sectional qualitative study Family (whānau), student and school principals from four schools participating in Ka Ora, Ka Ako, School-provided meal program Interviews and focus groups on perspectives of the Ka Ora, Ka Ako program, 2021-2022 n=18 Students n=34 Family members n=4 Principals	1) To assess the impact of the introduction of healthy free school lunches from family (whānau), student and school principal perspectives.	School-provided meal

Table organised according to current school food provision model, which may differ from the model explored in the study, indicated with \*.

† or ‡ Indicates publications emerging from the same methods

### **3.5.3 Features of school food provision models**

Fifteen features of school food provision models were identified in the global literature on parent perspectives (Table 3-4). The features identified were cost of food, time, effort and convenience, nutrition of food, parent responsibility/control, child preferences, policy and messaging, food quality, eating time, food access/availability, child input - preparation or dining, quantity, food safety, variety, eating environment, and food classroom education.

Most features were universally identified regardless of lunchbox, canteen or school-provided meal model, with features described by parents as barriers or facilitators in different models. Features of school food systems were therefore found to be influential in parent perspectives and experiences of each model. Features varied greatly in how they were delivered, resulting in parents reporting diverse experiences. The most commonly described features were the cost of food, time, effort and convenience, and nutrition of food. These features were identified across papers as being highly influential in parent acceptability and often framed as a barrier when delivery of a feature was not aligned with parent needs.

**Table 3-4: Features identified in included parent perspective studies**

Feature	Defintion	Bathgate & Begley, 2017 <sup>169</sup>	Burton et al., 2022 <sup>39</sup>	Cappelini et al., 2018 <sup>95</sup>	Casado & Rundle-Thiele, 2015 <sup>175</sup>	Ensaiff et al., 2018 <sup>96</sup>	Hansen et al., 2022 <sup>89</sup>	Harman & Cappelini, 2015 <sup>97</sup>	Hawthorne et al., 2018 <sup>74</sup>	Lindquist et al., 2021 <sup>76</sup>	Maher et al., 2020 <sup>67</sup>	Rathi et al., 2018 <sup>92</sup>	Watson-Mackie et al., 2023 <sup>85</sup>	Alcaire et al., 2021 <sup>86</sup>	Aydin et al., 2021 <sup>87</sup>	Booth, et al., Nanayakkara, Margerson, et al., 2012 <sup>94</sup>	Nanayakkara, 2021 <sup>84</sup>	Teeyale et al., 2012 <sup>84</sup>	Meier et al., 2020 <sup>98</sup>	Obeng-Gyasi et al., 2020 <sup>99</sup>	Aydin et al., 2023 <sup>61</sup>	Gupta et al., 2023 <sup>88</sup>	Ronggen et al., 2023 <sup>93</sup>	Dalma et al., 2016 <sup>92</sup>	McKellvie-Sebileau et al., 2023 <sup>203</sup>	O'Donnell et al., 2022 <sup>200</sup>	Sobek et al., 2022 <sup>200</sup>	
<b>Food provision model explored</b>		L	L	L	L	L	L	L	L	L	L	L	L	L,C	L,C	L,C	L,C	L,C	L,SM	L,SM	SM	SM	SM	SM	SM	SM	SM	SM
Cost of food	Costs of providing food, including purchasing of school-provided meals, canteen costs and costs of food for lunchbox provision.	X		X	X	X	X		X	X		X	X	X			X	X	X	X	X	X	X	X	X			X
Time, effort and convenience	Non-financial resources required for food procurement, preparation and provision				X	X	X	X	X	X			X	X	X		X	X	X					X	X	X		
Nutrition of food	The perceived nutritional quality of food			X	X		X	X		X		X	X	X	X		X		X	X	X			X	X	X		
Parent responsibility /control	Parent responsibility for food provision and monitoring	X	X	X		X		X		X			X	X	X				X		X			X	X	X		X
Child preferences	Child food preferences, enjoyment, restricted/selective eating and peer pressure			X		X		X	X	X	X		X	X					X	X				X	X	X		X
Policy and messaging	School food policy, including healthy eating and packaging policy, teacher monitoring and school food rules		X	X		X		X	X		X	X	X	X	X	X	X	X						X				
Food Quality	Quality of food items, including freshness							X		X				X					X	X							X	X
Eating time	Time allocated specifically for eating in school breaktimes	X	X			X		X							X		X											X
Child input - prep or dining	Child involvement in food preparation and dining choices	X							X	X			X				X	X			X							
Food access/availability	Availbility of food for procurement locally or at home						X			X				X	X	X												
Food safety	Handling, preparing and storing food to reduce the risk of foodborne illnesses	X							X	X							X				X							
Variety	Having a range of different food items, rather than repeated items each school day									X				X						X				X			X	
Quantity	Amount of food provided/needed to feed children							X		X									X					X				
Eating environment	The school food eating environment and as a social setting	X	X							X																		
Food classroom education	Education for students surrounding nutrition and food in school curriculum											X			X									X				

Studies grouped according to the school food provision model relating to the features described.  
L, Lunchbox; C, Canteen; SM, School-provided meal



### 3.5.4 Parent perspectives

Thematic analysis of parent perspectives across the included studies identified four themes and one overarching theme. These themes were: *child is the priority*, *lunchbox procurement, preparation and provision is challenging*, *school-provided meals have strengths and limitations*, and *parents acknowledge they are central to feeding*. The overarching theme was the parent perspective that *compromises must be made to meet the needs of family members*. Themes are described in text with examples from the literature, with the codebook and definitions presented in Table 3-5.

**Table 3-5: Parent perspectives on school food data codebook**

Theme	Theme definition and key findings	Key codes within this theme
<i>Child is the priority</i>	Child preferences are influential on decisions relating to lunchbox contents, participation and system critique Parents want their child to enjoy the meal and make decisions accordingly.	Child preferences/ enjoyment as a priority Treat provision Food that will be consumed as a priority Wasting money on food that won't be consumed Child responsibility
<i>(Subtheme) Peer influence on child preferences</i>	Positive and negative peer pressure influences the food children desire or consume in school.	Influence of peers on food provided
<i>Lunchbox procurement, preparation and provision is challenging</i>	There are challenges associated with resourcing and logistics for packed food provision Cost, policy/rules, messaging, monitoring, food availability, time, convenience, effort, school eating time, education, food safety are all challenges for parents.	Cost as a barrier to home food provision Cost of healthy foods Policy/rules Monitoring of lunchboxes by teachers/school External messaging picky eating as a barrier Nutrition of lunchboxes Food availability in the home Difficulty of finding foods Time to prepare food work and effort involved convenience of packed items School Messaging/misalignment Environment Eating time Education Food safety
<i>School-provided meals have strengths and limitations</i>	School-provided meals have strengths and limitations depending on what they offer and how it is delivered. This includes cost and value, nutrition, quality, quantity, dietary requirements, variety, convenience.	Cost disabling school-provided meal Poor nutrition of school-provided meals/canteen Good nutrition of school-provided meals Quality of food Quantity of food Dietary requirements Canteen policy/rules Value of the canteen Cost enabling school-provided meal Variety of school-provided meals Promotion of healthy eating Convenience of school lunch Importance of school food
<i>Parents acknowledge they are central to feeding</i>	Parents have key responsibilities in food provision and value their role. Parents desire the ability to monitor child eating and value the connection it brings, being their responsibility.	Parental responsibility Parent desire to monitor child's eating Parental connection Parents perceptions of their knowledge Providing information or education for parents
<i>Compromises must be made to meet the needs of family members</i>	Parents make compromises to ensure their child was well fed, happy and the system worked for them.	Compromises made based on the parents' priorities Disobeying policy

#### **3.5.4.1 The child is the priority**

Child preferences were described by parents as influential on decisions relating to lunchbox contents, participation and system critiques. Parents identified a desire to pack or purchase foods that children would look forward to, making meal breaks an enjoyable experience or ‘treats’, regardless of the healthiness of the food<sup>67, 195, 196, 197</sup>. Two studies identified parents providing food according to child preferences to reduce food waste<sup>65, 109, 195</sup>. Child preferences often acted as the influential factor in which model was adopted by families. This included children not enjoying school-provided meals resulting in lunchbox provision<sup>196, 198, 199, 201, 203</sup>, or contrastingly, children’s enjoyment of the meal being the reason for participation<sup>198, 199</sup>. Some parents described their child as being a picky eater, and therefore, the need for suitable meals to ensure they are fed<sup>193</sup>, while others identified that child preferences had broadened following exposure to new meals at school<sup>203</sup>. Further, parents described lunchbox provision as enabling catering to specific preferences<sup>174, 176, 195</sup>.

One sub-theme observed was the impact of *peer influence on child preferences*, playing a role in children requesting food items to appear ‘cooler’ or align with social norms in lunchbox provision<sup>67, 109, 176, 186</sup>. Peer influences had mixed impacts, with some peers encouraging healthy eating, while others influenced acceptance and rejection of foods. Parents described their child was “*made fun of*” for food items packed in lunchboxes<sup>176</sup>. Other parents whose children participated in a school-provided meal program pilot described the social benefits, including inclusion, avoidance of discrimination and positive peer influences on healthy food consumption<sup>202</sup>.

#### **3.5.4.2 School-provided meals have strengths and limitations**

Parents participants within included studies described the strengths and limitations of school-provided meal systems and the resulting perceived benefits and challenges, influenced by the previously described features. Many perceptions varied across the literature, being highly dependent on the school food model and family situation. Parents participating in pilots of school-provided meals or discussing a hypothetical system had positive views on a prospective system, acknowledging the potential of school-provided meals for equity and convenience<sup>193, 203</sup>. However, parents consistently noted challenges that would need to be addressed in the design of the system, many being aligned with the system features, including cost, nutrition, convenience, quality and quantity.

Cost was a major consideration with numerous school-provided meal affordability related codes identified within this theme. Participants of one study who received free school-provided meals in the US described the meal being free as a reason for uptake<sup>199</sup>. Negative perceptions existed in other systems, where parents were asked for a financial contribution to receive a school-provided meal. These perceptions included descriptions by parents that their child would be more likely to participate if the lunch was free of charge<sup>201</sup> and that school-provided meals were poor value for money<sup>195</sup>. This was similar to parents in Saskatoon, Canada, who were less willing to participate in

a school-provided meal program as price increased<sup>188</sup>. Parents discussing a potential school-provided meal model identified that school lunches should not exceed current lunchbox expenses, while offering something more than the current lunchbox system<sup>193</sup>. The notable impact of the feature of cost on system acceptability is further demonstrated by Meier and colleagues<sup>198</sup>. Results indicated that parents of children receiving a free meal were more likely to consider the school lunch to be better than food that was made at home, when compared to those not receiving a free school-provided meal<sup>198</sup>.

Conflicting parent perceptions were found surrounding the nutrition of school-provided meals, including the health promotion implications. Some parents in one study raised concerns about the healthiness of school-provided meals, describing being uncertain of the ingredients and others perceiving the school lunch as having too much sugar and fat<sup>199</sup>. One study discussed the low healthfulness perception of canteen foods, with majority of parents agreeing that home-prepared lunchbox is healthier than food supplied in the school canteen<sup>192</sup>, while another study found parent concerns around the definition of healthy<sup>161</sup>. However, parents whose children participated in the DIATROFI school-provided meal programme found the programme was perceived as promoting healthy eating<sup>202</sup>.

Both school-provided meals and canteens were perceived positively for their convenience<sup>193, 194, 199</sup>. School-provided meal programs were described as relieving the burden of food preparation<sup>202</sup>. Convenience acted as an enabler for parents, with parents in one study describing time to pack food was the reason for school-provided meal uptake<sup>198</sup>. Similarly, convenience was also cited as a reason for providing money for canteen purchases rather than preparing lunchbox foods<sup>194</sup>. Parents enjoyed the variety offered by school-provided meals, contrasting to the repetitive foods provided in the lunchbox<sup>176, 199</sup>, while others critiqued the repetitive menu on offer in some schools<sup>200</sup>.

Quality and quantity were negatively perceived by parents in some school-provided meal systems. Some parents perceived the quality of school lunches negatively<sup>176, 197, 200</sup> and was identified as a reason parents were dissatisfied with school-provided meals<sup>201</sup>. Further, quantity was a concern for some parents, with perceptions that school-provided meals did not provide enough food, were inconsistent or their child would eat enough<sup>176, 193, 197, 198</sup>, with one parent stating that “for a growing boy ... it is not enough food”<sup>197</sup>.

#### **3.5.4.3 Challenges of lunchbox procurement, preparation and provision**

Parents identified the challenges associated with resourcing and logistics of providing a lunchbox. Families identified financial constraints or cost as a barrier for packed food provision<sup>174, 175</sup>, with many perceiving healthy foods as having an increased cost<sup>109, 176, 189</sup>. Furthermore, some healthy foods were described as inconvenient to prepare to eat<sup>109</sup>. However, parents across numerous studies expressed they still tried to pack a healthy lunch despite barriers<sup>189, 193, 195</sup>.

Time and convenience of food preparation was captured within this theme and discussed by parents across a range of studies, acting as a barrier in lunchbox models<sup>174, 175, 189</sup>. Particularly, Hawthorne and colleagues found time was a barrier in lunchbox provision for many parents<sup>174</sup>. Parents described preparing a healthy lunchbox as being inconvenient<sup>109</sup> and identified time to prepare healthy options as a barrier to providing healthy food<sup>176</sup>. Parents identified lack of time/opportunities to cook, convenience and lack of availability of foods at home as potential reasons children may bring unhealthy snacks to school<sup>186</sup>. Studies identified interpersonal factors related to lunchbox behaviours. This included findings that full-time workloads limited the capacity of mothers to prepare lunchbox foods<sup>65</sup>. Additionally, caregivers with a higher income, living with a life partner and older caregivers perceived lunchboxes as being a greater workload when compared to their demographic counterparts<sup>189</sup>.

Several parents discussed the considerations resulting from school food policies, including healthy lunchbox, allergy, food safety or canteen policies<sup>174, 190, 192, 195, 196, 197</sup>. One Australian study found policies for lunchboxes included those that guided which foods could/should be packed and needed to be avoided (e.g., unhealthy items, allergens), avoiding packaging and preventing food sharing<sup>190</sup>. There were mixed perspectives described on such policies across studies, with some parents deeming lunchbox policies as reasonable<sup>192</sup>, while others disobeyed the rules and disliked monitoring<sup>195, 197</sup>. Parents expressed they felt judgement from other parents or school staff if their lunchboxes weren't deemed adequate in terms of parent effort, seemingly due to lunchbox social norms and social media influence<sup>65</sup>.

Parents expressed concern about the time allocated for children to consume their lunchbox food<sup>39, 109, 191, 196</sup>. Burton and colleagues<sup>39</sup> found that in Australia most parents reported ≤10 min was allocated for eating lunch, with many parents describing this as inadequate. As a result, parents described the need to pack foods that can be quickly consumed and still met child needs<sup>196, 197</sup>. Parents expressed a desire to increase allocated eating times, to enable social eating and mindful eating, while expressing concern about impacts on playtime<sup>39</sup>.

#### **3.5.4.4 Parents value their role in food provision**

A common reason parents choose to pack lunch was the opportunity to monitor consumption and having greater input into the foods consumed by the child. Parents described lunchbox provision as an enabler of knowing what the child was consuming, ensuring the food was healthy<sup>198</sup> and allowing parents to adjust food provision accordingly<sup>196, 197</sup>. This was also described as an opportunity to have greater control on the child's diet<sup>176, 195</sup>. For some parents, desire for monitoring of food contributed to their decision to opt-out of school-provided meal models<sup>198</sup>.

In lunchbox predominant models, parents positioned themselves as the decision-makers about the foods consumed by their child, indicating their perceived importance of this role<sup>39, 67, 186</sup>, while one study found parents described older children being responsible for their own lunchbox packing<sup>194</sup>.

Additionally, some parents also identified a need for free school-provided meals for “other children”, indicating the need for food availability for families in tough times, but not themselves<sup>161</sup>, deeming they are capable of adequate food provision.

Parents discussed their, or other parents, knowledge around food as an important aspect of the food system, noting the value of parent knowledge in healthy and loving food provision. One study found that parents believed they were in need of education<sup>161</sup> while another found parents were concerned about identifying healthy, convenient foods<sup>109</sup>. Contrastingly, most parents in one study identified their nutrition knowledge as “adequate” to “very good”<sup>174</sup>. Harman and Cappellini found mothers embraced healthy eating guidelines and held healthy eating and cooking knowledge<sup>197</sup>, demonstrating a desire to provide the best for their child and use thoughtful food provision to demonstrate love and care.

#### **3.5.4.5 Parents must compromise between the needs and priorities of family members**

The overarching theme observed across the data was compromise made by parents based on their priorities. Many parents discussed how they chose between and prioritised different features, with many citing the school food model, their family situation or personal beliefs/values as factors influential in their compromise. Many parents described having to choose between two aspects they care for, including a balance between their role as a parent and their child’s preferences<sup>109</sup>. Nutrition was compromised to meet parent desires for their child to enjoy the food<sup>67</sup>. Nutrition was also traded for convenience based on the parent situation<sup>65</sup>, with parents providing food that was pre-prepared and required minimal labour over healthy foods that may have a longer shelf life and demand greater labour for preparation<sup>109</sup>. Disobeying policy was also justified through the ethics of care and desire to provide food that will be enjoyed by the child<sup>195, 197</sup>. Compromises were made based on cost, with some parents spending more on healthy foods, while others prioritised spending less money and justified unhealthy purchases<sup>109, 176</sup>. Furthermore, parents appeared to compromise on the desire to have a school-provided meal program once cost increases<sup>188</sup>, likely making trade-offs between their priorities. A desire to reduce food waste and therefore money wasted was also discussed, cited as an additional reason for prioritising to child preferences and compromising on provision other food items, such as healthy food products<sup>109, 195</sup>.

## **3.6 DISCUSSION**

This review identified what features parents consider for school food provision models globally and explored what parents think about school food. Collated findings demonstrate that parents perceived there are benefits and challenges for all school food provision models, influenced by the broad range of features that informed how the system was experienced by parents. Furthermore, parents have priority features, which are key characteristics of school food systems creating the construct of school food for parents and influencing their perspectives on school food provision

models. Priority features were influential in parental decision making on food provision, requiring parents to make compromises to meet their needs based on their values and situation, demonstrating the complex socioecological influences of the system on parent perspectives. This review generated new knowledge, consolidating broad evidence, building on previous evidence of reduced scope, including a 2020 scoping review of experiences, perceptions and habits of parents packing school lunchboxes<sup>104</sup>. Use of Bayesian methods and exploration across all school food models provides a unique in-depth insight into the school food environment internationally.

There are benefits and challenges experienced by parents across all school food models. The range of perspectives indicated that there is no one perfect school food model delivered internationally for parents as key stakeholders. Various challenges reduce parent acceptability across the lunchbox, canteen and school-provided meal models described. The results showed patterns of strengths and limitations from parents in different models depending on system features and how those were delivered, which influenced their food provision decisions. This is consistent with a recent review of factors contributing to Canadian school food program acceptance, which found that the ways in which programs are delivered and promoted can have a significant impact on the perceptions and support of parents<sup>204</sup>. Distinct strengths included the convenience and potential affordability of school-provided meals and the enabling of lunchboxes for parent monitoring of intake and catering to child preferences, which is consistent with previous reviews<sup>28, 104</sup>. Many of these features acted as challenges in the opposing model, with many models lacking an appropriate middle-ground of all features that meets the needs of their parent population. This was evident for parents who were exposed to multiple food provision models within their school, or participating in a pilot program, who acknowledged the conflicting benefits and challenges to all models. Features that were misaligned with parent needs, such as high costs and limited time, created challenges in provision of nutritious food to children, therefore impacting health promotion opportunities including dietary intake, food education and habit formation. To optimise the acceptability and thus health promoting opportunity for school food models, such challenges for parents must be addressed. Therefore, while no school food model itself is perfect, consideration should be made in future research and school food programs to ensure all models incorporate key features, such as child preferences, convenience, nutritious food and reasonable cost to optimise parent acceptability.

Compromise was identified as an overarching theme, with parents prioritising features based on the delivery of the school food model, their personal beliefs and family situation. Parents had to make trade-offs based on their priorities, as many school food systems were not delivering all their ideal features. The range of compromises described reflect parents' individual beliefs and situation influenced their priorities about different aspects of school food causing mixed acceptability of the school food system. The priorities varied within each country, as shown within Australian findings, and regardless of school food system implemented, indicating how different experiences can be for

parents within each system. These influences and considerations are aligned with the levels described within the socioecological framework for nutrition and physical activity<sup>16</sup>, noting the policies, settings, inter- and intra-personal factors that influence food decisions. Intra- and inter-personal factors had a reciprocal influence on one another, including compromising on their values and nutrition knowledge to ensure the happiness of their child, or mothers working full-time and lacking time for food preparation therefore purchasing pre-packaged food<sup>65</sup>. This is aligned with the findings of the Canadian review of school food program acceptance, with authors concluding that parent's perceptions and acceptance of programs is influenced by cultural and regional factors, and may transform over time<sup>204</sup>. Findings therefore indicate that school food across countries does not and cannot use a one-size-fits-all approach, with a need for tailoring of features specifically to families and schools based on their socio-ecological situations, contributing to greater acceptability.

This review had several strengths. The inclusion of all study types allowed for a comprehensive examination of the research questions. The use of standardized methods also enabled the review to be replicable and transparent. The review followed the Bayesian methods for translation of quantitative data, which adhered to established guidelines, which improved the scope of the review. However, a limitation of the application of this method is that extracted findings may have arisen in data collection of the original studies through interview questions/prompts, researcher written questions or researcher analysis of the data, which may result in results that reflect researcher views, rather than solely those of the participant. Particularly, majority of included studies did not explore perspectives between demographic groups, limiting capacity for analysis of perspectives and demographics internationally. Further limitations include that only one reviewer conducted the study selection and extraction, which may have introduced potential biases or errors in the study selection process; however, this was addressed through sub-set checking by a second researcher and discussion amongst the research team. The search was limited to only three databases, which may have resulted in the omission of relevant studies. The limited scope of the search strategy, including use of three databases and only capturing studies published in English, may have also restricted the generalizability of the review findings. Critical appraisal demonstrated several studies poorly reported methods and lacked acknowledgement of study limitations. Inclusion of all studies strives to capture all potential parent perspectives; however, may have resulted in reporting bias and influenced the findings of this review, constrained by the available information and author interpretations. Furthermore, many studies had limited sample sizes or sampled participants only from specific population groups. Therefore, it is acknowledged that the results of this review are a reviewer summary of the author-presented results of included studies. Therefore, these findings may not be an accurate reflection of all parent perspectives within that school food model.

The review findings can be used to inform future research and optimisation of school food systems. Ongoing research should explore the priority features of parents in school food systems and the characteristics of these features and how this influences parent decision trade-offs and compromises. Further, understanding the specific needs of different parent populations, with regards to features such as cost, would inform school food action, including continuing to engage parents aligned with the Consumer and Community Engagement Framework for Research<sup>162</sup>. This would be valuable to inform a highly acceptable school food model for parents and allow for the features of school food systems to be appropriately tailored to the socio-ecological needs of the populations they serve, particularly for newly designed school-provided meal models. Awareness of the factors influencing school food program acceptance can aid in the evaluation, planning and optimisation process of future programs, such as those emerging in Australia, Canada and New Zealand.

### 3.7 CONCLUSION

This review found parents perceived that there are benefits and challenges across all school food provision models. There are a broad range of features that influence parent acceptability of a school food model. Further research is needed to understand the nature of these priorities and how they differ according for different families. These findings reiterate the importance of considering parent perspectives in the optimisation of school food models to increase acceptability, ensuring the system meets family needs through considering their priority features. Integrating parent perspectives within school food provision models is likely to support families to engage with the program and thus health promotion efforts.



## **CHAPTER 4. GETTING SCHOOL-PROVIDED MEALS TO THE TABLE: AN INTERNATIONAL MULTIPLE CASE STUDY OF SCHOOL FOOD SERVICE**

### **4.1 CHAPTER CONTEXT**

Following the review of the literature, identifying features of school food models, further exploration was needed to understand how these features functioned in the school setting, particularly for provision of a school-provided meal. The opportunity for this study to be completed within this candidature arose from a Flinders University International Field Trip Grant and further school visits. The field trip was intended for exploration of school-provided meal systems internationally across three countries. Additionally, visits to Tasmanian schools were enabled by a separate project, and schools visited had large variation in food service systems. This research study was designed prior to the visits, to allow a comprehensive description of the varied systems to be captured within this thesis. A case study was formed of all schools visited within the field trip and interstate visits. As such, this opportunistic research had constraints on the potential sample and scope; however, this provided a valuable insight into the thesis findings, allowing feasibility to be considered.

This study was designed to enable an understanding of what a food service entailed for a school-provided meal and how it differed across different contexts. This study also captured a broader understanding of school food service systems, including pilot programs, being of interest within the current transformation landscape in Australia.

The countries of interest were discussed with the advisory group of school food stakeholders to plan the international field trip, with members who had lived experience of school food service systems in different regions assisting to identify the most suitable options. Findings from observations were shared with the advisory group to interpret and understand the differences observed. Furthermore, the findings were shared at the Home Economics Institute of Australia conference in 2024, prior to analysis being finalised. This allowed for feedback from home-economists and teachers, ensuring the chapter was relevant for these audiences and adequate considerations had been included.

A version of this chapter has been peer-reviewed and published (Appendix 9.2) in *Health Promotion International*<sup>205</sup>. This chapter was used to prepare the publication, therefore there is direct overlap in content and phrasing. The chapter and publication were led by the PhD candidate, who was responsible for the research design, data collection, data analysis and writing. This work was supported by a team of local and international co-authors, who assisted in recruitment, data collection and provided guidance on the country context, with these partnerships fostered by the PhD candidate. PhD supervisors supported in project conceptualisation and provided intellectual guidance. Co-authors contributed <15% of work conducted.

## 4.2 CHAPTER ABSTRACT

### **Purpose**

The way children access and consume food during the school day is one of the many aspects in creating a health promoting school environment. The food service of school-provided meals differs greatly, depending on the country, region and school contexts; however, there is limited understanding of the diverse meal delivery within these settings. Therefore, the aim of this study was to understand different school-provided meal food service systems across different countries and contexts.

### **Methods**

This study used a qualitative, naturalistic observation, using an interpretative epistemology and a multiple-case design to explore food service across seven schools, mapped against a school-provided meal food service framework. This included three schools with an established school-provided meal system (England, France, Sweden) and four schools with emerging school-provided meal systems (Australia).

### **Findings**

Mapping captured findings across the domains of Menu offering, Food service system, Administration, Eating environment, Mealtime experience, and Post-meal. Results demonstrate the need for tailoring of school-provided meals, designed appropriate to the country, region and school context, including considering cultural underpinnings and available resources. Furthermore, a positive eating environment and elements of student choice and responsibility were all noted as principles important in a school food service.

### **Conclusions**

This knowledge can be used to inform planning of future systems, particularly for regions transforming into a school-provided meal model, and those looking to implement improvements to existing systems. Additionally, findings provide examples of realistic food service, feasible within the specific country contexts.

## 4.3 INTRODUCTION

Children internationally typically spend their formative years in schooling, commonly eating meals daily in this educational setting. Food eaten at school influences children's learning, health, growth and development, and is a key health promotion opportunity<sup>20</sup>. A school food service, which is the way children access food and drinks in this setting, is one of the ways to create a health promoting school environment<sup>20</sup>. A school food service can enable all children to have access to nutritious food before, within or after school time, supporting their learning<sup>206</sup> and establishing lifelong health

and positive food relationships. Improving school food service delivery is a common initiative to improve the health promoting environment of a school, within the broader school food system<sup>207</sup>.

Internationally, different models exist for provision and access of food to students during school hours. The predominant models in schools are home packed meals and school-provided meals<sup>72</sup>. The structure of school-provided meals at lunchtime varies greatly. Many countries have national school feeding programs, collaboratively supported by government and industry, which allows students access to school-provided breakfast and/or lunches. Other jurisdictions have more ad-hoc provision models or programs, such as food relief or charity food provision, which often provides free food for students who may be experiencing food insecurity. Commercial food offerings provide food for students to purchase, e.g., canteens/tuck-shops (small food shop within a school) or vending machines<sup>71</sup>. Contrastingly, some schools provide students and families with the option to leave school grounds during breaktimes, to consume a meal at home or purchase food from an offsite food service. Many schools offer a combination of these models, incorporating both home packed foods and a form of school-provided food offering, allowing parents to choose, or receive a subsidised or free school-provided meal for families in need<sup>41, 71, 126, 133</sup>.

The World Food Programme (WFP) reported that approximately 418 million children benefit from school-provided meal programs, including breakfast, lunch or snack provision; acting as one of the largest social safety nets in the world<sup>70</sup>. The food service of these school-provided meals, including menu composition rules, is often tailored to meet the needs of communities, countries, and cultures, while conscious of the available capacity and resources of the schools. As a result, the food services differ greatly, depending on the country, region and school contexts.

Globally, school-provided meals are recognised as a key avenue for equal, nutritious food provision, which have the potential to reach all students<sup>20</sup>. The current evidence on school-provided meals can be contextualised using the socio-ecological framework for nutrition and physical activity<sup>16</sup>. Previous evidence has described the macrolevel context of school food, understanding and comparing the differences between and within countries, the factors such as policy that lead to different school food models, and the nutrition of meals offered<sup>38, 41, 71, 178, 208</sup>. Extended description of national case studies have emerged, exploring each jurisdiction in depth<sup>209</sup>. A comparison of school food programs across 18 countries recognised the cultural and economic differences in countries that interrelate with the school food program of that region<sup>71</sup>. There is also research on the inter- and intra-personal context of school food, exploring experiences and perspectives of meal participants and stakeholders, including students, parents and staff, across different countries, understanding the acceptability of the food provided and school food systems<sup>126, 210, 211, 212, 213</sup>. Furthermore, Oostindjer and colleagues<sup>214</sup> utilised a cross-national comparative framework, positioning the role of school-provided meals as a tool for health, including history, opportunities and challenges.

Previous comparisons have noted the vast difference in school food environments across different countries, finding there is no uniformity in the provision of school-provided meals across high income countries<sup>178</sup>. However, limited evidence focuses on the individual school meso-level, understanding feasible examples of school-provided meal food service systems, being the way food is prepared and served within a school mealtime (hereon referred to as a school food service) and the complex steps that successfully interplay for meal delivery and creation of a health promoting school environment. While evidence captures the process of lunchbox provision<sup>65, 104, 175, 195</sup>, including the strengths and challenges in such a model for food providers, particularly mothers, there is limited exploration of the food service systems used for school-provided meals, closely exploring how a mealtime and the service of a school-provided meal functions. As there is substantial and often complex variation across countries and contexts, understanding differences in numerous feasible examples can provide crucial information for increasing functioning or designing a new school food service. This is important as there is growing interest in adoption of school-provided meals across countries including Australia, Canada and New Zealand<sup>5, 137, 151, 179</sup>, high income countries that have traditionally relied on lunchboxes brought into school, contributing to emerging school-provided meal pilot programs. As such, the aim of this study was to understand different school-provided meal food service systems across different countries and contexts, using a food service framework.

## 4.4 METHODS

### 4.4.1 Study design and methodology

This study is a qualitative, naturalistic observation, using a multiple-case design. The research question is a provocation, an open-ended question used to promote critical thinking. Similar observational methods have been used in previous research to understand the interactions of students within school mealtimes<sup>210</sup>. It allows for creation of new, critical perspectives and generates new thinking adverse to social norms, using an interpretative epistemology. Provocation can be used to isolate a particular concept for critical examination, with the researcher documenting the new knowledge in a systematic way<sup>215</sup>.

The research strived to explore what was occurring in each unique school food service system, situated within the cultural and historical context of that jurisdiction, using case study methodology. The aim was not to provide an overall description of school food systems representative of an entire region or regions, which can be found elsewhere<sup>209</sup>. Methods and reporting are aligned with the COREQ checklist<sup>216</sup> and case study selection methods described by Stake where appropriate, with use of key stakeholders to inform case study sites, and selection of cases that are hospitable to the inquiry<sup>217</sup> (See Appendix Table 9-3 and Table 9-4).

#### **4.4.2 Positionality statement**

The data collection team, comprising of the PhD candidate and GM, are white female English speakers with no children and approached this research from a background in public health and dietetics. The PhD candidate has experience conducting research exploring school food in Australia and is trained in food service. GM is an experienced qualitative researcher, with a focus on shared mealtimes and eating environments, and experience conducting observational research. The data collection team engaged in reflexive practice informed by an inquiry cycle, to promote reflections and conversations between the research team to mitigate the influence of biases and assumptions on interpretation of results.

#### **4.4.3 Sample**

Various countries were included to capture different school food service models across a range of contexts, including a range of historical underpinnings. This resulted in a scope of schools within Australia, England, France and Sweden.

Schools were eligible for inclusion in this study if they did not cater to a specific population (e.g., specialist schools) and included mid-day mealtimes where children consume a school-provided meal. Schools with different historical contexts or settings that influence the functioning and feasibility of food service systems were intentionally captured. Individual schools were included into the study following identification and selection by key stakeholders from each country or region, including school food researchers, government or not for profit staff members<sup>218</sup>.

All schools provided permission for the observer to access the school site, and a school representative consented to observer presence at a mealtime to observe and note the school food service observed. This resulted in a sample of seven school food services, four from Australia, and one from England, Sweden and France, with one mealtime observed at each school. Four schools were captured within Australia due to the current transitional status of the school food system and lack of evidence describing the highly variable meal service systems. Additionally, numerous Australian schools were included to capture diverse governance, mealtime structures and meal frequencies, providing evidence on how various food services can be delivered in a transitioning context. For example, the Tasmanian schools only service a proportion of the student population, unlike the international models, thus reflecting vastly different systems. While additional schools with varied school mealtime structures in England, Sweden and France would have been valuable, the number of schools included was limited by the in-person, opportunistic nature of the data collection and challenges gaining school access. Data collection focused on the food service system and its functioning, with no observation of individuals, and no personal identifiers or information captured on individuals. Ethics approval was not required, due to being a naturalistic system observation without any human participation in the research<sup>219</sup>.

#### **4.4.4 Data collection**

Data collection included field notes and sketches of a school mealtime and dining space, observing the food service system employed within schools in different schools and countries, with support of a data collection tool (see below). The PhD candidate and GM piloted the tool together prior to beginning data collection. The piloting allowed for training against the tool and acted as a reflexive exercise in pushing assumptions and biases. Pilot results were compared to establish face validity.

To understand the food service, the observer attended the school during a mealtime, with six observations conducted by the PhD candidate, and one observation conducted by GM, between June and November 2023. Both researchers have Australian Department of Human Services Working with Children Checks, which were presented to schools as requested. The observer was identifiable, and staff were alerted to their presence and their purpose at the meal. School representatives or key stakeholders provided country and school context to the researcher, as well as translating key information to English for observations in Sweden and France. System observation was undertaken in an unobtrusive manner, aiming to capture the typical mealtime using a naturalistic study design.

##### **4.4.4.1 Data collection tool**

A feature identification tool (See Appendix Figure 9-1) was developed by the researcher/s using the international literature review of parent perspectives of school food service features, described in Chapter 3. The tool provided prompts of the different features of school food systems, including the context of the food service, cost, messaging (e.g., healthy eating posters) in the eating space, length of eating, how food is accessed by students during the meal, the convenience and quantity of food provided, and the food environment where the meal was consumed (dining hall vs. classroom for example). The tool prompted descriptions of layout and facilities, aided by birds-eye sketches of the physical spaces, inclusive of food preparation and dining areas, and the flow of the system during mealtimes, ensuring all elements of the food service were captured. Posters and messaging on display in the dining areas were recorded and translated by school representatives or key stakeholders in Sweden and France. All field notes were exchanged and checked for accuracy and objectivity between the data collection team (PhD candidate and GM), to ensure data was true to naturalistic observation and to limit the impact of observer bias on interpretations.

#### **4.4.5 Data analysis**

Field notes and sketches were collated and translated into case studies of each school-provided meal observation. Using an interpretive lens, the case studies narratively described the food service and mealtime adopted in each school, flowing through the mealtime as a user may experience it. The case study approach, as described by Crowe and colleagues<sup>218</sup>, allows for an

“in-depth, multi-faceted understanding of a complex issue in its real-life context”. Case studies have therefore been contextualised with a summary of the school-provided meal history in the relevant country, collated from the literature and anecdotal evidence. This context was also combined with the relevant food service context data. The case studies were written by the PhD candidate and checked by GM and BJJ for consistency and objectivity. Stake’s checklist for assessing the quality of a case study was applied to ensure the case study reporting was appropriate for readers<sup>217, 218</sup> (See Appendix Table 9-4). Full case studies are available in Appendix 9.3.2.

To address the research question and allow comparison between different school food systems, the data captured in the case studies were inductively coded using a descriptive coding method on NVIVO<sup>220</sup>. The PhD candidate independently coded, which was then reviewed by a second researcher for accuracy (BJJ/GM). Common concepts were then mapped against the draft school food service framework<sup>221</sup> forming subdomains. The framework was developed iteratively alongside this mapping process to understand the key considerations of a school food service, including those of pilot programs in Australia. The framework and a further description are available in Appendix 9.3.1. In brief, the framework included context, budgeting, menu offering, food service system, administration, eating environment, mealtime experience, and post-meal domains, each relating to a key stage of school-provided meal food service. These domains and mapped sub-domains were then compared between case studies to interpret the consistencies and differences in the food service systems.

## 4.5 RESULTS

Of the seven case study schools, six were conducted in primary schools and one in a high/secondary school (Table 4-1, Appendix 9.3.2). The case studies captured schools over a range of country and food service contexts, as summarised in Table 4-1, including a range of pricing, universality, and historical contexts. This included three schools with established school-provided meal systems (England, France, Sweden) and four schools where school-provided meal systems are emerging (Australia).

**Table 4-1: Context summary of the case studies (n=7)**

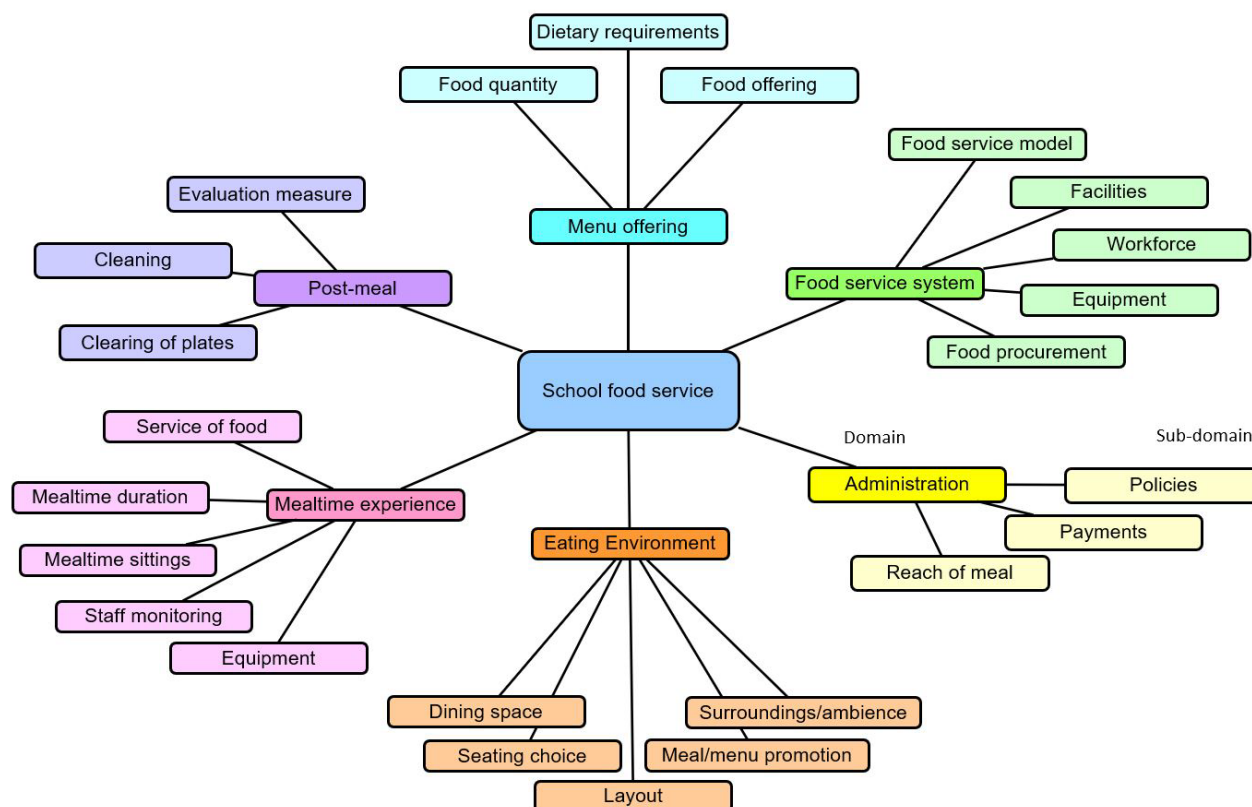
<b>Case study</b>	<b>Country context<sup>†</sup></b>	<b>School context</b>	<b>School food service context</b>	<b>Cost structure (to families)</b>
<b>England</b>	Established school-provided meal system	Public primary school West London	Meal available daily for all students	Pricing based on household income and year group. Free for all students in reception, year 1 and year 2*, free in some regions for years 3 to 6 (e.g., London)
<b>Sweden</b>	Established school-provided meal system	Public primary school Uppsala	Meal available daily for all students	Free for all students up to 16 years*
<b>France</b>	Established school-provided meal system	Public primary school Dijon	Meal available daily for all students	Social pricing based on household income*
<b>South Australia</b>	Predominantly lunchbox system, trialling school-provided meal system as an alternative to a canteen/tuck shop offering	Independent primary school Adelaide	Pilot program Optional participation Meal available once weekly for all students	Flat cost for all families
<b>Tasmania 1</b>	Predominantly lunchbox system, trialling school-provided meal system	Public primary school Wider Hobart region	Pilot program Optional participation Meal available once weekly for all students	Free*
<b>Tasmania 2</b>	Predominantly lunchbox system, trialling school-provided meal system	Public high school (primary school located nearby) Northern Tasmania	Pilot program Optional participation Meal available once weekly for select year levels, rotating	Free*
<b>Tasmania 3</b>	Predominantly lunchbox system, trialling school-provided meal system	Public primary school Wider Hobart region	Pilot program Optional participation Meal available daily for all students	Free*

\*Government (national and/or local) subsidies

<sup>†</sup>Further country context is provided in Appendix 9.3.2



Codes from case studies were organised into 25 sub-domains, which were mapped to six relevant domains from the food service framework, 1) Menu offering, 2) Food service system, 3) Administration, 4) Eating environment, 5) Mealtime experience, and 6) Post-meal (Figure 4-1). Context and budgeting domains were not identified from the case studies. Domains and sub-domains are described using extracts from case studies.



**Figure 4-1: Map of school food service coding**

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## Menu offering

Three sub-domains identified from the case studies were mapped under the menu offering domain; dietary requirements, food offering, and serves and portions. Menus can be understood in relation to the country context, with national or regional nutrition guidelines in place across France, Sweden and England, informing all food that should be served within that jurisdiction. For example, food quality guidelines in France that guide components of the meal and frequency of foods, ensuring children's nutritional needs are met while considering environmental and social sustainability. In Sweden, guidelines focus on meals being tasty, safe, nutritious, eco-smart, pleasant, and educational, including student involvement and pedagogic meals.

Many systems offered food to cater for a range of dietary requirements, providing alternatives or meal options that enabled participation from children with dietary requirements. While others had no noted service of alternative dishes suitable for dietary requirements, such as the case studies from France, Tasmania 1, 2 and 3.

*Special meals are provided for students with specific dietary requirements on separate plates...* – South Australia case study

*There are no alternative meals or special diet meals provided.* – Tasmania 2 case study

Menus served across all case studies typically consisted of a larger dish as the main meal component, accompanied by vegetables, fruit and/or dessert, with water and milk available or brought by students in water bottles. The main meal was typically a common dish within that country and provided a range of food groups, including a vegetable, protein and carbohydrate element. The food captured in case studies is considered age-appropriate in terms of ingredients, size and nutrition. In France, the meal consisted of five courses, while most other case studies described one or two courses.

*... slow cooker filled with butter chicken curry, rice cooker of white rice...* – Tasmania 3 case study

[main meal consists of] *bouchées de poulet rôties (roast chicken)...* and *œufs pochés sauce milanaise (egg with cream sauce)...* served alongside *légumes méditerranéens (Mediterranean cooked vegetables)* ... and *baguette*... – France case study

Choices between menu offerings were available in many case studies, including between main meal options, sides or toppings. When choice was available for main meals, this usually consisted of two protein options. While some case studies described providing only one main meal, the inclusion of optional cheese and fruit allowed students to still have choice in the foods they ate.

*Food service staff ... ask students their choice between the options of the day and ... portion size...* – England case study

Food quantity included different portion sizes and number of serves for students. Portion size options were offered across several systems, providing students with choice regarding quantity of food. Students in all meal systems, except for England, were offered the choice to collect more food or additional serves.

*Additional serves of baguette and vegetables are readily available upon request.* – France case study

## **Food service system**

Within the food service system domain, five sub-domains: food service model, food procurement, facilities, workforce and equipment were identified. The food service model differed greatly across

case studies depending on facilities available. Main meals were prepared offsite and delivered in the South Australia, Tasmania 3 and France case studies, using a cook-chill food service model, while the remainder prepared all food onsite from ingredients and served in a cook-fresh model. Food service model and procurement method were related to availability of resources, whether case studies had an onsite kitchen facility for food preparation, or had a satellite kitchen, which is a kitchen only resourced for reheating and serving food that has been pre-prepared elsewhere. Regardless of the differing models used, all case studies still delivered a school-provided meal successfully and timely.

*The food is prepared in the attached kitchen; prepared, cooked and served on the same day.* – England case study

*The curry served has been delivered frozen to the school, after being prepared in a centralised kitchen.* – Tasmania 3 case study

All systems used a workforce, including staff members and students. Different workforces were allocated various responsibilities for meal preparation across the case studies. While in one case study some students were preparing food in the kitchen as a learning experience, other case studies had a meal, prepared by a team of food service staff.

*Students in the high school hospitality class prepare the food for this school meal during the pre-lunch lessons.* – Tasmania 2 case study

*Food service staff place the trays of chicken and vegetables onto the tables...* - France case study

When not acting as a food preparation workforce, students were sometimes allocated responsibilities that contributed to the food service flow.

*... students ... with the corresponding laminated number go up and retrieve the dessert component...* - South Australia case study

Schools provided a range of equipment to support the food service system, ranging from disposable items to ceramic, glass and metal plates, cups and cutlery

## **Administration**

Sub-domains mapped to the administration domain included policies, payments and reach of meal. Food safety policies and practices were displayed to guide school-provided meal programs in few case studies.

*A small whiteboard states the allergens present in the meals ... Students enter through the main entrance and pass by a hand-hygiene station...* – Sweden case study

Across all case studies, no payments were observed being made by students. The relevant context indicates that while payments are made for many of these systems, they are not at the mealtime,

meaning there was no indication of who may have been a recipient of a subsidised or free meal in the England and France case studies.

*A teaching assistant staff member uses an iPad to tick off student names. No payments are made by students and it is unknown who receives free school meals. – England case study*

Within each system, there was variation in the reach of the meal and observed participants. This included universal systems, where all students present were participating in the meal, or combination systems, where some students ate from their lunchboxes in the same meal area. This can be understood alongside the country context, with some jurisdictions utilising a combination of models for food provision and enabling optional participation, leading to lunchboxes consumed alongside school-provided meals. Other jurisdictions, such as France, prevent lunchboxes in school canteens, with the exception of children with food allergies.

*Only students who are participating in the meal come into the dining room... – France case study*

*At mealtime, those who are not participating in the school meal can collect their lunchbox and choose a seat at the tables. – Tasmania 1 case study*

## **Eating environment**

Eating environment domain captured the dining space, layout, seating choice, surroundings/ambience and the meal/menu promotion sub-domains. Meals were served and consumed in dedicated, multi-purpose, and/or repurposed spaces. This included school halls, classrooms or outdoor spaces, often used for multiple purposes across the school day and adjusted for purpose with furniture and décor. The use of a multi-purpose or repurposed space was shown in the four Australian case studies, none of which included a purpose-built dining room for a school-provided meal food service, in contrast to their international meal counterparts. This relates to the country context, describing the pilot program nature of the school-provided meal offering in the included Australian schools.

*... students from one classroom file out into the courtyard space, bringing their water bottles and collecting a plastic stool from a stack by the door as they enter... another classroom remains in their room, collecting their handmade placemat from the teacher and placing this on their group desks – Tasmania 3 case study*

*The meal occurs in a large dining room, previously a boarding house dining room and kitchen – South Australia case study*

Many meal spaces had an attached kitchen, with a service counter and window between the eating and preparation spaces.

*... dining room is conjoined with the large kitchen facility, where food is prepared. – England case study*

Meal spaces were furnished with shared tables, for students to eat meals collectively. Across many case studies, students were provided with choice in where to sit, with guidance from adults for younger students as required.

*Students enter the dining room and find a seat, guided by teachers into groups or empty spots – Tasmania 1 case study*

All meal spaces included an element of natural lighting, with large windows often overlooking garden or play areas. Many meal spaces were decorated with additional items, such as tablecloths and flowers.

*Large windows and glass doors overlook play areas on one end of each room and let in natural light. – France case study*

*A bunch of pink and white flowers in a glass jar sits in the middle of each table. – Tasmania 1 case study*

Information was displayed in most of the meal spaces, including information about the school food program, allergy information, food education and health promotion information, food procurement (e.g., paddock to plate), and food seasonality. While informative, this content also acted as room décor and contributed to the aesthetics of the meal space.

*Posters displayed on one wall shows images of the foods which are best grown in each month. – Sweden case study*

*... a series of posters describe different menu items and ... the rituals and time that should be implemented to help students at mealtime. – Tasmania 2 case study*

## **Mealtime experience**

Relevant sub-domains mapped to the mealtime experience domain included the service of food equipment (including plating), staff monitoring, mealtime duration and mealtime sittings. Service of food and plating responsibilities varied greatly across case studies. Meal service responsibility ranged from staff plating food and serving this food directly to students at tables, or students plating and self-serving their own food. In addition to responsibility for their own meal, students often had assorted roles in assisting or supporting the staff members to serve other students as a volunteer workforce.

*... bowls are filled with pasta and salad and are placed at the kitchen window. From here the bowls are collected by volunteer older students or classroom teachers, who deliver this to each waiting student... - Tasmania 1 case study*

*Students collect a ceramic plate from the beginning of the buffet area, then proceed along the line, self-serving the food they are interested in. – Sweden case study*

Staff or adults were present in all case studies, assisting with the food service or monitoring student behaviour.

*Staff monitor the meal for behaviour and ensure food is being appropriately shared, providing assistance where required.* – South Australia case study

All mealtimes were less than 30 minutes in duration, with the exception of the case study in France who sat down for approximately 40 minutes for their multi-course meal, aligned with cultural eating norms. Case studies showed most food services had several staggered mealtimes within the same dining space. Students spent time playing before or after the mealtime.

*After about 15 minutes most students are finished eating and head outside to enjoy their playtime.* – Tasmania 1 case study

*This process repeats, with students leaving once they are finished and different year levels beginning their mealtime in a staggered fashion throughout breaktime.* – Sweden case study

## **Post-meal**

Clearing of plates, cleaning and evaluation measures were all mapped to the post-meal domain. After students finished eating, all case studies described students contributing to the post-meal tidying or clean up. This contribution ranged from students stacking their plates at the table for staff to collect, to students being responsible for disposing of food waste.

*Once students are finished eating, they stack their own dirty dishes in a pile on the table, helping the staff to clear these onto the trolley to be cleaned in the kitchen ...* – France case study

*Once they are finished eating they bring their bowl and fork to a clean-up area, where they scrape the waste from their meal into a bucket, stack their bowl on a table and place their fork into a tub.* – Tasmania 1 case study

*Food waste is scraped into the bin by students, and then cutlery, plates and cups are placed in their designated tray.* – England case study

Once students complete their responsibilities, the cleaning of the dishes and dining room is typically the responsibility of staff.

*After the students leave, staff quickly collect the share plates, returning them to the kitchen space, and pick up any large pieces of food from the floor...* - South Australia case study

*Students stack their cutlery and crockery into a dishwasher tray which sits in the window between the kitchen and dining room, where a staff member is washing the dishes as they are collected.* – Sweden case study

Two case studies captured an evaluation strategy of the described food service. France included a

satisfaction rating scale, and a weighed food waste measure in the Sweden case study, showing the students and staff how much food waste had been produced from that meal. This is understood within the country contexts, indicating the focus on reducing food waste in these well-established meal programs.

*There is an opportunity for students to provide feedback on the main meal which was served, using a smile scale button outside the door. – France case study*

*Once they are finished eating, food and other waste is scraped into a bin station, with separate bins signed for food waste or other, such as serviettes. The bin is automatically weighed, indicating the amount of food waste which has been collected that day. – Sweden case study*

## 4.6 DISCUSSION

The present study addresses a gap in the literature by describing how food service systems for school-provided meals are delivered internationally with differing contexts. Case studies were developed through naturalistic observation and an interpretative epistemology to explore individual food services. The case studies were mapped within a school food service framework, relating to domains of Menu offering, Food service system, Administration, Eating environment, Mealtime experience and Post-meal. This allowed for an understanding of how food services can function and exist across various school settings, related to the country context and school facilities. The results showed the food service of school-provided meals was not uniform; however, many case study schools created a health promoting eating environment using information and meal promotion, decoration of dining spaces, and social eating, and empowered students with choice and responsibility.

Variation was found across the food service systems examined, with different systems all able to deliver a consistent end-product, of a nutritious and age-appropriate lunchtime meal provided within a school-setting. The study findings highlight that there is no consistent profile of a school-provided meal program. Numerous factors influence the variation observed, including the historical context, resources and facilities, and the program goals and cultural underpinnings. The history outlined in the country context had clear influence on the food service described in the case studies. Particularly, there is a contrast between the established school-provided meal contexts and the developing Australian school-provided meal pilot programs. The established systems captured in the present study predominantly introduced school-provided meals as a mode of food welfare stretching back to the early-mid 1900s<sup>214</sup>. This decades-long offering has allowed for school facilities to be purpose-built, food service systems to be well established and funding models to be in place to adequately support functioning of a sustainable system. Contrastingly, the developing systems appear constrained by resources and funding, resulting in a limited program

reach, need for multi-purpose dining spaces and occasional use of students as a workforce. This is unsurprising, as limited resources and funding has been acknowledged as a challenge for schools in Australia, New Zealand and Canada when transitioning to a school-provided meal service<sup>5, 139, 222</sup>, resulting in varied and flexible offerings within each school. The programs delivered are also related to the cultural underpinnings and government priorities of the high-income countries included. This includes the recognition of feeding children as a public priority contributing to the universal, free meal offering in Sweden<sup>223</sup>, while the importance of French food culture acts as a driving force for the 5-course meal structure, extended mealtime and restaurant-inspired meal format<sup>4</sup>. This demonstrates a combination of intrinsic factors, such as school facilities (e.g., onsite kitchen, dedicated dining space), and extrinsic factors, such as policy, funding and culture, can influence on the required system. Meaning no one size can fit all when it comes to design and delivery of a school-provided meal, even within one country or region. As a result, this reiterates the need for consideration of the specific context when developing a school-provided meal program, while establishing the goal of the program to appropriately prioritise resources.

With increasing understanding of the role that school mealtimes play in learning, habit formation and food relationships, as well as the need for child acceptability<sup>100, 214, 224</sup>, school-provided meal programs have needed to evolve into much more than just a feeding program, transforming the school approach to food. This is well distinguished into three phases of school-provided meal programs, by Oostindjer and colleagues<sup>214</sup>. The current position was captured by The WFP, describing school feeding programs as “platforms through which important complementary education, nutrition and health activities are delivered”, (p.26)<sup>70</sup>. This is aligned with the health promoting schools principle, which situates schools as a safe setting for living, learning and working<sup>20</sup>, with the eating environment important in creating a learning environment to form positive relationships with food. Despite variation in the established or developing nature of the programs, all case study schools demonstrated modes of achieving a broader approach to food. This included creating a positive eating environment and mealtime experience conducive to child wellbeing, with information and meal promotion, decoration of dining spaces, and social eating. The lack of visible payments anonymised any eligibility for free and subsidised meals, which have been associated with stigma and shame<sup>225</sup> supporting an equitable, safe and wellbeing promoting environment for meal participants. This consideration for the food environment, regardless of the stage of implementation, demonstrates the importance of a positive and health promoting approaches to food needed to deliver a modern school food service.

Elements of student choice and responsibility were present across all school food service systems in various ways. In every case study, students were provided with choice, whether it was around seating, two meal items, portion size, additional servings or when they could leave to begin playtime. These choice elements align with the ‘limited or guided choices’ definition described by Vaughn and colleagues<sup>226</sup>, providing appropriate choices for the child, being reasonable within the



situation, which is a commonly utilised practice by parents<sup>227</sup>. Students had responsibility for the meal service across each system, including serving, cooking, clearing/scraping plates or cleaning, contributing to an ownership of the program functioning. While student choice and responsibility were consistent principles in every case study, the extent to which these were emphasised varied, with staff present in all systems, to provide support or hold responsibility for other roles. Child choice and responsibility are key concepts for child acceptability of a school-provided meal system. Previous research with children describing a hypothetical school-provided meal scenario found children consistently referred to the choices and roles they would hold, including seating choice, food or beverage choice and cleaning responsibilities<sup>228</sup>. In the present study, choice and responsibility that was limited or guided provided an opportunity for students to have autonomy over the program, while still exposing them to new experiences integrated into the program delivery. For example, allowing children to choose between two healthy food options, balancing autonomy while ensuring children are exposed to a nutritious meal. These principles of child food autonomy have potential to facilitate student engagement and incidentally create a learning experience about food service. Autonomy-supportive practices have been associated with healthier food choices for children<sup>229</sup> and have potential for broader positive effects, such as developing healthy food habits and including influencing the intake of broader society<sup>214</sup>. As such, the adoption of student choice and responsibility principles across all case studies demonstrates the importance for this in the delivery of a school food service model and contributes to the creation of a health promoting environment.

The current study findings should be understood in the context of the strengths and limitations. The observational study design allows exploration of the school food system and how it functions, capturing a unique and consistent understanding of the system functioning than might be possible with other data collection methods, such as interviews. The non-experimental naturalistic nature allows observation in the natural environment without intervening or manipulating any features, strengthening the external validity of this research. Observational research avoids the potential confirmation bias that may be present in interviews, allowing the researcher to observe and interpret from an outsider perspective. While this limits subjectivity, observational research still poses a risk of observer bias influencing the results and interpretation. To mitigate this, reflexive journaling with the use of the inquiry cycle and cross-checking by other researchers at each stage of the data collection and analysis was used to reduce the potential influence of observer bias and acknowledge the role and influence of the researcher as part of the research.

The naturalistic design poses notable limitations, as not all factors within a system are visually observable and therefore important elements can go undetected. This may include the costs, administration and adoption of the food service, which influence the system functioning. Furthermore, this study was limited in its scope due to the in-person data collection and focus on high-income countries. Therefore, the findings do not capture breadth of variation that may be seen

over a wider range of countries at different income levels with varied government priorities, or other countries undergoing school food transitions, such as New Zealand and Canada. It is also important to note that while there was variation in resources available across the case studies, all case studies were from high-income countries. Thus this variation must be considered relative to the level of privilege these countries have over others with alternative financial contexts<sup>178</sup>

Future research should continue to explore school food models using a food service lens. Often being an overlooked component of the program, this research has demonstrated the influential impact food service delivery has on the experience of a school-provided meal model. This includes understanding the ways a food service can function and how challenges are addressed when resources are limited, to ensure a school-provided meal can still be provided. Ongoing work should explore the perspectives of stakeholders on food service of school-provided meals, understanding which of the domains plays a critical role in system acceptability and feasibility. Particularly exploring what sub-domains are most important to parent and students, as key stakeholders, to provide further insight into the components needed for design of highly acceptable programs, including the reach of the program, cost and eating environment. The food service framework (9.3.1) developed iteratively using findings of this study can also be used to support in the planning and evaluation of future school-provided meal programs, understanding the key stages of the food service influencing the mealtime functioning. This framework should continue to be developed to optimise the potential application.

## 4.7 CONCLUSION

This research provides an understanding of how a food service can be delivered, relevant to the context, in schools with varied facilities and resources. Particularly, this provides examples of feasible school-provided meal programs and the food service factors that play a role in system functioning. The findings build on existing research of school-provided meal systems across countries, focusing on the food service on the school level, demonstrating how these highly variable systems can function to achieve a collective end goal. Results demonstrate the need for tailored school food programs, designed appropriate to the context in which it exists. Furthermore, positive eating environments, appropriate levels of child choice and responsibility were all noted as principles important in a successful school food service and can contribute to an environment conducive to health promotion. This knowledge can be used to understand what is feasible in school food service, informing planning of future systems, particularly for regions transforming into a school-provided meal model, and those looking to implement improvements to existing systems.

# **CHAPTER 5. “NOT JUST STUDENTS IN NEED”: FINDINGS FROM A NOMINAL GROUP TECHNIQUE STUDY OF WHAT PARENTS WANT IN AN AUSTRALIAN SCHOOL-PROVIDED MEAL SYSTEM**

## **5.1 CHAPTER CONTEXT**

Findings of the review (Chapter 3) demonstrated the need to further engage parents, particularly understanding specific parent needs within the Australian context to inform school-provided meal systems. This aligned with the Consumer and Community Engagement Framework, indicating the need for parent perspectives to inform a potential system to ensure acceptability and thus adoption. Therefore, the next stage of research intended to explore how the features identified within the review align within the Australian context, understanding how a school-provided meal system would need to be designed to meet the priorities of Australian parents. The learnings gathered within the case studies (Chapter 4) provided a feasibility lens to the workshop discussions, to ensure the potential complexity of adopting a system into a real-world setting and the importance of system tailoring were adequately considered.

The advisory group of school food stakeholders was engaged in a pilot workshop, where the workshop was conducted with advisory group members as test participants. Advisory group members were then able to provide comprehensive feedback on the workshop experience, which was used to modify workshop flow, language and optimise engagement opportunities for participants. Findings of the workshops were also reported to advisory group members, supporting interpretation of the results.

In addition to gaining a comprehensive understanding of Australian parent perspectives, this study also strived to prioritise the features of school food systems. This allowed the most important features to be further evaluated within the Discrete Choice Experiment (DCE), aligned with best practice for DCE design.

A version of this chapter has been peer-reviewed and published (Appendix 9.2) in Australian and New Zealand Journal of Public Health<sup>230</sup>. This chapter was used to prepare the publication, therefore there is direct overlap in content and phrasing. The chapter and publication were led by the PhD candidate, who was responsible for the research design, data collection, data analysis and writing. Data collection was also supported by a research assistant, who was acknowledged as a co-author. PhD supervisors supported in project conceptualisation and provided intellectual guidance. Co-authors therefore contributed <15% of work conducted.

## 5.2 CHAPTER ABSTRACT

### **Purpose**

Schooling is a unique nutrition promotion setting, where children consume over 2000 lunches. Currently in Australia, school food provision is predominantly reliant on parents/caregivers providing lunchboxes. Interest in a transformation to school-provided meals is growing; however, parent perspectives are not well understood, critical to ensure acceptability. Therefore, this study explored the most important features of a potential school-provided meal system to parents of primary school children in Australia.

### **Methods**

Virtual workshops were held using the Nominal Group Technique to identify, discuss and prioritise features of a potential school-provided meal system. The workshops expanded on and contextualised 15 features identified from an international literature review of parent perspectives across different school food provision models. Eligible participants were Australian parents and/or caregivers of primary school-aged children.

### **Findings**

Five workshops were held with a total 25 participants. Parents discussed a wide range of features they would be interested in seeing within a school-provided meal model. Parents identified new features in addition to those identified from the narrative review, with a total of 28 features identified. The top five features of most importance to parents were nutrition (importance score 0.46), cost (0.42), stigma considerations (0.32), catering to dietary requirements (0.29), and sustainability and waste (0.25), demonstrating there are many considerations for Australian families when discussing the potential transformation of our school food model.

### **Conclusions**

Workshop findings demonstrated there is potential for a parent-accepted school-provided meal model and the key considerations needed in the design. Findings can be used to inform the design of school food programs aligned with parent needs, supported by implementation strategies used internationally and locally, conducive to optimum child and parent health outcomes.

## 5.3 INTRODUCTION

Children will consume over 2000 lunches at school across their years of schooling. This means that schools, and particularly school lunches are a unique nutrition promotion opportunity that reaches all children regardless of socio-economic and cultural circumstance<sup>20</sup>. Internationally, children access lunch at school via many different food provision models. Common food provision

models include lunches packed at home (i.e., lunchboxes, packed lunch), school-provided lunch or meal(s) and or a combination of the two<sup>41, 71, 126, 133</sup>. Additional models include food relief provision, and 'competitive' foods e.g., canteens and vending machines<sup>71</sup>. The variation in models results in very different school food environments and health promotion opportunities. The different models place food provision responsibility on different key stakeholders, including parents/caregivers (i.e., those responsible for the care of children, hereon referred to as parents), schools, government and non-government organisations.

Universal school-provided meals, where all children in a school are provided a school lunch, can deliver benefits in children's health, development, wellbeing and education<sup>88</sup>. School-provided lunches are associated with better diet quality compared to a lunchbox<sup>38, 83, 231</sup>. Meal provision reduces parent burden in purchasing and packing lunches, and the complexity of school health promotion, while acting as a social safety net for all children. Globally, one in two children receives a school-provided meal<sup>72</sup>. Countries including Australia, Canada and New Zealand that predominantly use a lunchbox model, are interested and piloting the adoption of a school-provided meal model<sup>5, 133, 179, 203, 232, 233</sup>.

In Australia, the call to consider the benefits of a school-provided lunch offering is growing, particularly given cost of living pressures post COVID-19 pandemic<sup>234</sup>. Currently school food provision is predominantly reliant on parents using lunchboxes, supported by canteen purchasing and ad-hoc food relief provision. Challenges of the current lunchbox system have been well described, including parent burden, food safety, food policies and guidelines, ineffective nutrition promotion efforts<sup>235</sup>, and limited eating times, with the current system lacking cohesion<sup>5, 235</sup>. School-provided lunches have therefore gained initial support from parents<sup>159, 161</sup> and other stakeholders<sup>158</sup>, with pilot programs of school-provided lunch programs emerging<sup>236</sup>. Design of an Australian school-provided meal model could use learnings from international examples and be tailored to the needs of Australian stakeholders. Previous research has explored the perspectives of Australian stakeholders including education staff, health promotion staff and food industry staff, identifying the potential of school-provided meals in Australia<sup>158</sup>. Student views have also been explored, identifying the considerations for a child-acceptable Australian system<sup>228</sup>. A system transformation would require a shift in the social norms of food provision from exclusively parents' responsibility to a shared community responsibility<sup>105</sup>. Additionally, parents hold a central role in children's diets as the primary food providers<sup>237</sup>, including financially, while being one of the largest stakeholder groups in school food systems. Therefore, consultation with parents to understand their perspectives on a system is critical to ensure acceptability.

While emerging evidence indicates parent interest in a school-provided meal offering<sup>159, 161</sup>, research has not explored Australian parents' perspective on a potential transformation in depth, with limited understanding of the priorities in system features. Understanding what features are a priority to parents can lead to tailoring the design of new school-provided meal systems to meet

families' needs, paving the next steps for school food transformation. Therefore, this study aimed to understand the most important features of a potential school-provided meal system to parents of primary school children in Australia.

## 5.4 METHODS

### 5.4.1 Study design and methodology

The Nominal Group Technique (NGT) design was used to collect cross-sectional quantitative and qualitative data. The present study is reported according to the requirements of the Strengthening the Reporting of Observational Studies in Epidemiology Statement for cross-sectional studies (STROBE)<sup>238</sup> (See Appendix Table 9-5). Methods and reporting were performed in accordance with the ethical standards laid down in the Declaration of Helsinki and was approved by the Human Research Ethics Committee of Flinders University (5812). All participants provided informed consent prior to participating.

The NGT process is a structured variation of small-group discussions or focus groups<sup>239</sup>. It is a collaborative consensus process designed to prioritise ideas amongst a small group. The NGT process is a resource efficient method, allowing for the inclusion of a diverse range of participants in a low burden workshop that is short in duration, in comparison to interviews and surveys<sup>240, 241</sup>.

The workshops sought to explore and contextualise findings of the review (Chapter 3) to the Australian population and school food transformation environment<sup>173</sup>. The review synthesised globally what parents identify as the key features of school food provision models, using a mixed papers narrative review method, including 26 studies from 11 countries. The review deductively themed 15 features of school food systems and their definitions, that were commonly reported in the literature of parent perspectives<sup>173</sup>. The features identified in the review were cost of food, time, effort and convenience, nutrition of food, parent responsibility/control, child preferences, policy and messaging, food quality, eating time, food access/availability, child input - preparation or dining, quantity, food safety, variety, eating environment, and food classroom education<sup>173</sup>.

### 5.4.2 Participants

Participants were eligible if fluent in written English, to allow for participation in the NGT tasks, and if they had a child enrolled in primary school in Australia. The workshops were advertised using targeted, paid Meta adverts<sup>172</sup>. Participants were provided an AUD\$10 Prezzee voucher to reimburse internet expenses. The flyer was distributed through several organisations, community groups and schools. Participants expressed their interest using a brief online survey via Qualtrics<sup>242</sup>, which confirmed eligibility, collected socio-demographics and availability. Participants

were then contacted via email and/or phone and invited to workshop times, aligned with their provided availability.

A recruitment strategy, informed by national data on parent populations, available in Appendix Table 9-6, was employed to guide purposeful recruitment, using parent socio-demographics provided in the survey. This included targets for participants across a range of demographics, with recruitment strategies modified to reach populations of interest. For example, this includes participants of diverse cultural backgrounds, gender identity, socio-economic position, education and employment, family size, family structure and living location.

Following a number of suspicious survey responses, based on location tracking and flagging from Qualtrics<sup>242</sup>, further fraud detection software was included in the survey and suspicious responses discarded as per recommendations. Additionally, modifications were made during recruitment based on participant feedback. This included predominantly communicating via text message, rather than phone call or email and sending additional reminder texts.

### **5.4.3 Positionality statement**

The data collection team (PhD candidate, DCD) consisted of white females with no children, therefore, did not approach this research with personal experience of parenting or cultural adversity. Careful consideration was taken to mitigate the influence of the researchers on parent participants during the workshops, through neutral positioning, and reflexive meetings held between the research team to bracket assumptions, reflect on findings and reduce the influence of bias during data analysis. Research was also conducted in consultation with an advisory group of school food stakeholders, including parents and educators, to ensure the research methods are appropriate and inclusive for participants, while enabling transparency in analyses.

### **5.4.4 Instrumentation**

Prior to beginning data collection, a pilot workshop was conducted with advisory group members, to test the workshop flow and structure, with modifications made as needed. The NGT process was conducted within virtual 1.5-hour workshops using Microsoft Teams (Version 1.0; Microsoft). The workshops were held between September and October in 2023. Workshops were held by two researchers, one who facilitated (PhD candidate) and the other who scribed notes and provided attendees with any technical support (DCD). Workshops were audio-recorded, which was later transcribed using Fireflies AI transcription service<sup>243</sup> and checked by the PhD candidate for accuracy.

Participants were provided context of the current school food system in Australia, a summary of school-provided meal systems internationally and introduced to a potential school-provided meal system in Australia at the beginning of the workshops by the PhD candidate. The research aim and the findings of the previous review, including the 15 parent identified features of school food

systems internationally and their definitions, were described by the PhD candidate. Presentation of the existing features at the beginning of the NGT process provided participants further relevant context, while examples of 'features' of school food assisted with participant understanding and was time efficient to reduce participant burden. Participants were prompted to consider if there were 'any other important features of an Australian school-provided meal system that aren't included?'. Participants then completed the four NGT stages: brainstorming additional features; recording features; discussing features; voting on ideas<sup>240, 244</sup>, further described in Table 5-1. All features were discussed in the discussion phase, to ensure all features were comprehensively understood in the Australian context.

Following the discussion phase, the final list of features was collated and transferred to a Qualtrics<sup>242</sup> questionnaire and shared with participants for voting. Participants voted on the most important features to make a school-provided meal system acceptable to them as a parent/caregiver. Participants voted for a total of five features, selecting one feature per rank position. Votes were scored, with the top voted item from each participant receiving a score of 5 points, second voted item receiving 4 points etc.<sup>240</sup>. The total scores for each feature were summed and top five scored features were shared with participants, providing an opportunity for further comment. Data captured from each workshop included a list of features, definitions and discussion points, audio and chat transcripts, and voting scores on features.

**Table 5-1: Summary of Nominal Group Technique method as used in workshops**

<b>NGT stage</b>	<b>Content</b>
<b>1. Brainstorming additional features</b>	The facilitator asked participants to silently brainstorm new features that were not identified in the literature.
<b>2. Recording features</b>	Participants shared their brainstormed features in a round-robin style feedback session, guided by the facilitator, allowing for equal sharing of ideas. Features and definitions were recorded on a shared document by the scribe. Participants who had no new features could 'pass' their turn to share. This process continued until all new features were documented.
<b>3. Discussing features</b>	Participants were able to refine, collate and build on the original features identified in the literature and new features, through group discussion. Participants asked clarifying questions to the group and built on other participant's features. Participants shared specific details about the features that would make it acceptable to them and ideas about how a potential school-provided meal system could function. The facilitator moderated the discussion, and all points were summarised by the notetaker onto the shared document. Notes were checked with participants throughout the workshop to ensure they were accurately reflecting their views, and any unclear sentiments were confirmed, allowing for collaborative collation and cross-checking of new features that had been raised in other workshops. Features were collated or separated based on group consensus and updated on the document.
<b>4. Voting on ideas</b>	Participants voted privately using an online Qualtrics <sup>242</sup> survey to rank their top five features.



Total votes were summed by researchers live in the workshop and the highest scoring ideas were presented to the participants, with participants asked if they had any further comments on the top features, before the workshop was completed.

### 5.4.5 Sample size

Best practice guidelines for NGT studies recommend aiming for 6-8 participants per workshop<sup>158, 240, 241</sup>. The number of workshops is based on the principle of data saturation, the point at which additional workshops do not provide new insights, themes or information related to the phenomena of interest<sup>245</sup>. The aim was to conduct a minimum of three workshops, with 7-10 participants scheduled per workshop, to account for non-attendance.

### 5.4.6 Data analysis

#### Analysis of qualitative data

Qualitative data consisted of feature lists, definitions and workshop discussion points, summarised within workshops by the scribe and checked by participants live in workshops, and workshop transcripts. Data checking by the PhD candidate was conducted at the end of each workshop to understand data saturation. Data saturation was defined as no new features identified and consistency in the discussion of the features for at least two sequential workshops. Features identified in multiple workshops were also collated. Collation allowed for a completed list of features and definitions to be developed after the final workshop. Accuracy of collation was aided by the cross-checking of ideas between workshops with participants, to understand if features and definitions were consistent and discussion with DCD.

Following completion of all workshops, transcripts were reviewed by the PhD candidate to confirm the collated feature definitions, accuracy of the workshop discussion notes and identify key quotes. Quotes that captured the workshop discussion points have been presented alongside summaries of features, ensuring the parent voice is accurately presented<sup>246</sup>. Many features were discussed as being associated with one another, therefore are presented in conjunction.

#### Analysis of quantitative data

Quantitative data consisted of the voting scores from participants. Scores were analysed to determine the overall importance score and therefore identify the priority features. Voting scores were analysed in two groups, the total voting score across all workshops and voting scores clustered by workshops. This allowed consideration of both the influence of workshops on conversation clustering and individual perspectives<sup>240</sup>. As informed by the qualitative data, scored votes for collated features were combined and all votes for each feature summed to form the total score across workshops. To cluster workshop scores, the top five features from each workshop were scored using the same point allocation method (i.e., top voted item from each workshop

receiving a score of 5 points, second voted item receiving 4 points etc. <sup>240</sup>). These scores were then used to calculate the importance scores.

The total score across all workshops was used to calculate the importance score for participants.

$$\text{Importance score by participants} = \text{total score from individual votes} / (\text{total participants (24)} \times \text{maximum score per person (5)})$$

Total scores from workshop rankings were used to determine the importance score, relative to the number of workshops it was raised in.

$$\text{Relative importance score clustered by workshops} = \text{total score from workshop ranking} / (\text{number of workshops feature was discussed in} \times \text{maximum score per workshop (5)})$$

Overall importance considered both the individual and workshop-clustered importance scores, used to determine the overall rankings of the items, out of a maximum value of one.

$$\text{Overall importance} = (\text{Importance score by participants} \times 0.5) + (\text{Relative importance score clustered by workshop} \times 0.5)$$

The results presented collate the features discussed in the workshop, with the overall importance, discussion points and direct quotes, shared verbally or messaged in the Microsoft Teams chat (messaged quotes are identified).

## 5.5 RESULTS

### 5.5.1 Sample characteristics

Eighty-eight participants completed the expressions of interest survey, with 48 eligible participants stating they were available at the workshop day/times and scheduled into a workshop. Forty interested participants did not respond to communication or were unavailable to participate in a workshop and therefore were lost to follow-up. Five workshops were held, with a total of 25 participants attending (4-9 participants per workshop). No new features or unique information was identified following analysis of the transcripts 4 and 5 when compared to the initial three transcripts. While all participants contributed to the feature identification and discussion, captured in the qualitative data, 24 contributed to the quantitative voting, due to technology challenges for one participant.

With the exception of workshop one, there was mixed attendance, with an approximate 50% rate of non-attendance (Table 5-2). This was attributed to a number of factors, with many participants stating last minute challenges had arisen and needed to care for their child or family. Numerous participants contacted the PhD candidate on the day of the workshop and said they would be

unable to join. Participants who were willing and available were rescheduled into another suitable workshop time.

**Table 5-2: Number of participants per workshop**

Workshop number	Participants attended
1	9*
2	4
3	4
4	4
5	4
Total	25

\*One participant had an error with voting, resulting in votes not being captured

Most participants (n=19/25) identified as women and were married/de facto/partnered (n=19/25), living in major cities (n=21/23). Participants were diverse in their described culture and country of birth (n=9/25). Most participants worked part-time (n=14/25) and had completed tertiary education (n=15/25) or a postgraduate degree (n=6/25). Participants lived across areas of varying levels of socio-economic advantage, with participants from each quintile of socio-economic advantage (SEIFA). Household income ranged, with seven participants with a household income between \$20,800-\$90,999 and 11 with an income of \$91,000+. Further participant characteristics are available in Table 5-3.

**Table 5-3: Demographics of workshop participants (n=25)**

	<i>N</i>
Age (years) (mean, SD)	38 (7.6)
Gender identity	
Man	6
Woman	19
Relationship status	
Married/de facto/partnered	19
Divorced	2
Single	4
Cultural identity <sup>1</sup>	
Identified as culturally diverse or born in a country other than Australia	9
Socio-Economic Indexes for Areas <sup>2</sup>	
Quintile 1 (highest level of disadvantage)	4
Quintile 2	2
Quintile 3	5
Quintile 4	6
Quintile 5 (lowest level of disadvantage)	6
State of residence <sup>2</sup>	
Victoria	10
New South Wales	5
South Australia	3
Western Australia	3
Queensland	2
Parent/caregiver employment	
Not currently employed outside the home	4
Employed casually	2
Employed part-time	14
Employed full-time	5
Annual Household income <sup>3</sup>	
20,800-33,799	2
41,600-64,999	3
65,000-90,999	3
91,000-155,999	2
156000+	9
Parent/caregiver education level	
Some tertiary education	3
Completed tertiary education (degree, diploma, certification)	15
Postgraduate degree	6
Did not complete high school	1
Remoteness <sup>†</sup>	
Regional/Remote Australia	2
Major Cities	21

SEIFA, Index of Relative Socio-economic Advantage and Disadvantage 2021<sup>247</sup>. Calculated using postcode, SEIFA considers income, education and employment in specific living areas, therefore indicating the social and economic well-being in that region.

<sup>1</sup>Cultural identity was self-described by participants to allow them to self-identify, stating either their cultural identity or country of birth other than Australia. Cultural identities stated by participants included Asian, Māori, Croatian, Ukrainian, Caribbean and French. Countries of birth included Pakistan, the US and England.

<sup>2</sup>2 participants did not provide postcode, preventing identification of state/territory, SEIFA and remoteness using Australian Bureau of Statistics data<sup>247, 248</sup>

<sup>3</sup>6 preferred not to answer

### **5.5.2 Features**

Participants were presented with the pre-identified 15 features and definitions from the narrative review, described in Chapter 3 (Table 3-4). Participants discussed existing features and identified new features, resulting in 28 total features. Table 5-4 presents the 28 features, definitions and importance rankings. Top-ranking features discussed in text and relevant quotes, with all other features are summarised below

When voting, participants described prioritising the non-negotiable features required for a school-provided meal system to function, in addition to a range of features they view as important in their acceptability. The top five features of highest importance were nutrition, cost, stigma considerations, catering to dietary requirements, and sustainability and waste. Features that were commonly voted on included three new features such as stigma considerations, catering to dietary requirements, and sustainability and waste, as well as 16 prioritised features from the narrative review. This indicated many priorities of the parents in the present study were aligned with parents internationally. Parents discussed a wide range of features and concepts they would be interested in seeing within a school-provided meal model. While not top priorities, all features identified can be considered important to parents and parents acknowledged features were often interrelated and relied on one another.

**Table 5-4: Summary of parent prioritised features of a potential school-provided-meal system in Australian primary schools**

Feature	Definition	Number of workshops feature was discussed in	Priority ranking per workshop					Total number of participants voting on feature	Total score from individual votes	Importance score by participants	Total score from workshop ranking	Importance score clustered by workshop	Overall importance	Overall ranking
			1	2	3	4	5							
Nutrition of food	The perceived nutritional quality of food (based on the Australian Dietary Guidelines)	5	3	1	2		4	24	43	0.36	14	0.56	0.46	1
Cost of food	Financial costs of providing food	5	2		1		3	24	43	0.36	12	0.48	0.42	2
<i>Stigma considerations</i>	Provision of food doesn't influence shame, dignity and agency	3	-	-		2	3	12	20	0.17	7	0.47	0.32	3
<i>Catering to dietary requirements</i>	Requirements related to child health i.e., allergies or intolerances, related to the child's medical history	3		-	3	3	-	16	21	0.18	6	0.40	0.29	4
<i>Sustainability and waste</i>	Procurement considerations and management of food waste in the food environment	3	-	4		-	2	12	12	0.10	6	0.40	0.25	5
Food access/availability	Reliable access to food and food readily available when needed	5		3		5	2	24	17	0.14	8	0.32	0.23	6
Quality	Quality of food items, including freshness	5	1					24	25	0.21	5	0.2	0.20	7
Time, effort and convenience	Non-financial resources required for food procurement, preparation and provision	5	4	2				24	20	0.17	6	0.24	0.20	8
School food policy and messaging	School food policy, including healthy eating and packaging policy, teacher monitoring and school food rules	5		2		4		24	18	0.15	6	0.24	0.20	9
Food safety	Handling, preparing and storing food to reduce the risk of foodborne illnesses	5				1		24	20	0.17	5	0.20	0.18	10
Variety	Having a range of different food items, rather than repeated items each school day	5			4		3	24	15	0.13	5	0.20	0.16	11
Food classroom education	Education for students surrounding nutrition and food in school curriculum	5		4			4	24	13	0.11	4	0.16	0.13	12
Catering to child preferences	Child food preferences, enjoyment and restricted/selective eating	5	4				5	24	17	0.14	3	0.12	0.13	13
Eating environment	The school food eating environment, including room setup and area as a social setting	5		5	5			24	15	0.13	2	0.08	0.10	14
Parent/caregiver engagement	Parent involvement in food provision and monitoring of child intake	5		4				24	10	0.08	2	0.08	0.08	15
Eating time	Time allocated specifically for eating in school breaktimes	5	5					24	13	0.11	1	0.04	0.07	16

New features indicated in *italics*

In addition to these features, *Mind-Body connection*, *Cooking/preparation facilities*, Child input – preparation or dining, *Quantity*, *Community engagement*, *Flexibility*, *Cultural considerations*, *Employment opportunities*, *Resourcing arrangements*, *Government school-provided meal program policy*, *Food sourcing*, and *Champion/Advocate* were raised in a single workshop or received a score of <5

### 5.5.3 Top 5 ranked features

#### Nutrition

Nutrition was the top-ranked feature, with an overall importance score of 0.46. Nutrition was consistently discussed as an important feature, which was reflected with it ranking within the top five features in four of the workshops. The sentiment surrounding nutrition was that it needed to be a focus of the program and was required to make it acceptable.

Nutrition was often discussed by parents with quality, which was a top ten ranking priority. These concepts were often seen as quite interrelated, or parents had a desire for food to be provided that was both nutritious and of good quality. Parents discussed quality in terms of fresh fruit and vegetables and good cuts of meat. One parent related this to a popular video where Jamie Oliver makes chicken nuggets with chicken scraps.

*“Quality for me would be the chicken nuggets thing with Jamie Oliver versus the nutrition would be food groups.” – #14, Father, workshop 3*

Nutrition was framed as food that supported a “*mind-body connection*”, meaning it supported concentration and learning for the classroom. Parents described the importance of consuming nutritious food in educational outcomes.

*“the kids all get provided ... fruit ... They found that there was a much higher success rate in students focusing on their tests when they did that...” - #24, Mother, workshop 5*

This was discussed as contrasting with current food relief or canteen programs, which were framed as focused on food quantity and donated foods, rather than nutrition or quality.

*“...one of the struggles I have ... the ways that food relief is provided is that it's often just getting carbohydrates because it's cheap and ... available. But what we actually need in bellies for brains is a wide range of quality fresh fruit, vegetables, protein...” – #15, Mother, workshop 3*

The Australian Dietary Guidelines were discussed as a potential way to inform the menu and ensure that the school-provided meal would be of a high nutrition standard. Relating to the school food policy and messaging feature, parents also proposed the creation of new school-provided meal specific nutrition guidelines and discussed that nutritionists and dietitians could play a role in informing the menu.

*“I guess it would be good to have nutrition profile be matched to the growth stage of the child/their needs.. e.g. protein and calcium etc” – #9, Mother, workshop 1, message in meeting chat*

Parents noted their interest in having balance when it came to the nutrition of food, including items on the menu that aren't nutritious but contribute to the enjoyment of the meal, such as cake. This

related to creating positive food relationships and not restricting children or teaching them that foods are 'bad'.

*"it's about everything in moderation"* – #8, Mother, workshop 1

Parents discussed other features, such as variety (ranked 11<sup>th</sup>) and quantity (ranked 21<sup>st</sup>), all being related to the food provision and the menu to be offered; however, the voting revealed they viewed these as having lower importance in comparison to the nutrition.

## **Cost**

The cost of meals was of high importance to parents, with an overall ranking of 2 and a score of 0.42, consistently discussed across all workshops, and ranked as a top priority for three of the five workshops. Many parents discussed the need for such a system to be affordable for all families. Parents identified their need for price of food to be aligned with a measure such as household income. Government contribution or subsidies were positioned as a key enabler for this, with need for achieving equity both across different schools and within each school being a key consideration.

*"With funding I think if it is part or wholly 'parents pay' I think it should be like CCS [Child Care Subsidy] - parents pay based on income"* – #8, Mother, workshop 1, message in meeting chat

*"...and I guess just if they were to bring food into schools, making sure that it is affordable because otherwise it kind of just defeats the purpose, especially in lower socioeconomical places..."* – #24, Mother, workshop 5

Concerns were also raised by some parents about making sure all those in need are captured by the income measure used and how you can ethically distinguish need, discussing issues with eligibility for existing systems and that many families are not eligible.

*"...the students who doesn't have health care card, their parents are also struggling actually ...It's a complicated thing ... You can't say, okay, they can afford and they can't afford..."*  
[sic] - #16, Mother, workshop 3

Other parents posed the potential for voluntary contribution, paid alongside school fees. Cost was also discussed in relation to the potential benefits that can be achieved through a school food provision system being available at a lower cost than lunchboxes.

*"If you've got four kids and all four kids need lunches, then, you know, then that's a lot of money. If a school can provide that and take that off of a parent who is financially struggling, then that could mean a world of difference ... for them."* – #24, Mother, workshop 5

Funding for schools and the need for additional budgets to allow for such a system to be implemented was acknowledged by parents, including staffing costs. However, parents acknowledged that investing in a school-provided meal system would be money well spent.



*"I think the cost benefit ... the health benefits to the cost would be huge..." – #22, Father, workshop 5*

### **Stigma considerations**

Stigma considerations was a new feature identified, ranked third on importance, with an overall score of 0.32, and identified in three workshops. This included a range of considerations centred around making sure the food provision did not result in any emotional harm and was provided in a way that supported positive food relationships. It was consistently defined as the provision of food that doesn't influence shame, dignity and agency. One parent described this as *"increasing equity and removing shame"* (#25, Mother, workshop 5).

School-provided meals were posed as a potential way to achieve greater equity across society.

*"Try to give .. people like a level playing field ... to compete in society and things and rural areas or whatever ... I'm shocked we don't have this in Australia to be honest" – #22, Father, workshop 5*

However, parents also considered the risks associated with school-provided meals, including for eating disorders or judgement of quantities consumed.

*"There's a lot of stuff wrapped up in food for children and we need to ensure that they have a very healthy relationship and part of that is ensuring ... dignity and agency for the child." – #15, Mother, workshop 3*

Concerns were linked to the school food policy and messaging, which was ranked 9 and scored 0.20, with messaging a way to reduce stigma. These concerns centred around nutrition messaging, including monitoring of children's intake, staff imposing right or wrong quantities, or providing nutrition opinions and categorising food as good and bad. Parents noted a system would need to address these aspects to prevent stigma.

*"... having teachers come and say you have to eat the healthy food before the unhealthy food is really unhelpful... So my concerns are less about the kind of food that's given and more around that the policy and messaging ... teachers have their own nutrition hobby horses that they get on ..." – #19, Mother, workshop 4*

*"I just feel like [monitoring of intake] that might be a stigma and shame of not eating versus eating too much." – #14, Father, workshop 3*

Bullying and feelings of shame were described by parents as being prevalent in current lunchbox systems, including shaming of lunchbox contents. School-provided meals were posed as a potential way to reduce these feelings of shame and support positive food relationships, if delivered correctly.

*“...and there's sort of a lot of ... shame that can be placed on parents when they their child comes home with a note that says, you had ... a chocolate in your lunchbox today and that's not okay...” – #25, Mother, workshop 5*

*“... having [school-provided meals] ... so that then children aren't being shamed for what's in their lunchbox, shaming the children, shaming the parents ... That'll create a healthier relationship with food that will reduce the risks of eating disorders and risk of bullying, risk of ... rejection from peers and things like that.” – #24, Mother, workshop 5*

Concerns were raised surrounding current food relief practices in Australia and New Zealand and the association with shame, resulting in reduced uptake.

*“My brother's a teacher in New Zealand, and we're talking about this, and it was like, do you guys have a Breakfast Club or whatever? Oh, yeah, we do, but just the poor kids go so then no one goes ... So being mindful of how that can play out” – #20, Mother, workshop 4*

Parents noted the importance of ensuring no one is aware who receives free meals to address potential shame, if using a subsidised pricing model, with any potential payments occurring behind the scenes. There was also concerns raised about potential stigma implications of having food that is only accessed by high income families.

*“... ensuring that there is food provided in a way that is dignity promoting and doesn't promote shame for children ... who are potentially food insecure ...” - #15, Mother, workshop 3*

*“... depending on what the cost model is, it might be that only the rich kids get the provided lunches and the poor kids bring their lunch ... because it's higher cost ... than packing stuff from home.” – #19, Mother, workshop 4*

### **Catering to dietary requirements**

Dietary requirements were ranked fourth, with an overall importance score of 0.29. Dietary requirements were originally captured as a component of child preferences, with limited findings in the narrative review on dietary requirements. However, with parents recognised this as a separate feature across three workshops. Dietary requirements were defined as requirements related to child health i.e., allergies or intolerances, related to the child's medical history, which parents discussed as being a safety issue. Therefore, catering to dietary requirements was often posed as a non-negotiable, but challenging consideration.

*“Melbourne, you know, is labelled the allergy capital of the world. The risk of anaphylaxis for certain kids, are we able to manage all of that with everyone in the same area or it's gonna have to have to be separated ... It does get challenging. So there needs to be a big safety consideration as well.” – #18, Mother, workshop 4*

One parent described how dietary requirements were addressed at her previous hospital workplace and the feasibility of catering to all requirements.

*“...special dietary requirements that were ... less common, they had dedicated freezers and ... those meals ... came from a different source ... and I guess kids could always bring their own as well. Obviously, universal provision is the goal, but there's gonna be some cases where it's not feasible.”* - #19, Mother, workshop 4

Dietary requirement discussion was followed up with discussion of cultural considerations, with kosher and halal diets. These features were all discussed as necessary but potentially challenging considerations in designing an inclusive and appropriate menu.

*“We're really lucky in this country that we have such a social and culturally diverse country that there would be so many options that would have to be available ... you'd have to cater for so many allergies and medical conditions and preferences...”* - #18, Mother, workshop 4

Parents discussed that the menu should be diverse and include a range of different food items, including different cultural foods, also relating to the variety and cultural considerations features.

*“Though we live in Australia, I'd like to think that the menu would be multicultural”* – #2, Mother, workshop 1

International examples were referenced, including United Kingdom where a menu was offered that addressed dietary requirements and catered to child preferences with offering a large number of options.

*“...you'd get ... a weekly menu and it would have like six to eight options. They had vegetarian, vegan, sandwiches alone had three or four different options...”* - #23, Mother, workshop 5

However, when it came to catering to preferences of children, a lower ranked feature (13<sup>th</sup>), parents were conscious that this could have detrimental impacts, and a strength of school-provided meals is the exposure and learning around different foods.

*“... I'm a little bit wary of too much catering to preferences because I think it's been really good for my children to be exposed to new foods, and if you ask them what they want to have for lunch they will tell you the same thing all the time because they know they like it and it's a safe food...”* #8, Mother, workshop 1

*“... there's also the benefit potentially of children seeing other children eating different foods that they might not normally be exposed to.”* - #11, Mother, workshop 2

## **Sustainability and waste**

Sustainability and waste was a new feature identified, ranked 5<sup>th</sup> with a score of 0.25, raised in three workshops. It was defined across workshops as procurement considerations and management of food waste in the food environment.

School-provided meals were recognised as having the potential to be more environmentally friendly through reducing food packaging, used in lunchboxes.

*“... when you're producing for lots of people at a time, that's often easier managed than doing individual portions of food, there's often less packaging ... waste could be managed much better within the school environment” – #11, Mother, workshop 2*

Parents discussed the ways a school-provided meal program could be sustainable, such as using locally sourced food and ‘seconds’ of food products, including imperfect vegetables.

*“... the supermarkets reject a whole heap of food because, like, it's too big or too small or wrong colour or whatever ... they're still perfectly fine to eat, but maybe they could use that because it's preventing food wastage” – #14, Father, workshop 3*

Discussions for addressing food waste included the potential to repurpose food for those in need, composting or making leftovers available for families to purchase.

*“... maybe if there was excess food at the end of the day, maybe they could donate it to a local charity, they could then help a local soup bus or homeless shelter, maybe.” – #14, Father, workshop 3*

*“... maybe schools can be given the FOGO [Food Organics and Garden Organics, Australian biodegradable waste program] composting system so that any food waste is used that way as well.” – #16, Mother, workshop 2*

*“I would love to be able to ... do something with the leftovers or buy leftovers and take them home as a family meal or something like that ... because I think that would sort of a) alleviate wastage or b) if your kids liked something...” - #2, Mother, workshop 1*

Sustainability and waste was also discussed as an important consideration for the food classroom education feature, ranked 12<sup>th</sup>, teaching students about food and waste.

*“they [teachers] can educate them, if you want to take it home ... finish your lunch and put it in your bag ...or if you don't want to take it home ... there are garden beds or there are food waste bins...” - #10, Mother, workshop 2*

## **Summary of other features**

Access/availability was defined as having reliable access to food in the form of a school-provided meal and being readily available when it is needed. This was discussed as providing a form of food security for families who are struggling and the importance of every child being able to access

food. Some parents suggested universal provisioning was the way to achieve this, with all students able to access food.

*“So what we actually do need in any system is the universal provision ... so that every student is receiving it. It's not just students in need or students whose parents can afford it, but it's all students so that every child is able to access food.” - #15, Mother, workshop 3*

Having a school-provided meal was also discussed in relation to the time, effort and convenience feature for parents. Parents discussed the access to a provided meal as a way to relieve caregiver stress and pressure of preparing lunchboxes or cooking in the evening, because a good lunch was provided at school.

*“Lunchboxes are the bane of my existence ... I find it really challenging to come up with new, healthy, interesting ideas all the time...it would just be one less thing you'd have to think about and there's lots of busy people out there.” – #11, Mother, workshop 2*

*“Just knowing that you can just send your kids off to school and you know they're going to be ... taken care of, nutritious food and everything, that is huge for parents...” – #22, Father, workshop 5*

Parents considered school-provided meals as more than just a mealtime, recognising the many features that create a school-wide positive food approach. Parents considered the eating environment and food classroom education features, describing the potential ways to create a positive eating environment and aligning food provision with education.

*“I think a really nice eating environment is really... important too ... nice long communal tables ... and it's like really basic stuff, but ... nice quality, like eating utensils and all that stuff.” – #8, Mother, workshop 1*

*“a kitchen garden at the school that would enhance their ... education in the classroom...” – #5, Mother, workshop 1*

*“...you could talk to them about things like today we're having ... roast vegetables or steamed vegetables and talking to them about what those cooking methods are and then how they differ nutritionally...” – #25, Mother, workshop 5*

Parents discussed the need for variety and cultural considerations throughout the program. Making the food inclusive and a learning opportunity about different cultures. Parents also posed the opportunity to recognise and respect indigenous foods and practices throughout the program.

*“...embedding indigenous foods ...possibly even grow and prepare them.” – #25, Mother, workshop 5*

Parents had a range of considerations about how other stakeholders could be involved and how the program could be staffed, discussed under the features of parent/caregiver engagement, employment opportunities, resourcing arrangements and community engagement. Parents

expressed an interest in being involved as ad hoc volunteers but emphasised the need for a paid workforce for the system to function. Further, parents noted that this would provide a suitable employment opportunity for parents.

*"I would love to like help. So I don't know, ... if you need someone to like peel 50 potatoes. I'm your girl, I'll do that once a month on a Friday. That kind of active involvement could be quite fun for those who want to and can..." – #20, Mother, workshop 4*

*"...the ability for a model like this to provide employment opportunities for people that can only work school-based hours, so there would be a number of parents or guardians ... that would like to engage in the workforce, but find it very difficult to do so because of the amount of school holidays and the hours and so forth, and it's cost prohibitive." - #15, Mother, workshop 3*

Parents discussed the potential of involving community members in volunteering opportunities, building school community. Many parents referred to the potential for older adults to be involved, referring to the connections they had seen on a popular ABC TV show and social experiment, Old People's Home for 4 Year Olds.

*"If Beverly from down the road or, you know, Morris from down the road wanna come in and they wanna help, you know, amazing. Community based volunteering would be fabulous..." – #20, Mother, workshop 4*

*"...I would love to, as a parent, help out, but with work ... I just wouldn't be able to ... I think a lot of the slightly older, shall I say, generation, would be great to get involved." - #18, Mother, workshop 4*

When discussing the child input feature, parents suggested ways that students could be involved in the food service and gain skills.

*"... give them those skills... that whole process... we start by washing our hands, we prepare food, we wash dishes as we go, we clean up all ... and then the impact that has on them being responsible humans later on when they leave school..." – #25, Mother, workshop 5*

*"Things like gardening and food preparation increase kids engagement with food and likelihood to try new things and stuff. So it could be a real benefit if they're involved in all levels." - #19, Mother, workshop 4*

Flexibility for parents involved a choice to participate in the program or provide a lunchbox. Some parents framed this as the school-provided meal providing a potential backup option when you didn't have food available at home.

*"Late deadlines for orders too when you realise you don't have any bread 😂" – #8, Mother, workshop 1, message in meeting chat*

The feature of eating time was raised as a concern, with a need to increase eating time to accommodate a school-provided meal.

*“Most primary schools have ten minutes to eat lunch ... it's crazy. ... a lot of children couldn't possibly eat lunch in ten minutes.” – #18, Mother, workshop 4*

Parents had suggestions about the best or most acceptable ways certain features could be addressed. Parents discussed how a newly adopted system could be completely tailored to the Australian population needs to ensure the features were appropriately addressed. Parents acknowledged that many established long-standing school-provided meal systems may have been developed when approaches to allergies and healthy food provision varied and we could have a different Australian approach.

*“...we can think outside the box, right? We don't have to choose an established model, we can make something that fits ... our Australian way of doing things... so you know, we can kind of have a modern Australian spin on it that works for our population.” – #19, Mother, workshop 4*

## 5.6 DISCUSSION

This study identified and prioritised the features that parents of primary school-aged children consider important for a universal school-provided meal system. The starting point in the parent workshops were features synthesised in an international narrative review of parent perspectives, focusing on parents as key stakeholders, as representatives for their children and current food providers, including financially. Study participants identified new features, adding to the contemporary knowledge of what features of school-provided meal systems are important to parents. Prioritisation indicated nutrition, cost, stigma, dietary requirements, and sustainability and waste were of highest priority for Australian parents, being critical in forming an acceptable school-provided lunch offering. Parents valued features identified in the review, indicating alignment with parent perspectives internationally. These findings can inform school food innovation efforts in Australia to provide universal school-provided meals, ensuring the system is available and accessible for all students and food provided is conducive to student's health, growth and development. Given that parents are a key stakeholder instrumental in the success of school food provision systems, these findings are also relevant in an international context, particularly for jurisdictions exploring improvement or adoption of school-provided meal offerings.

The features can be contextualised against existing international school-provided meal programs, including the United States and the United Kingdom, and emerging school food provision system transformations, such as Canada, New Zealand and the Netherlands<sup>133, 179, 203, 233</sup>. Features highly prioritised from the narrative review included cost and nutrition, with parents indicating the need for a potential system to be affordable and nutritious. Cost and nutrition have also been discussed in

literature from Canada and the Netherlands in their exploration of adopting school-provided meals, being an important feature internationally<sup>188, 193</sup>. While cost and nutrition are considerations for parents across food provision scenarios<sup>249, 250</sup> they are often critiqued in international school-provided meals, likely contributing to the present prioritisation by parents. Cost critiques include cost being a barrier to participation in school-provided meals when there is limited free meal eligibility, lack of social pricing or a perceived high cost/low value<sup>195, 201</sup>. Similarly, parents value nutrition and chose to provide a lunchbox in place of the school-provided meal when the meal perceived as being unhealthy or not guided by nutrition policies<sup>198</sup>. Results therefore indicate that parents internationally are aligned in their considerations regarding cost and nutrition. Future planning of school-provided meals, including improvements to existing programs and introduction of new systems, should consider the challenges faced strategies to address these in successful examples, ensuring these features are adequately addressed to gain parent acceptability and underpin system feasibility.

Newly identified priority features not captured in the previous narrative review include stigma and sustainability, which reflect recently growing considerations in school-provided meal programs internationally. This is aligned with the modern transitions of school food programs described by Oostindjer and colleagues<sup>214</sup>, including integrating health and sustainability, and considering community and societal impacts. The increasing recognition of stigma and sustainability within school-provided meals has resulted in actions to ensure these features are addressed, which was found to resonate with parent participants. Actions to reduce stigma include the implementation of universal meals in California and Maine<sup>251</sup> and increasing recommendations for cashless systems in the United Kingdom to limit subsidised meal stigma<sup>252</sup>. Sustainability actions include sourcing local food and limiting waste production in Sweden and France to reduce the environmental impact<sup>4, 214, 253</sup>, and policy alignment with the Sustainable Development Goals in Canada<sup>137</sup>. Such successes indicate strategies that can be integrated in newly adopted systems transforming from lunchbox provision, informed by those tried and tested in existing school-provided meal systems.

Findings can be positioned within the Australian school food environment, and literature exploring the views of other stakeholders, representing the perspectives on transformation of school food provision systems. Results align with previous workshops exploring alternative school food provision models with Australian stakeholders including education staff, health promotion staff and food industry staff<sup>158</sup>. Stakeholders identified school lunch prepared onsite using a rotating menu of seasonal produce, minimally processed food, and a range of cultural foods, offering social pricing, as having the highest potential impact and achievability<sup>158</sup>. This aligns with the cost, nutrition and cultural consideration discussions in the present study, with parents recognising the diversity of the population<sup>254</sup> and the need for an inclusive meal system. Another research study explored the Australian child perspective on a hypothetical school-provided meal using a story completion method<sup>228</sup>. Results found children described the menu as having variation and choice, with some



students noting the need for meals catering to a range of dietary requirements<sup>228</sup>. Furthermore, students described the eating environment, including space to eat the food and social interactions about the meal experience they were sharing<sup>228</sup>. These student findings closely align to the features of child preferences, variety and eating environment discussed in our study. Additionally, the student findings relate to the dietary requirements priority feature, being a major concern with rising rates of allergies and higher instance of allergies compared to other comparable countries<sup>255</sup>. Alignment of the parent perspective with diverse stakeholders and our broader food environment indicates there are consistent considerations needed to achieve stakeholder investment in Australia. These learnings can inform the design and strategies needed when transforming a school food system internationally.

A strength of the study was using the NGT method, allowing all participants to contribute and ensuring the overall feature list and ranking was a collation of all participant views, with all methods informed by literature<sup>239, 240, 241, 256</sup>. Collation of features and conversations on a shared document during workshops allowed participants to take part in the analysis, reducing the impact of researcher bias result interpretation. Saturation of features and consistency in discussions demonstrates that adequate data were collected to support interpretations. Limitations included that parent participants represent a slightly higher level of advantage and education than the general Australian parent population, so views may vary with alternate population groups. Additionally, while the grouping of ideas into features enables distinct concepts to be clearly identified and prioritised, parents found this challenging, with many features being associated with one another.

Findings indicate the importance of involving parents to ensure their needs as key stakeholders are met, holding a central role in children's diets as the primary food providers. Transitioning to a school-provided meal model in current parent-provided systems would shift responsibility and can reduce parent autonomy. As with many public health initiatives, parents, students and other stakeholders must feel the system aligns with their priorities and therefore are more likely to invest and participate. Creating a system, underpinned by policy, which integrates stakeholder perspectives and aligns with their needs can enable the success of a potential school-provided meal, gaining buy-in and increasing uptake from families, described in the Needs Assessment & Engagement Guide for school food programs in Canada<sup>257</sup>. Future research should continue to explore parent interest and engage students to ensure their voices are heard, particularly across population groups and on various socio-ecological levels (i.e., considerations on the individual, school, state and national levels), to create a system suitable for all families.

The present study has demonstrated the considerations in developing a parent-accepted transformation to existing school food systems. These findings can be used by policymakers, schools and health professionals as an initial roadmap to the design of school food programs that centre the needs of parents. Particularly ensuring systems consider providing

universally available and accessible, nutritious meals that meet the needs of parents as key stakeholders and strive for improving equity in food provision. The results emphasise the potential of using existing international examples as an initial framework and tailoring appropriate to the parent needs, ensuring learnings are taken from successful tried and tested models that are successful in health promotion wherever possible, to increase feasibility, acceptability and impact of school food initiatives.

## 5.7 CONCLUSION

This study demonstrated the perspectives on features of school-provided meal programs for Australian parents, identifying the priority areas of nutrition, cost, stigma, dietary requirements, and sustainability and waste. The parent prioritised features are critical when designing school-provided meal programs. Findings align with previous international research on school-provided meals and growing Australian stakeholder perspectives on a potential model, indicating the potential for using existing examples to guide system transformations, with tailoring to the local environment. This research demonstrates the importance of including parents in the design of school-provided meal programs, ensuring parent voices are heard to ensure acceptability, as a highly influential stakeholder. Further research to understand priorities across different population groups is needed to design a school-provided meal program that is tailored and meets the needs of each family.

# **CHAPTER 6. UNPACKING THE COST OF THE LUNCHBOX FOR AUSTRALIAN FAMILIES: A SECONDARY ANALYSIS**

## **6.1 CHAPTER CONTEXT**

Findings of Chapters 3 and 5 demonstrated that cost is a key consideration for parental food provision, influential on the food decisions made and is a critical factor in acceptability of a school-provided meal offering. Additionally, the importance of cost was reiterated by the advisory group of school food stakeholders, particularly examining cost for different groups. Concerns centred around ensuring school food is affordable for families of different circumstances, such as socio-economic position. As such, this indicated the importance of exploring demographic factors and costs, as a key consideration in a potential transformation of school food in Australia. This study also strived to understand realistic cost values to allow willingness to pay to be further evaluated within the Discrete Choice Experiment (DCE).

A version of this chapter has been peer-reviewed and published (Appendix 9.2) in *Health Promotion International*<sup>234</sup>. This chapter was used to prepare the publication; therefore, there is direct overlap in content and phrasing. The chapter and publication were led by the PhD candidate, who was responsible for the research design, data analysis and writing. This work was supported by a team of interstate co-authors, who shared the data used for this analysis and provided guidance on methods, with these partnerships fostered by the PhD candidate. PhD supervisors supported in project conceptualisation and provided intellectual guidance. Co-authors therefore contributed <10% of work conducted.

## 6.2 CHAPTER ABSTRACT

### **Purpose**

Ninety percent of Australian school children bring a lunchbox to school, with 44% of the food consumed during school hours being unhealthy. Amongst other factors, cost is a key consideration for food provision; however, the costs to Australian families are not well understood. Therefore, this study aimed to determine what families are currently paying for school lunchboxes in Australian primary schools, and to examine associations between food costs and socio-demographic factors with diet quality.

### **Methods**

An audit of local retail outlets was used to determine food costs of lunchbox contents. Costs (AUD) were adjusted for inflation as of early-2023. The lunchboxes of 1026 children aged 4-12 years at 12 Catholic primary schools in New South Wales, Australia were assessed at the start of the day, using photography assessment methods and a validated School Food Checklist.

### **Findings**

The mean cost of lunchbox contents was \$4.48 AUD (SD 1.53), containing a mean energy of 2699kJ (SD 859), with 37.3% (SD 23.9) of energy sourced from unhealthy foods. Multiple linear regression analyses found that the strongest predictors of higher lunchbox cost ( $p < 0.05$ ) were higher proportion of energy from unhealthy foods ( $B = 0.016$ ) and lower Socio-Economic Indexes for Areas ( $B = -0.178$ ), when controlling for child socio-demographics.

### **Conclusions**

The findings indicated that lunchbox food costs to Australian families are comparable to alternative school food provision models in Australia and internationally. Results demonstrate the cost of food is not the only barrier in providing a healthy school lunchbox. As such, there is a need for cost-considerate systematic initiatives addressing food provision challenges and socio-economic disparities faced by families, such as school-provided meals.

## 6.3 INTRODUCTION

Childhood is a key stage for the development of healthy dietary habits. Dietary intake and food choices are established during childhood and adolescence, supporting growth and development<sup>9</sup>. For children, there are numerous socio-ecological influences on dietary intake and health behaviours. These influences include parent knowledge and beliefs, time and resource availability, and socio-economic position<sup>258, 259</sup>, making these factors important considerations for health promotion strategies. Additionally, the experience of food insecurity is associated with developmental consequences and can contribute to reduced academic performance<sup>260</sup>.

School is a key health promotion setting, playing a critical role in the establishment of health and dietary intake habits during developmental years. Children internationally consume approximately one third of their daily energy intake during school hours, regardless of food provision model<sup>61, 78, 261, 262</sup>. Hence, food consumed in school is important in dietary habit formation and an opportunity for health promotion. Food consumed by Australian children during school is typically sourced from home in a lunchbox, used by approximately 90% of students<sup>38</sup> or purchased from an onsite canteen/tuckshop. Other students may receive a meal from a lunch or food relief program; however, there is currently no universal safety net for food insecure families or to address the dietary quality of children. Lunchboxes of primary-school aged children are ordinarily packed by the parent or student at home, to be consumed across the school breaktimes (e.g., morning and midday eating breaks). Australian children's school-time diets are currently profiled by a high intake of unhealthy foods<sup>60, 61</sup>, consistent with the typical dietary quality of lunchboxes observed in the UK, Canada and the US<sup>2, 83, 262</sup>. Furthermore, core foods are rarely consumed from lunchboxes during the school day, with vegetables, dairy and alternatives, and meat and alternatives being consistently under consumed in lunchbox systems internationally<sup>2, 61, 83</sup>. As a key health promotion setting identified by the World Health Organization<sup>20</sup>, it is important to explore the factors related to school-time dietary quality to best support positive health and development outcomes and contribute to supporting lifelong health promoting dietary habits.

The cost of food is one of many considerations faced in lunchbox food purchasing and preparation by parents<sup>65, 67, 109, 175</sup>. Literature investigating the perspectives of Australian parents when preparing lunchboxes has found food costs to be a commonly reported barrier, along with considering child preferences, limited time available for preparation, need for convenience and food safety concerns<sup>109, 175</sup>. Parent perceptions of these barriers has been discussed in relation to socio-demographic factors and family characteristics, including time availability, knowledge and disposable income availability<sup>65, 189, 197</sup>. Barriers including cost may have varying influence on families across socio-demographics. To improve the dietary quality of lunchbox contents, the impact of food costs and the relationship between food costs and key demographic factors, including parent time availability, knowledge and socio-economic position, must be understood. This understanding could inform population-tailored public health strategies to alleviate the barriers in school food provision and improve dietary quality of Australian children.

While cost structures can act as a major factor in food provision and purchasing patterns, literature has not been compiled to understand school food costs and associated impacts across different countries. As identified in Chapter 3 and 5, pricing structures act as driving factors in acceptability of different food provision models for parents. An understanding of these cost values can enable comparison and contextualisation of Australian costs.

Previous literature has explored the cost of canteen items in Australia<sup>263, 264, 265</sup> and international studies examined school-provided meal and lunchbox costs<sup>2, 71, 76, 266, 267</sup>. However, little is known

about the food costs of Australian school lunchbox provision. Australian-specific studies are essential to reflect the unique food culture, school environment and food supply of this country. Additionally, in the context of this thesis, understanding the current lunchbox costs to Australian parents, within the context of the broader international literature, enables key demographics, cost structures and feasible cost values for financial viability to be identified.

Therefore, the aims of this study are to 1) understand school food costs internationally, 2) determine what parents/caregivers are currently paying for food and beverage items in the lunchboxes of Australian primary school children, and 3) examine associations between lunchbox food costs, socio-demographic factors and dietary quality.

## 6.4 METHODS

### 6.4.1 Understanding school food costs internationally

To address the first aim, searches were completed to identify cost literature in Australia and internationally. This involved a systematic search completed on 23<sup>rd</sup> May 2022 using Scopus, Web of Science and PubMed and a grey literature search using Google. The search strategy is described in Chapter 3 (Table 3-1). Additionally, grey literature was identified through a series of Google searches, using selected search terms utilised in the systematic search, aiming to find international reports on school food cost to families. Relevant references released after the search was conducted were individually identified and included if eligible. Costs in international currencies were converted to AUD based on average conversion rates across the previous decade<sup>268</sup>; however, the limitations of this method must be acknowledged when drawing cost comparisons. Pounds were considered at the conversion rate of 1GBP = 1.80AUD, USD considered at the conversion rate of 1USD = 1.35AUD, and New Zealand Dollars considered at the conversation rate of 1NZD = 0.92AUD<sup>268</sup>. Converted costs are indicated with \*. Relevant findings have been summarised below (Section 6.5.1), with key findings included in the discussion of results from aim 2 and 3 (Section 6.6). All findings were considered to inform cost values and associated factors further explored in Chapter 7.

### 6.4.2 Understanding the Australian lunchbox

### 6.4.3 Study design

To address aims 2 and 3, a secondary analysis of cross-sectional data collected as part of a 2017 study in Newcastle, New South Wales (NSW), Australia<sup>60</sup> was completed. Data collection and initial data preparation was completed by research staff at the Hunter New England Local Health District. The study was conducted according to the guidelines laid down in the Declaration of

Helsinki, and approval was obtained from Hunter New England Human Research Ethics Committee (reference number 06/07/26/4.04), the University of Newcastle (reference number H-2008-0343) and the Maitland Newcastle Catholic Schools Office. This study is reported according to the requirements of the Strengthening the Reporting of Observational Studies in Epidemiology Statement for cross-sectional studies (STROBE)<sup>238</sup> (See Appendix Table 9-6).

#### **6.4.4 Data source**

##### **6.4.4.1 Setting**

Data were collected in February to March 2017, across 12 Catholic primary schools located in the Hunter region of Newcastle, NSW<sup>60</sup>. The Hunter region includes major city and regional areas. The region is characterised by a higher proportion of population from low socio-economic backgrounds. This data was collected as the baseline assessment as part of a pilot study for the SWAP IT intervention to target food provided in the lunchboxes and physical activity of primary school children<sup>269</sup>. This data was selected as it is the most recent and comprehensive lunchbox data available within an Australian population, striving to reduce burden and research waste that may be associated with repeating these methods.

##### **6.4.4.2 Participants**

Schools were eligible for inclusion in the study if they were a primary school, with over 120 enrolments and used the communication app 'Skoolbag', which has large population reach and allowed for the SWAP IT intervention to be administered<sup>269</sup>. Only Catholic schools were included as the population for the broader factorial trial, with ethics approval granted by the Maitland Newcastle Catholic Schools Office<sup>269</sup>. Schools were excluded if they were participating in any other nutrition-based research studies, were a secondary school, or catered exclusively to children with special needs. School principals were contacted by Health Promotion Officers, who are employed within a population health service to support schools with health policies and programs, working collaboratively with research staff<sup>270</sup>, via letter and follow-up phone call, with interested schools providing informed consent in a face-to-face meeting. Eligible schools were invited until 12 schools accepted the invitation to participate, with sample size based on power requirements for the primary study<sup>269</sup>.

Parents with a child at a participating primary school (kindergarten, which is the first year of primary school, to grade six) were invited to participate. Parents were provided with a study information package and active parental consent was required. Children also provided assent to participate on the day of data collection.

##### **6.4.4.3 Data collection**

Data collection was completed by researchers from the University of Newcastle and the Hunter New England Local Health District. Child characteristics, including gender and school grade, were collected using the consent forms completed by parents. Additionally, parental postcode, employment status and highest education qualification level were collected using a computer-assisted telephone interview with the consenting parents.

Lunchboxes were observed at the beginning of a school day by trained research assistants. Child and parent participants were not informed which day data collection would take place, to mitigate the influence of social desirability bias. At the beginning of the school day, prior to any food consumption, children were asked to display their lunchboxes on their desks and open any opaque containers or unidentifiable item packaging. Children who were sourcing lunch from the canteen on the day of data collection were excluded from the analysis. Eligible lunchboxes were labelled with a unique identification number during data collection. Children identified unclear items for researchers, who noted the items and photographed the lunchbox contents. Photographs were analysed by two trained dietitians to identify lunchbox items and reach a consensus decision, with a third assessor resolving any conflicts.

To support the identification and characterisation of lunchbox contents, dietitians used the validated School Food Checklist<sup>271, 272</sup>. This checklist includes 20 food and beverage categories and provides the average kilojoules per category and mean cost of items in Australian dollars<sup>271, 272</sup>. Modifications to the School Food Checklist were made to enable classification of items as ‘the five food groups’ (i.e., Vegetables and legumes/beans, Fruit, Grain (cereal) foods, Meat and alternatives, Dairy and alternatives) or ‘unhealthy’ (i.e., Foods and drinks that are not needed for a healthy diet and do not fit into the five food groups) according to the Australian Guide to Healthy Eating<sup>1</sup>. Mean cost of food reflected the food prices as of 2017 when data collection occurred, using an audit of food and beverage prices in local retail outlets<sup>60</sup> and costs assigned to each food item in proportion to grams. FoodWorks Professional Edition V7 (Xyris Software, Highgate Hill, QLD, Australia) was used as a guide for serving size and kilojoule per serving calculations (e.g., providing grams and kJ for one slice of bread) or via a database of nutrition profile of pre-packaged snack foods, developed by dietitians within the Hunter New England Population Health and University of Newcastle, based on an audit of Australian supermarket products.

#### **6.4.5 Secondary analysis**

##### **6.4.5.1 Data sharing**

Data and associated data dictionary were shared with Flinders University researchers following a modification to the ethics application by the SWAP IT pilot project Chief Investigator. Dr Brittany Johnson, supervisor of the PhD candidate, was included in the ethics applications from the Hunter New England Human Research Ethics Committee (reference number 06/07/26/4.04) and the



University of Newcastle (reference number H-2008-0343). Provided data was deidentified, requiring no further ethics approvals for the present secondary analysis conducted by the PhD candidate.

#### **6.4.5.2 Data preparation**

Socio-Economic Indexes for Areas (SEIFA) quintiles were identified using postcode of residence data according to 2016 Australian Bureau of Statistics data<sup>273</sup>. Percentage of energy sourced from the core food groups and unhealthy food was calculated as the proportion of total lunchbox kilojoules. Data were also grouped by those with 0%, 0.1-50% or 50.1-100% of energy from unhealthy food. This allows comparison between lunchboxes only providing serves of the five food groups, therefore meeting healthy lunchbox recommendations<sup>274</sup>, against typical lunchboxes that contain unhealthy food and beverages<sup>61</sup>, and those that primarily consist of unhealthy food and beverages, which is not in line with dietary recommendations<sup>1</sup>. Data checking and visual histogram assessment demonstrated that such grouping was appropriate, with high frequency of healthy-only (0% energy from unhealthy foods) lunchboxes enabling distinct analysis of this group. Further, the distribution of lunchboxes containing energy from unhealthy foods meant that the groupings accurately reflected the typical lunchbox profiles (median 34% IQR 23, 42) and not recommended lunchbox profiles (median 63% IQR 56, 78) from literature<sup>1, 61</sup>. Food costs (AUD) were adjusted by the PhD candidate for inflation between early-2017 when initial costs were determined, and 2023 when the present analysis occurred, using Australia's Consumer Price Index (CPI) for Food and Non-Alcoholic Beverage<sup>275</sup>, with data sourced from the Australian Bureau of Statistics<sup>50</sup>. This rise equated to an approximate 20% increase in CPI, from 106.0 in March 2017 to 127.6 in March 2023<sup>50</sup>. To reflect this, all lunchbox cost values were increased by 20.4%. Data were checked for normality, finding the data was normally distributed; therefore, mean and standard deviation are used in reporting.

#### **6.4.5.3 Covariates**

Regression analyses explored variables that can be incorporated into public health promotion strategies, to inform future programs. For example, demographics that could be considered in cost subsidies such as multiple children or socio-economic position, or known barriers to provision, such as time availability or knowledge to tailor initiatives. Socio-economic position was classified using the SEIFA Index of Relative Socio-Economic Disadvantage (2011). This index considers income, education and employment in specific living areas, therefore indicating the social and economic well-being in that region. Lower quintiles represent areas experiencing greater levels of disadvantage<sup>273</sup>. Parent employment status was used as a proxy to reflect parent time availability, as being time poor is commonly identified as being a major limitation to preparing lunchbox foods. This relates to the findings from Watson-Mackie and colleagues<sup>65</sup>, who found mothers who were not in the formal workforce had more time to prepare food that they considered healthy and avoid

pre-packaged foods, in contrast with mothers working full time. Additionally, international literature on both mothers and fathers demonstrates households with higher level of employment are more impacted by time barriers, contributing to convenience-based food choice coping strategies<sup>276, 277</sup>. Parent education level was used as a proxy for parent knowledge, with highest level of education status being associated with higher nutrition knowledge<sup>278</sup>. Percentage of energy sourced from unhealthy foods was used to reflect the dietary quality of the lunchbox. However, it is of note that lunchbox provision, regardless of socio-demographics, is often of a similar nutrition profile<sup>61</sup>.

#### **6.4.5.4 Potential confounders**

Child characteristics including child gender and grade that have associated relationships with food intake in the literature but are not typically feasible to address in school initiatives were treated as potential confounder variables.

#### **6.4.5.5 Data analysis**

Analyses were undertaken in IBM SPSS Statistics<sup>279</sup>. Descriptive statistics were used to provide descriptive information on the mean and standard deviation for lunchbox food costs and food costs across a series of prespecified socio-demographic subgroups. Missing data and extreme outliers were excluded from the analysis, and data checks were run to identify any errors.

Multivariate linear regression analyses were used to examine the relationship between child and family socio-demographic factors and lunchbox dietary quality with lunchbox food cost. Multivariate regressions included participants with complete socio-demographic and lunchbox data ( $n=992$ ). The model included family socio-demographic factors of interest and dietary quality, controlling for child characteristics. This included the independent variables of SEIFA, parent education, parent employment, number of children within the family enrolled in primary school and dietary quality of lunchbox, controlled for child gender and grade, and outcome of lunchbox food costs. The predictor variables were assessed for collinearity with no associations found. Parent employment status categories were dummy-coded into new variables<sup>280</sup>, with engaged in home duties coded as the reference category, based on hypothesised trends. SEIFA and education levels, which were ordinal categories, were coded numerically and treated as continuous variables in the regression<sup>280, 281</sup>. All other variables were considered continuous for the analysis.

## **6.5 RESULTS**

### **6.5.1 School food costs internationally**

Literature searches provided an overview of school food costs internationally. From the reviewed literature, eight peer-reviewed studies were identified, with four further European, UK, US and

international reports identified from the grey literature. Four studies investigated the costs of canteen products in Australia, two investigated Australian lunchbox costs and one investigated National School Lunch Program and lunchbox costs in Texas, US (Table 6-1). Two additional reports released after the search was completed were included, summarising school-provided meal trials from Australia and New Zealand. The consistency of the available cost literature was mixed, limiting full comparisons of school food costs. This was evident when considering the canteen focussed studies, which commonly explore individual item pricing, rather than how much each child may be spending at the canteen to form a full recess and/or lunch meal. Additionally, while literature reported on the cost to parents of a school-provided meal, full meal costs were less commonly reported, e.g., costs without subsidy or full cost of the meal including staffing.

The available peer reviewed Australian literature indicates that canteen pricing structures do not enable healthy, adequate and enjoyable food choices. When investigating the food costs using canteen guidelines, unhealthy choices (classified as red choices using Australian canteen guidelines) are typically significantly lower cost in comparison to choices aligned with national dietary guidelines (green choices)<sup>263, 264, 282</sup>.

Of the two studies investigating lunchbox costs in Australia, only one reports the cost per lunchbox. The mean cost of the contents of grade six students lunchboxes attending Catholic schools in a region of NSW was \$3.73 per child per day, according to a 2017 analysis<sup>283</sup>. Costs were identified in European and US models, with Harper and colleagues<sup>71</sup> describing the cost of school meals in 2008. Findings identified that costs within countries with supporting government subsidies ranged from £1-2 (\$1.80-3.60 AUD\*). Additionally, a US report by the School Nutrition Association found the average cost of school meals to families ranged from USD \$2.48 - \$2.74 to elementary, middle and high school students respectively (\$3.35 - \$3.70 AUD\*)<sup>266</sup>.

For trial programs in Australia and New Zealand, described in the grey literature, meals are provided to families at no cost, with funding supplied by the associated government departments. In Tasmania, the meals in 2023 cost an average of \$9.98 AUD (range \$8.78 to \$13.36), with this price reducing from \$11.55 in 2022, with costs including food and staffing (food preparation and service<sup>151</sup>). Price reductions can be attributed in part due to increased program scale, with costs predominantly covered by government funding. In New Zealand, the 2023 Ka Ora, Ka Ako Healthy School Lunches Programme, provided at no cost to families, was costed at a maximum of NZD \$5.39 (\$4.99 AUD\*) per child in grades 0-3 and \$6.31 NZD (\$5.84 AUD\*) for a larger portion for children in grades 4-8 for lunch each day, paid through government funding<sup>179</sup>. More recently, for meals provided by suppliers in Term 1 2024, pricing ranged between \$5.78 NZD (\$5.35 AUD\*) and \$8.62 NZD (\$7.97 AUD\*) depending on child grade and differing portion sizes<sup>284</sup>, including food and staffing costs; however, this does not account for staffing costs within the school to deliver the meal service.

Lunchbox costs have also been compared to costs of the school-provided meal model where mixed food provision models are available. One US study found that for three of four schools investigated, the cost of lunchboxes (mean of \$1.52-1.72 across different schools (\$2.05-2.32 AUD\*) was significantly less ( $p < 0.05$ ) than National School Lunch Program (NSLP) meal cost to families (\$2.00-2.25 (\$2.70-3.04 AUD\*))<sup>285</sup>. However, the school lunches provided healthier meals than most lunchboxes<sup>285</sup>. Another US study, conducted in 2011, found the mean price of lunchboxes was similar to the NSLP cost<sup>2</sup>. Specifically, the reimbursable NSLP meal cost USD \$1.82 and \$2.05 (\$2.46, \$2.77 AUD\*) for elementary and intermediate school students respectively. Comparably, the average cost for meals brought from home was \$1.93 and \$1.76 (\$2.61, \$2.38 AUD\*) for elementary and intermediate students. Therefore, the costs of school meals across many jurisdictions in the US and EU and packed foods to families typically equate to less than \$4 per day to feed a child during school hours. This may not consider additional subsidies that further reduce this cost to families and noting the likely price increase since these figures were published.

The school lunch take-up survey in England in 2013/14 investigated the costs of food in primary, secondary and special schools in England. The results of the survey reported by Wollny and colleagues<sup>267</sup> found that increased cost was significantly related to decreased take-up of school lunch. This indicates families are more inclined to participate in the school lunch program and willing to pay when the meals are priced lower. The grey literature search identified several countries provided a free school-provided meal from government funding, including Finland and Sweden, at no direct cost to families, although the costs are included in national taxes<sup>76</sup>. This has potential to substantially reduce family food costs, allowing for funds to be reallocated for purchasing of other meals, household items or savings. This pricing model also addresses equity, ensuring all families are provided with equal access to food regardless of socio-economic position.

One study found the lunchboxes of Australian children classified in the lowest socio-economic position were significantly more expensive than those of children in the highest socio-economic position<sup>286</sup>. Children with higher lunch costs concurrently had significantly more servings of 'junk foods', which likely caused price differentials<sup>286</sup>. However, it is important to note this data does not reflect current pricing, being collected in 2003-2004, and therefore demonstrates an important area for contemporary research. This price differential across socio-economic position is consistent with the findings from Caruso and Cullen in the US, that students attending lower income schools had higher cost home lunches than students attending middle-income schools<sup>2</sup>.

**Table 6-1: Summary of the cost of school food provision literature, by provision model**

Study Country	Study design, population and methodology, year of data collection/costing	Aim	Key results	Methodological critique / Critical appraisal / Limitations to this study
<b>Australian Lunchboxes</b>				
Brown et al. (2021) <sup>283</sup>	Baseline data of an RCT Catholic schools in NSW, Australia Lunchbox contents of grade 6 students determined using school food checklist updated for 2017 costs, 2017 n=1915 students	To determine the cost and cost effectiveness of a pilot RCT m-health intervention in decreasing the total kilojoules packed in primary school lunchboxes.	Mean school lunchbox cost per day AUD: \$3.73 for intervention group \$3.72 for control group (SD NR)	Not nationally representative
Sanigorski et al. (2005) <sup>286</sup>	Cross-sectional study 18 primary schools in Barwon South-Western region of Victoria, Australia Lunchbox contents determined using school food checklist of 5–12-year-old children, 2003-2004 n= 1681 students	(1) to determine the main foods and beverages consumed at school and their contribution to energy intake (2) to examine canteen use and foods purchased within the school environment (3) to compare the cost of school lunches across socio-economic groups (4) to compare current dietary patterns with those collected from the 1995 NNS.	Lunches of children in the lowest SES quartile were more expensive than those of children in the highest SES quartile, cost NR  \$0.26 statistically significant difference p=0.002  Children in the lowest SES had significantly more energy from fruit juice/cordial, packaged snacks, chocolates/lollies, fat spreads, and soft drinks but significantly less energy from cakes/buns, fast foods, and fruit than all other children, adjusted for age and gender  Presence of junk foods was significantly associated with SES, with children of lower SES having more servings of 'junk food'	Not nationally representative  No true cost value reported, only discusses cost differences †  Costs from 2005
<b>Australian Canteens</b>				
Woods et al. (2014) <sup>264</sup>	Cross-sectional study Government-funded primary and secondary schools Menus collected from online Canteen costs and nutrition classifications analysed, 2012 n=263 menus	To assess the compliance of Australian school canteens with relevant state or territory canteen guidelines and policy.	Mean cost AUD (SD): Cheapest pie: \$3.17 (0.51) Cheapest salad: \$4.25 (0.82) Significant (p<0.001) difference between pie and salad costs (mean difference not reported)	Only including schools with online menus, convenience sample, government schools only  Ethics approval not described
Haynes et al. (2021) <sup>282</sup>	Secondary schools included in the Cross-sectional study National Secondary Students' Diet	To assess the nutritional quality of Australian	Mean cost per classification AUD (SD): Green: \$3.50 (1.28) Amber: \$3.09 (1.43)	NSW Government schools did not provide menus in

	and Activity Surveys, 2012-2013, 2018 waves Canteen costs and nutrition classifications analysed n=244 menus	secondary school canteen menus.	Red: \$2.61 (1.13) Green items were most heavily promoted (66.8% of promoted items) Green items significantly more expensive than amber and red (p<0.001)	2012-13, risk of bias from omission  Costs from different time points
Billich et al. (2019) <sup>263</sup>	Cross-sectional study Primary and secondary schools across five Australia states Menus collected from online Canteen costs and nutrition classifications analysed, 2016-2017 n=200 menus	To examine the relative price of 'healthy' and 'less healthy' lunch and snack items available within Australian school canteens.	Mean cost per item AUD (SD): Lunch items Healthy items: Primary schools \$2.85 (0.75), Secondary schools \$3.20 (0.70) Less healthy items: Primary \$2.15 (0.72), secondary \$2.70 (0.60) Significant difference in cost healthy vs. less healthy items for both primary and secondary schools (p<0.01)  Snack items Healthy items: Primary schools \$1.00 (0.45), Secondary schools \$1.85 (1.15) Less healthy items: Primary \$0.95 (0.50), secondary \$1.45 (0.70) Significant difference in cost healthy vs. less healthy items for secondary schools (p=0.04) but not primary schools (p=0.67)  75% and 41% of primary school and 57% and 48% of secondary schools sold the less healthy lunch and snack items respectively item at a lower cost than the healthy item	Amber and red items grouped together. Only online available canteen menus  Not nationally representative
Wyse et al. (2017) <sup>265</sup>	Cross-sectional study Government schools in New South Wales, Australia Schools invited, and participants provided menus Canteen costs and nutrition classifications analysed, 2013 n=70 menus	To describe the price of foods available in primary school canteens according to their nutritional value	Cost range AUD: \$0.05-\$6.00 Mean cost AUD (SD): \$1.89 (\$1.22)  'Red' categorised foods cheapest snacks and drinks, 'Amber' cheapest sandwiches and hot foods.	Not nationally representative  Costs based on 2013 costs  Study does not discuss limitations
<b>School-provided meal pilot programs</b> (grey literature)				
School Food Matters School Lunch Project Tasmania, Australia <sup>151</sup>	Developmental project evaluation of schools involved in the School Lunch Project Reported median costs per meals, 2022 and 2023 N=6 in 2022, 12 in 2023	To determine the feasibility, benefits, and challenges of providing nutritious cooked school lunches to students in Tasmanian government schools.	Total costs, including costs for the food supplier, support organisation and schools.  2022 \$11.55 AUD (range \$9.81 to \$21.41)	Program not implemented at scale (i.e., not daily)

	Tasmanian schools receiving school-provided meals		2023 \$9.98 AUD (range \$8.78 to \$13.36)	
			No cost to families	
Ka Ora, Ka Ako New Zealand Lunches program <sup>179, 284</sup>	Maximum cost of meals, 2023 budget  More recent website update containing the termly report for Ka Ora, Ka Ako Suppliers Term 1, 2024 lunch prices for lunches made by suppliers (paid by the Ministry of Education)	Ministry of Education online information, outlining the 2023 pricing <sup>179</sup> and in 2024 updates for suppliers, with termly price adjustments made for inflation <sup>284</sup>	Maximum price of lunches. Paid by Ministry of Education and provided at no price to families. Including labour and food costs.  2023 Year 0-3 \$5.39 (\$5.35 AUD) Year 4-8 \$6.31 NZD (\$5.84 AUD)  Price of lunches for suppliers.  Term 1 2024 Year 0-3 \$5.78 NZD (\$5.3 AUD) Year 4-8 \$6.77 NZD (\$5.82 AUD) Year 9+ \$8.62 NZD (\$7.97 AUD)	Not true cost of the program, prices may differ depending on model used or supplier
<b>International combination models</b>				
Caruso and Cullen (2015) <sup>2</sup>  US	Cross-sectional study 12 schools in Texas Home-brought lunches of elementary (kindergarten-grade 5) and intermediate students (grade 6-8) observed, cost determined using local grocery store costs, 2011 n=242 Elementary students n=95 Intermediate students	To assess the quality and cost of elementary and intermediate school children's lunches from home compared with the new US Department of Agriculture NSLP guidelines.	Reimbursable NSLP meal cost USD \$1.82 and \$2.05 for elementary (E) and intermediate (I) school students respectively (\$2.46, \$2.77 AUD*) The average cost for meals brought from home was USD \$1.93 (E) and \$1.76 (I) (\$2.61, \$2.38 AUD*) Students attending lower-income schools had significantly (p<0.05) higher cost home lunches (USD \$1.94) (\$2.62 AUD*) than middle-income (\$1.63) students p>0.05 No significant differences were found between children of different sex Home-packed meals were significantly (p<0.05) higher in sodium, lower in vegetable and milk compared to school meals (NSLP)	Small sample size, risk of sampling/selection bias. Low precision  Costs from 2011, USD
Johnson et al. (2009) <sup>285</sup>  US	Cross-sectional study Children attending four elementary schools (kindergarten-grade 5) in North Texas Observational assessment of home-packed lunch contents on one day, costed using local supermarkets, Year of data	To compare nutrient content and cost of home-packed lunches to nutrient standards and prices for reimbursable school lunches and prices.	School lunch was USD \$2.25 at schools A and B and \$2.00 at schools C and D (\$3.04, \$2.70 AUD*) Mean cost (SD) of home-packed lunches was USD \$1.72 (1.12), \$1.52 (0.85), \$1.80 (1.09) and \$1.69 (0.87) for schools A, B, C and D respectively (\$2.32 (1.51), \$2.05 (1.15), \$3.15 (1.47) and \$2.28 (1.17) AUD*) There was a significant difference p<0.05 between school lunch and home packed costs for schools A, B and D Home packed lunches contained fewer calories, more	Home-packed items only assessed through observation and estimation  Costs from before 2009

collection not stated  
n=333 students

sodium, less vitamin A, calcium, iron, and dietary fiber than  
NSLP standards

# International grey literature

School Nutrition Association (2022) <sup>266</sup>	Cross-sectional survey School meal program directors in the US completed a survey, distributed by the School Nutrition Association Reported average cost of meals during the school year, 2016-2017 n=1550 SNA member school districts nationwide	N/R	Average lunch cost to families/day (USD) Elementary \$2.48 (\$3.35 AUD*) Middle \$2.68 (\$3.62 AUD*) High \$2.74 (\$3.70 AUD*)	Limited results reported Standard deviation not reported
US				
Bruckmayer et al. (2021) <sup>76</sup>	Review study Targeted search of school meal programmes in the EU Studies included from 2015-2020 on programmes in schools based in EU countries Searches on PubMed, EBSCOhost, Web of Science, ScienceDirect, Scopus, Google and Google Scholar, in 2020 n=28 studies included	The objectives of this research note are to gain insight into the rationales and available evidence behind the provision of free or subsidised meals to children, via schools (including Early Childhood Education and Care (ECEC) and primary and secondary schools) across the EU	Pricing models of national programmes (values not reported): France: Subsidised according to household income Italy: Subsidised according to household income Portugal: Subsidised according to household income Slovakia: Subsidised according to household income Finland: Free Sweden: Free	Cost values not reported
EU				
Harper et al. (2008) <sup>71</sup>	Review study Internet based searches for published and unpublished literature to compare information on the provision of the school meal service Google searches, Government organisations and Medline searched for published and unpublished literature, 2007 Currency converted to £ using a universal currency converter n=18 countries investigated	The aim of this review is to compare information on the provision of the school meal service in countries previously reviewed whilst also reviewing new countries around the world.	Sweden and Finland the costs are paid by Government, Brazil and Chile provide free meals to only children from deprived backgrounds Most countries that receive partial government funding for school meals and partially paid by parents/caregivers the average cost to parents/caregivers varied from £1.00 to £2.00 (\$1.80-3.60 AUD*) Australia purchased (canteen) school lunch £1.00 to £2.00 (\$1.80-3.60 AUD*) France, Spain and Italy lunch cost £2.50 or more (\$4.50 AUD*)	Costs from different time points  Reporting does not reflect more recent changes to school food programs and inflation cost changes
International				
Wollny et al. (2015) <sup>267</sup>	Cross sectional survey Primary, secondary and special schools in England School lunch take up survey, commissioned by the UK Department for Education, 2013/14	This survey was commissioned by the Department for Education to inform on-going policy development around school lunches. The objectives were to:	Cost of a lunchtime meal ranged from £1.00 to £3.00 with a mean of £2.04 (\$1.80-5.40, mean \$3.67 AUD*) Average cost of a lunchtime meal was a significant predictor of school lunch take-up. For every increase in average cost by £1 (\$1.80 AUD*), take-up of school meals fell by 18.5 percentage points.	Lower response rate than expected Missing or incomplete data within sample  Costs from 2013/14
England				



Prior to commencement of  
universal infant school meals  
policy  
n=822 schools

- Measure take-up of school lunches, establishing a baseline for the School Food Plan
- Understand variations in take-up by different school characteristics
- Identify key drivers of school lunch take-up
- Establish the average price of a school lunch

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\*Pounds considered at the conversion rate of 1GBP = 1.80AUD, USD considered at the conversion rate of 1USD = 1.35AUD, New Zealand Dollars considered at the conversation rate of 1NZD = 0.92AUD<sup>268</sup>

† Authors contacted for cost data, unable to retrieve value

## 6.5.2 Australian lunchbox costs

One thousand and twenty-six children aged between 4 and 12 years consented to participate and completed data collection. Socio-demographic and anthropometric characteristics of the sample are presented in Table 6-2. The mean age was 7.9 years (SD 2.0). Participants were primarily distributed across SEIFA quintiles 1-4, aligned with the profile of the region, with 49.4% of responding parents/caregivers being university educated. As such, this sample represents a diverse range of families, including those living in areas of higher disadvantage, when contextualised against the Australian population (see Appendix Table 9-6).

**Table 6-2: Characteristics of the sample of Australian primary school children and their families (n= 1026)**

	<i>N</i>	%
<b>Child Characteristics</b>		
Age (years) (mean, SD)	7.9	2.0
Year Level (mean, SD)	2.8	2.0
Gender		
Male/Boys	538	52.4
<b>Family characteristics</b>		
SEIFA		
Quintile 1 (highest level of disadvantage)	221	21.5
Quintile 2	345	33.6
Quintile 3	260	25.3
Quintile 4	189	18.4
Quintile 5 (lowest level of disadvantage)	11	1.1
Parent/caregiver employment†		
Unemployed, student, other	39	3.9
Engaged in home duties	110	11.1
Employed part-time	467	47.0
Employed full-time	378	38.0
Parent/caregiver education level‡		
Did not complete high school	66	6.7
Completed High School	102	10.3
TAFE Certificate or Diploma	334	33.7
University degree or other related	490	49.4
No. of children in primary school		
One	524	51.1
Two	409	39.9
Three or more	93	9.1
Remoteness		
Regional/Remote Australia	178	17.3
Major Cities	848	82.7

† Reported by one parent/caregiver. 32 not reported/missing

‡ Reported by one parent/caregiver. 34 not reported/missing

SEIFA, Index of Relative Socio-economic Advantage and Disadvantage<sup>273</sup>.

## 6.5.3 Descriptive analysis of lunchbox cost

Table 6-3 presents children's mean school lunchbox food cost, energy and dietary quality. The mean daily cost of a lunchbox was \$4.48 AUD (SD 1.53) per child, containing a mean of 2700kJ (SD 859). Of the total energy, a mean of 37.3% (SD 23.9) was sourced from unhealthy foods. This reflected previous national data on lunchbox provision<sup>61</sup>.

**Table 6-3: Descriptive results of the cost and dietary quality of lunchboxes of Australian primary school children (n=1026)**

	<b>Mean</b>	<b>SD</b>
<b>Cost AUD\$</b>	4.48	1.53
<b>Total energy kJ</b>	2699	859
<b>kJ from the five food groups</b>	1607	611
<b>kJ from unhealthy food</b>	1092	864
<b>Percentage of energy from unhealthy foods (%)</b>	37.3	23.9

#### **6.5.4 Lunchbox cost across socio-demographic groups and dietary quality**

Mean lunchbox food costs within socio-demographic groups are presented in Table 6-4. Children in kindergarten and grade six had the highest lunchbox costs; however, there are no clear trends in the cost of lunchboxes with child grade. Male children had higher food costs for lunchboxes (\$5.54 (SD 1.55)) compared to female children (\$4.42 (SD 1.51)). Children with 100% of food sourced from the five food groups (healthy items only and aligned with recommendations) had lower cost lunchboxes (\$3.62 (SD 1.18)) in comparison to those with mostly food from the five food groups, the typical lunchbox profile (<50% unhealthy foods) (\$4.37 (SD 1.24)), and mostly unhealthy food, not aligned with recommendations (>50% unhealthy foods) (\$5.15 (SD 1.96)). Children living in areas of most disadvantage had higher lunchbox costs (SEIFA quintile 1 mean = 4.64 (SD 1.88), quintile 2 = 4.68 (SD 1.49), quintile 3 = 4.49 (SD 1.37), quintile 4 = 3.99 (SD 1.27), quintile 5 = 3.65 (SD 0.70). Parents engaged in home duties had higher mean food costs (\$4.59 (SD 1.92)) compared to other employment statuses. Mean cost differed across parent education, with lower lunchbox cost for parents with technical and further education (TAFE) (\$4.48 (SD 1.58)) or University (\$4.32 (SD 1.43)) level education compared to those who did/did not complete high school (\$4.77 (SD 1.75), \$4.79 (SD 1.52), respectively). Mean cost for families with one child in primary school was higher (\$4.53 (SD 1.51)) compared to those with two (\$4.43 (SD 1.55)) or three children in primary school (\$4.46 (SD 1.59)).

**Table 6-4: Mean school lunchbox food costs of Australian primary school children by child and family socio-demographic groups, and dietary quality (n=1026)**

	N	Mean Cost \$AUD	SD
<b>Child Characteristics</b>			
Grade			
Kindergarten	177	4.57	1.52
1	149	4.44	1.53
2	138	4.54	1.50
3	149	4.38	1.62
4	152	4.45	1.48
5	140	4.33	1.50
6	121	4.69	1.60
Gender			
Male/boys	538	5.54	1.55
Female/girls	488	4.42	1.51
Percentage of energy sourced from unhealthy foods			
Five food group items only	138	3.62	1.18
<50% energy sourced from unhealthy foods	616	4.37	1.24
>50% energy sourced from unhealthy foods	272	5.15	1.96
<b>Family characteristics</b>			
SEIFA Quintiles			
1 (most disadvantaged)	221	4.64	1.88
2	345	4.68	1.49
3	260	4.49	1.37
4	189	3.99	1.27
5 (least disadvantaged)	11	3.65	0.70
Parent/caregiver employment †			
Unemployed, student, other	39	4.31	1.21
Engaged in home duties	110	4.59	1.92
Employed part-time	467	4.44	1.43
Employed full-time	378	4.45	1.53
Parent/caregiver education level ‡			
Did not complete high school	66	4.77	1.75
Completed High School	102	4.79	1.52
TAFE Certificate or Diploma	334	4.48	1.58
University degree or other related	490	4.32	1.43
Number of children in primary school			
1	524	4.53	1.51
2	409	4.43	1.55
3+	93	4.46	1.59

† Reported by one parent/caregiver. 32 not reported/missing

‡ Reported by one parent/caregiver. 34 not reported/missing

SEIFA, Index of Relative Socio-economic Advantage and Disadvantage <sup>273</sup>.

### 6.5.6 Associations between socio-demographic factors and dietary quality with lunchbox cost

Multivariate linear regressions showed significant associations ( $P < 0.05$ ) between proportion of energy from unhealthy foods ( $B = 0.016$  (SE 0.002),  $P < 0.001$ ), SEIFA Index ( $B = -0.178$  (SE 0.045),  $P < 0.001$ ), and cost of lunchbox contents, when adjusting for child gender and grade ( $F = (9,892) = 11.05$ ,  $P = 0.001$ ) (Table 6-5). There were no significant associations ( $P > 0.05$ ) between parent education level ( $B = -0.105$  (SE 0.054),  $P = 0.052$ ), number of children within the family enrolled in primary school ( $B = -0.118$  (SE 0.072),  $P = 0.104$ ) and parent employment status (Unemployed  $B = -0.145$  (SE 0.246),  $P = 0.556$ ; Employed part time  $B = 0.017$  (SE 0.102),  $P = 0.870$ ; Employed full time  $B = 0.026$  (SE 0.158),  $P = 0.867$ ) and cost of lunchbox contents.

**Table 6-5: Associations of individual and family socio-demographics of Australian primary school children with the food costs of school lunchboxes**

Variable	<i>B</i>	<i>SE B</i>	<i>Standardized β</i>	<i>p</i>
Proportion of energy from unhealthy foods	.016	.002	.247	<.001
SEIFA Quintiles*	-.178	.045	-.123	<.001
Parent/caregiver education level	-.105	.054	-.061	.052
Parent/caregiver employment status vs. engaged in home duties				
Unemployed, student, other	-.145	.246	-.018	.556
Employed part-time	.017	.102	.005	.870
Employed full-time	.026	.158	.005	.867
Number of children within the family enrolled in primary school	-.118	.072	-.050	.104

$F = (9,982) = 11.05$ ,  $p = 0.001$

$R = 0.303$ ,  $R^2 = 0.092$

\* Socio-economic index For Areas - Index of Relative Socio-Economic Disadvantage - 2016 - SA1 – Quintiles  
Model controlled for gender, school grade and the number of children within the family enrolled in primary school.

## 6.6 DISCUSSION

This study explored what parents are paying for school food in Australia and associations between lunchbox food costs with dietary quality and socio-economic position, using a sample of Australian primary school children. Lunchbox food costs were approximately \$4.50 per child per day, with higher cost lunchboxes associated with poorer dietary quality of lunchboxes and higher level of disadvantage. These findings are contextualised with literature identified from a systematic search of school food costs internationally. The costs identified within this study are comparable to the alternative school food provision options described in the literature, including school-provided meals and canteens, in Australia and internationally<sup>2, 29, 154, 179, 266</sup>. These results inform the key factors that are associated with higher lunchbox food costs to inform future public health strategies.

Lunchboxes containing higher proportions of unhealthy foods had higher food costs, indicating healthy food provision consisting of core foods can be more affordable than provision of unhealthy foods for the lunchbox. This finding contrasts with pricing in Australian school canteens, where healthy lunch items and snacks including salads, sandwiches and fruit, categorised as 'green' foods, according to canteen guidelines, are typically more expensive than the less healthy 'red' options, including pies, hot dogs and chips<sup>263, 264, 265</sup>, likely in-part due to the labour costs of preparing items<sup>265, 287, 288</sup>. The purchasing of lunchbox items from the supermarket is aligned with analyses of Australian habitual food budgets, with a recent analysis finding that food purchases according to Australian dietary guidelines are more affordable by \$124 to \$227 per fortnight than the current habitual diet, which contains >50% unhealthy foods, for all socio-economic groups<sup>289</sup>. Furthermore, a costing of healthy and sustainable food baskets (median \$188.21) compared with a typical Australian food basket (\$224.36) found the healthy and sustainable basket was significantly ( $p<0.05$ ) less expensive and more affordable in all metropolitan areas and socio-economic quintiles<sup>290</sup>. However, the authors noted it was important to consider the acceptability of the healthy and sustainable basket, which requires more preparation and cooking, demanding a higher skill level and time dedication<sup>290</sup>. Qualitative interviews with Australian parents described the experience of packing lunchboxes finding that parents perceive healthy food as having higher costs and being inconvenient, therefore unhealthy and convenient foods are commonly provided in place<sup>109</sup>. This perception may be due to the labour of healthy food provision<sup>287</sup>, including the burden of creating healthy meals, cost, time for preparation and knowledge, while considering child preferences and palatability. This contrasts with commonly available ready-to-eat unhealthy lunchbox products items, which are convenient, food safe, require minimal labour and are acceptable to children<sup>109, 192, 287</sup>. Furthermore, many of these products feature child- or parent-directed marketing<sup>291</sup>. As a result, there is potential for promotion of healthy lunchbox provision to reduce food costs, concurrently to increasing the availability and access to healthy, convenient and affordable food, to address the challenges faced by families.

Inequities exist in the food costs of lunchboxes, with lower socio-economic position being associated with higher lunchbox costs, with a difference of up to \$0.90 between the most and least disadvantaged quintiles, irrespective of unhealthy food content. These findings are consistent with limited previous evidence. Sanigorski and colleagues<sup>286</sup> found lunches of children in the lowest socio-economic quartile in Victoria, Australia in 2003-04 were more expensive than those in the highest socio-economic quartile, with a \$0.26 significant difference between groups. Additionally, results of a US study found that students attending lower income schools had higher cost home lunches than middle-income schools<sup>2</sup>. It is likely there is a multitude of complex factors that contribute to this discrepancy, including influences across various socio-ecological levels of influence, including preferences, knowledge and food availability. These findings could also be attributed to a greater total quantity of food provided and an increased proportion of costly convenient foods in the lunchboxes. Food access and availability challenges may influence food

provision, with less availability of healthy or affordable options in areas of a higher level of disadvantage. This was found in a Sydney, NSW food basket survey, with greater variety and quality of fresh fruit and vegetables in suburbs of a high socio-economic position, compared to suburbs of a low socio-economic position<sup>292</sup>. Furthermore, while nutritional and financial literacy may play a role in the provision of higher cost items, it is important to consider the varying impact of food provision challenges across different socio-economic groups, which were unable to be controlled for in the present study. Specifically, a systematic review of 28 international studies found socio-economic position was associated with predictors of dietary intake including home-environment factors, parent modelling and child nutrition knowledge<sup>293</sup>. Further, barriers to food provision influence families differently based on their situation, for example a qualitative study with Australian mothers found that mothers who lacked time for preparation were less concerned about financial constraints, thus spending more on food<sup>65</sup>. While parent employment status, used as a proxy for time availability, was not significantly associated with cost when other demographics were controlled in the present study, the example from Watson-Mackie and colleagues<sup>65</sup> demonstrates that there are many complex influences that can contribute to trade-offs in prioritisation of food costs. Therefore, the impact of higher cost lunchboxes for families of low socio-economic position should be considered, as a larger proportion of income being spent to provide school food, reducing lunchbox affordability. The complexities of this relationship demonstrate the need for tailored, socio-demographic conscious programs aiming to address the unique barriers faced by families, to support diet quality in school.

The food costs of \$4.48 per child per day lunchbox provision for parents can be interpreted in the context of other school food provision models, as identified in study aim 1. Purchasing food for recess and lunch from an Australian school canteen can provide a relatively comparable alternative, a canteen intervention in NSW primary schools finding canteen lunch orders cost a mean of \$4.69 (SD 1.80)<sup>29</sup>. In Tasmania, Australia, the school-provided meal program cost an average of \$9.98 per child per day, including equipment, food preparation and service staffing costs<sup>151</sup>. In New Zealand, the 2023 Ka Ora, Ka Ako Healthy School Lunches Programme was costed at a maximum of NZD \$5.39 (\$4.99 AUD) per child in grades 0-3 and \$6.31 NZD (\$5.84 AUD) for a larger portion for children in grades 4-8 for lunch each day<sup>179</sup>. Both of these programs offer meals to students at no cost to families. Internationally, the reported average daily cost of US government-subsidised school-provided meals for families was USD \$2.48–\$2.74 (AUD \$3.35–\$3.70)<sup>266</sup>, with school-provided meals found to be generally cheaper than home-packed lunches for elementary and intermediate students<sup>2</sup>. School-provided meal systems alleviate labour demands on families and can address parent identified barriers to lunchbox provision<sup>104</sup>, increasing access to food for all school children. While limited research has explored parent willingness to pay for a school-provided meal or healthy canteen provision in Australia, pilot data indicates families may be willing to contribute between \$3-5 per child per day<sup>154, 159</sup>. Therefore, the current costs of lunchboxes in the broader school food context demonstrate the potential feasibility of a cost-

comparable, lower burden alternative for Australian families, particularly with a government and parent co-contribution model.

This study provides comprehensive and contemporary insight into the food cost of Australian primary school children's lunchboxes. A strength was the inclusion of evidence-informed covariates in the regression to ensure results were an accurate depiction of independent relationships and the large sample of primary school children. A key limitation was the single inflation rate applied to all products when adjusting costs to 2023, which may not consider greater inflation rates for certain food products, including differing cost changes for healthy products. Further, as data was collected in 2017 it may not reflect recent changes as a result of rising costs of living in Australia and the discussed 20% inflation of food costs. These cost changes may have contributed to families adopting different purchasing patterns and led to varied lunchbox composition, which is not captured in the results. Additionally, the mean cost of food does not capture the influence of product discounts on purchasing trends or total lunchbox costs. While lunchbox contents were systematically assessed by trained dietitians, items were not weighed to determine exact quantities. The variables available within this dataset prevented identification of families experiencing food insecurity, noting this may influence the quantity or type of food provided in lunchboxes and thus the cost. Collation of international literature within this chapter strived to address the limitations of this dataset, including diverse participants with a range of experiences. Future research should qualitatively explore lunchbox burdens for families experiencing food insecurity. Finally, despite the large sample, only including participants in one region of NSW attending Catholic schools are captured, which may reflect families of an above average household income due to increased Catholic school fees<sup>294</sup>, limiting the generalisability of the findings.

Understanding the factors related to school food costs can inform policy and practice across the food system. Australian state and territory policies encourage promotion of nutritious dietary intake in the school community. To support this, future programs should aim to improve the access to healthy and affordable lunchbox foods, which have a low preparation burden for families, across all socio-economic groups. An avenue to achieve this may include increasing the availability and promotion of affordable, enjoyable, convenient and healthy foods in local supermarkets and school canteens. Internationally, school food systems should consider how cost influences the choices of families to ensure there is equitable access to food in schools.

Future research should explore the potential of improved lunchbox programs, school canteen offerings or a school-provided meal option in Australia to alleviate the labour burden for families, including time and convenience, at a low cost. Specifically, exploring parent interest in a school-provided meal system and financial cost families are willing to contribute, including how contributions may differ across family socio-demographics or depending on what the system



provides for families. Furthermore, food costs should be considered in the context of the household budget and experience of food insecurity, to determine school food affordability.

## 6.7 CONCLUSION

The present study provides the most comprehensive and contemporary insight into the food costs of the lunchboxes of Australian primary school children for families. The food cost for lunchboxes of Australian primary school children is approximately \$4.50 AUD, with higher cost for lunchboxes containing a higher proportion of unhealthy foods and families living in greater areas of disadvantage. These findings reiterate that cost of healthy food is not the key barrier in providing a nutritious school lunchbox. Therefore, there is a need for cost-considerate systematic initiatives that capture the multitude of school food challenges faced by families and the associated socio-economic disparities.

# **CHAPTER 7. EXPLORING PARENT PREFERENCES FOR A SCHOOL-PROVIDED MEAL OFFERING USING A DISCRETE CHOICE EXPERIMENT**

## **7.1 CHAPTER CONTEXT**

Understanding parent priorities and how these may differ for families of different circumstances is valuable in informing the design of a school-provided meal system that is acceptable to all Australian parents. This study draws on the findings from the studies reported in Chapters 3 to 6 to understand parents' preferences. The use of a Discrete Choice Experiment allowed exploration of parent preferences for different attributes of a school-provided meal system and willingness to pay for the offerings.

Using multiple sources of evidence to inform the design of a Discrete Choice Experiment is aligned with best practice guidelines<sup>295</sup>. The attributes explored in this study were identified and prioritised from features identified in the review (Chapter 3) and Nominal Group Technique workshops (Chapter 5), contextualised by considering a realistic school-provided meal system using the case study observations (Chapter 4). The importance of using a Discrete Choice Experiment and presence of trade-offs in school food decision making was evident from findings of the review, as parents balanced competing priorities regarding school food. Cost values and questions have been derived from the findings of the cost analysis (Chapter 6), including current lunchbox costs, school food costs internationally, different cost structures (e.g., government co-contributions) and consideration of social pricing based on socio-demographic analyses.

The language and terminology used for the attributes, levels and broader survey were constructed with the advisory group of school food stakeholders to ensure accessible and appropriate terms were used. The survey was pilot tested by the advisory group and other stakeholders, with feedback used to inform modifications. Findings were also discussed with the advisory group members, contributing to the interpretation of findings.

The PhD candidate was responsible for the research design, data analysis and writing. DCE design and analysis support was provided by a Health Economist at Deakin University. PhD supervisors supported in project conceptualisation and provided intellectual guidance.

## 7.2 CHAPTER ABSTRACT

### **Purpose**

Australian lunchboxes are not adequately meeting the needs of our community. There is growing interest in adopting a school-provided meal model in Australia. As a key stakeholder, it is important to understand Australian parent preferences for a school-provided meal model. This information is critical in designing an acceptable and financially viable system. Therefore, this study aimed to understand parent preferences for a school-provided meal model for Australian primary schools and to explore differences in preferences across socio-demographic groups.

### **Methods**

An online survey incorporating a Discrete Choice Experiment (DCE) was administered to parents of primary school-aged children (i.e., children aged between 5-12 years) across Australia. The DCE involved 12 choice tasks, where parents were required to choose between two hypothetical school-provided lunch model options. Each option included varying levels of the six attributes: cost, nutrition and quality, environmental sustainability, access, menu options, and the school approach to food. Attributes and levels were selected through a multi-stage research process, with four cost values used to determine willingness to pay. A d-efficient design was constructed, with data analysed using multinomial logit models and the Krinsky and Robb method to calculate willingness to pay. Questions on demographics and interest in school-provided meals were used to understand the population and findings.

### **Findings**

The final sample consisted of 383 participants, predominantly women (90%). A majority expressed interest in school-provided meals (93%). The DCE analysis identified significant influences on parent choice, with nutrition and quality being the most influential attribute ( $\beta=0.71$ ), followed by menu options ( $\beta=0.47$ ), environmental sustainability ( $\beta=0.35$ ), and a whole-school approach to food ( $\beta=0.28$ ). A negative cost coefficient indicated a preference for lower-cost options. Parents were willing to pay for enhancements in attributes, showing a willingness to pay AUD\$6.47 for nutritious quality meals, AUD\$4.32 for two menu options, and AUD\$3.23 to incorporate environmental sustainability principles.

### **Conclusions**

Australian parents showed support for the potential introduction of a comprehensively designed and delivered school-provided lunch program, aligned with their preferences. Parents strongly preferred nutrition and quality, menu options, and environmental sustainability in a potential program, demonstrating a willingness to pay to ensure these attributes are appropriately included. Findings indicate the key considerations needed for policymakers and school food staff to create a parent-accepted, financially equitable school-provided meal program in Australia.

### 7.3 INTRODUCTION

School is a key setting for health promotion, with food consumed during school hours influencing nutrition, education, equity for children and their families, as well as impacts on environmental sustainability<sup>70, 88</sup>. Parents are the primary food providers for their children, bearing both financial and decision-making responsibilities regarding food. In Australia, parents are typically responsible for choosing, purchasing and packing foods for school lunches. Parents have reported on the challenges of packing a healthy lunchbox, including having to make compromises in what they provide for their child to eat at school due to the influence of factors such as convenience, cost and child preference (Chapter 3, 5)<sup>109</sup>. Parents in different circumstances have also described varying challenges, with parents holding different values depending on individual, settings and broader contexts, as described in Chapter 3<sup>65</sup>. While previous initiatives have strived to improve the nutrition of food consumed by children during school hours (e.g., nutrition policies), these have further contributed to parent burdens in food provision<sup>5, 65, 109</sup>. To increase potential acceptability and impact of school food initiatives as a health promotion strategy<sup>5</sup>, parent perspectives and values should be central in program design, aligned with the Consumer and Community Engagement Framework for Research<sup>162</sup>, recognising parents as key stakeholders.

Growing literature has positioned school-provided meals as an alternative school food provision model in Australia, to achieve benefits for children's health and development, and reduce parent burden<sup>5, 151, 161</sup>. A pilot study informing this thesis found that 61 of 71 (86%) diverse parent participants were interested in school-provided meals, stating convenience, school food environment, variability and food security were key motivators<sup>159</sup>. Parents were willing to spend a median of AUD\$4 per child, per day for a school-provided meal, aligned with their current self-reported spend on lunchbox provision<sup>159</sup>. Another study exploring perspectives of Victorian parents found 57% of parents would allow their child to participate in a school lunch program, with 34% being unsure<sup>160</sup>. Parents were most commonly willing to pay AUD\$5-\$6 per child per day, or less<sup>160</sup>. A survey of 787 Australian parents found 53% agreed or strongly agreed that *"well-balanced, healthy free school lunches should be provided at school to all students"* and 30% were neutral<sup>161</sup>. Parents flagged concerns including healthiness, responsibility, dietary requirements and cost. Interest in school-provided meals was associated with socio-demographic characteristics, including higher interest from non-English-speaking parents, and parents with a lower education level<sup>161</sup>. Additionally, the authors outlined the importance of considering values and demographic factors to gain support for school-provided meal programs<sup>161</sup>. These priorities align with findings from the review (Chapter 3) and parent workshops (Chapter 5), indicating that parent hypothetical interest is tied to how the program is designed and delivered, with parents in different socio-demographic positions holding different values for system features.

Understanding parents' preferences for a potential school-provided meal system is important in informing the needs for a system. Specifically, exploring priorities and trade-offs when decision

making around school-provided meals can provide unique insight into the priority features of a system. Existing methodological approaches summarised above that have been used to explore interest in school-provided meals, have included questionnaires and interviews, which have not determined the preferences of parents for different components of a meal system. Discrete Choice Experiments (DCE) provide an alternative approach, enabling elicitation of values for hypothetical services, mimicking real-world decision making and thus allowing for financial value and trade-offs to be determined<sup>296</sup>. Additionally, while cost is consistently reported as a priority consideration, along with being a key factor in achieving food provision equity, there is limited exploration of parents' willingness to pay for a school-provided meal. Willingness to pay is the price someone is willing to pay for a good or service and is commonly used to explore perceived value. However, no previous Australian evidence has applied health economics methods to explore parental willingness to pay across populations or for different system features. As such, alternative methodologies such as DCEs are required to understand parent values in a transformed school food system and how these differ across the population.

Therefore, this study aimed to investigate 1) parents' preferences and 2) willingness to pay for different aspects of a school-provided meal system in Australian primary schools, and 3) if this differed depending on socio-demographic factors. The survey also sought to describe parent considerations and practices around school food using a representative sample.

## 7.4 METHODS

### 7.4.1 Study design and methodology

To achieve the project aim, an online survey was administered to primary school parents across Australia. The main component of the survey was a DCE, to investigate parents' hypothetical preferences and willingness to pay for different aspects of a school-provided meal system in Australian primary schools. DCE analysis is a quantitative method originating from marketing to understand choice behaviours, with health economists increasingly using this method to understand preferences<sup>296</sup>. More recently, DCE methods have been adopted in food choice contexts, such as parent's snack decision making for their child<sup>249</sup>, parent and child school lunch behaviours<sup>297</sup> and young adult food choices<sup>298</sup>. This method provides a unique alternative to standard survey methods, with DCE questions capturing the prioritisation relationship between different aspects of a system and the trade-offs that occur in the decision-making process<sup>296, 299</sup>.

DCEs are used to measure the preferences for a range of aspects of a system, described as attributes. These attributes are categorised into numerous levels<sup>296</sup>. Combinations of these levels are produced to create options or situations in different choice sets. These choice sets are posed to participants along with a hypothetical scenario, with participants making choices to mimic real-world decision making. DCEs theorise that participants will select the option with the combination

of levels that they believe has the greatest utility<sup>296</sup>. Collation of responses allows researchers to understand the relative strength of preferences towards different attribute levels, using regression modelling. Therefore, DCE analysis was considered an appropriate method to assess food, health and wellbeing related preferences in the school-provided meal context.

Additionally, incorporating a cost attribute allows for the estimation of willingness to pay, eliciting the financial value parents may hold for a school-provided meal offering and the perceived value of different attributes a system would offer. A cost attribute within a DCE enables the financial trade-offs for attributes of a system to be assessed, using a more indirect method, thus increasing the validity compared to direct survey methods<sup>300</sup>.

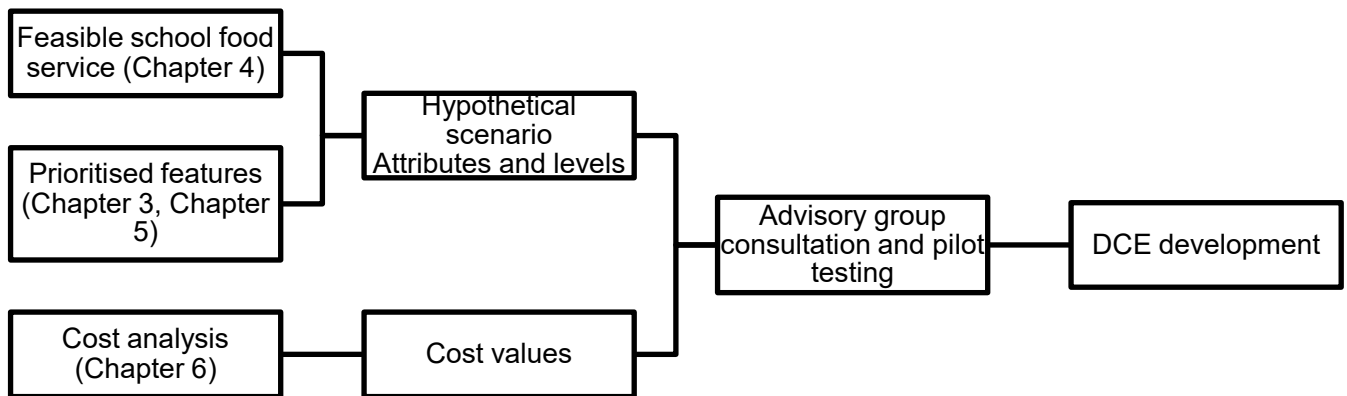
Methods and reporting were performed in accordance with the ethical standards laid down in the Declaration of Helsinki and were approved by the Human Research Ethics Committee of Flinders University (7146). The present study is reported according to the requirements of the Discrete choice experiment REporting ChecklisT (DIRECT)<sup>301</sup> and Strengthening the Reporting of Observational Studies in Epidemiology Statement for cross-sectional studies (STROBE)<sup>238</sup> (See Appendix Table 9-7 and Table 9-8).

#### **7.4.2 DCE attribute and level development**

Identification of attributes is a crucial step in DCE design. Best practice recommendations were used to inform attribute identification methods<sup>299</sup>. Sources of evidence recommended to support the selection of attributes include literature reviews, qualitative research and preliminary studies<sup>299</sup>. To ensure a low cognitive load for participants, it has been recommended to capture between 5-7 attributes within a DCE and limit the number of attribute levels<sup>299</sup>. For each of these attributes, levels selected must have adequate distinctions between one another to enable trade-off to be examined.

The hypothetical scenario, attributes and levels were selected for this study using evidence sourced from the series of multi-methods studies included in this thesis (Figure 7-1). All findings were collated to form realistic attributes, levels and choice tasks, directly related to Australian parent considerations. Prioritised features established in the workshops (Chapter 5) and relevant literature context were consolidated in an evidence synthesis session with the PhD candidate and PhD supervisors to translate features into distinctive attributes, which were relevant and appropriate. The choice scenario was established through consideration of key features discussed in the workshops relating to the safety of a school-provided meal program and considered in the realistic lens captured in the case studies (Chapter 4). This included features necessary to ensure a meal could be delivered with limited resources while complying with school and government regulations. This included following food safety practices and catering to dietary requirements. These are also features currently adopted commonly in Australian childcare settings when food is provided, thus are considered feasible. The cost findings (Chapter 6) informed the cost levels that

were required for the willingness to pay component. The attributes, levels and scenario were presented to the advisory group of school food stakeholders for feedback, and modified to ensure all terms were easily understood and relevant to parents across various jurisdictions, settings and language capabilities.



**Figure 7-1: Flow diagram of DCE development within the context of this thesis**

As a result of the evidence synthesis session amongst the research team, six attributes of importance to parents were selected for inclusion. For each attribute (except cost), two levels were deemed most appropriate to elicit adequate trade off and were reasonable for potential school-provided meal scenarios (Table 7-1). The use of two levels also ensured the analysis was within the scope of this project and allowed for binary options, such as presence of an attribute within a system, or absence. Four levels were selected for the cost attribute, with values capturing a range of potential cost offerings and high values chosen to force adequate trade-offs. This included fully subsidised cost (\$0), comparable cost to current offering, with some subsidy (AUD\$4), full estimated potential cost of meal including all attributes, equipment and staffing (AUD\$10), based on Australian pilot programs<sup>151</sup>, and full cost with an additional contribution to subsidise another child's meal (AUD\$15).

Reference values were chosen as the 'standard practice' in school-provided meal systems, reflecting the offering that is more affordable, and simpler to implement. Non-reference values reflected attribute enhancements, commonly associated with benefits of school-provided meal offerings in growing literature and parent preferences established in Chapter 5; however, they can be more challenging to implement. This was an important justification for exploring the willingness to pay, to establish if parents preferred enhancements in attributes, and if they valued them financially. Reference values were dummy coded as '0' with non-reference values coded as '1' to categorical variables to be compared and assess the preference between categories.

**Table 7-1: Summary of attributes and levels included in Discrete Choice Experiment**

<b>Attribute</b>	<b>Levels</b>
<b>Cost</b>	\$0 \$4 \$10 \$15
<b>Nutrition and Quality</b>	Basic menu to get food in bellies (ref) Menu focus on nutritious food from quality ingredients
<b>Menu options</b>	One meal offering (ref) Two meal choices
<b>Access</b>	Optional to participate (ref) All students receive meal
<b>Environmental sustainability</b>	No focus on environmental sustainability (ref) System focus on environmental sustainability
<b>School approach to food</b>	School lunch stands alone from learning, with no integration or messaging efforts (ref) System focus on learning, positive messaging and an integrated approach to food

ref= reference level. Costs are in Australian dollars (AUD).

### 7.4.3 DCE choice tasks

Each DCE choice task involved parents choosing between two school-provided meal model options, each option comprised of six attributes and a different combination of levels. Each choice task was unlabelled, as the alternatives are not specific and attributes are arbitrary<sup>299</sup>. After they had made their choice, parents were asked if they would prefer to opt-out of having a school-provided meal system (i.e., no change to the current school food system) or maintain their choice. The ‘opt out’ option was included to increase the external validity of the case<sup>302</sup>, when neither of the options are deemed suitable or the participant is strongly adverse to a school-provided meal model. The initial choice between the meal models, before the opt-out question, ensured that adequate preference data was collected from all participants. It was anticipated that those strongly disinterested in school-provided meals would opt out of every scenario, limiting understanding of priorities and trade-offs, and restrict future research directions for developing an acceptable school-provided meal system. To address this, participants answered attitudinal questions later in the survey. Once data was collected, the percentage of parents interested in school-provided meals was analysed to inform the primary analysis (i.e., with or without opt out). The analysis found that a strong majority of participants were interested, allowing the focus to be primarily on their preferences within the system (i.e., without opt out). The information provided to participants and example of a choice task is presented in Figure 7-2.



The first set of questions will show you a scenario, where you will need to select between Option A and Option B. Choose the option that most closely matches what you would prefer if your child's school provided for your child to eat/drink during the school day.

We have listed some items which will vary in the scenario options. When making your choice please consider only these things:

#### **Cost**

How much money it will cost you in Australian dollars (AUD) for a school-provided meal per child, per day (this is the out of pocket value, not considering tax or government contributions)

Alternatives include \$0, \$4, \$10, \$15.

#### **Nutrition and Quality**

Nutrition and quality is the nutritional value and overall quality of the food provided at school. Alternatives include having a school meal menu that provides food, with a range of food groups, using quality ingredients, supported by policy. Or alternatively, a menu providing food based on availability and preferences, aiming to fuel children's energy levels or get food into bellies.

#### **Menu options**

Menu options refers to two main meal choices which children can select between at mealtime, or being offered one main meal option at each mealtime. Children who have dietary requirements will always be catered for.

#### **Access**

Access is about how children can access meals provided by schools. Alternatives include a universal system (everyone receives the school-provided meal) or an optional school meal system (where you could choose not to participate and continue to provide a lunchbox, or only participate some of the time).

#### **Environmental sustainability**

Environmental sustainability refers to using locally-sourced produce, using imperfect fruit and vegetables, reducing food waste, donating leftover foods, and providing foods which have lower carbon footprint, supported by policy. The alternative would be a menu and system which does not specifically consider environmental sustainability.

#### **School approach to food**

This is how the mealtime is integrated as part of the broader school day. A focus on the school approach to food includes the school meal program being connected with the classroom education, which could include kitchen gardens or cooking lessons, with the mealtime focussed on students learning about food and being exposed to food in a way that helps develop positive attitudes towards food and eating, supported by policy. Or alternatively, no focus on the school approach to food with the meal being only focussed on providing children with food.

**Imagine your child's school were to start providing the foods your child was going to eat at lunchtime. Food would be provided by trained staff, in a safe manner, with meals appropriate for dietary requirements. Please indicate which option you most prefer to be provided at your child's school. Assume they are all available options.**

	<b>Option A</b>	<b>Option B</b>
<b>Cost</b>	\$4	\$10
<b>Nutrition and Quality</b>	Menu focus on nutritious food from quality ingredients	Basic menu to get food in bellies
<b>Menu options</b>	One meal offering	Two meal choices
<b>Access</b>	All students receive meal	Optional to participate
<b>Environmental sustainability</b>	System focus on environmental sustainability	No focus on environmental sustainability
<b>School approach to food</b>	System focus on learning, positive messaging and an integrated approach to food	School lunch stands alone from learning, with no integration or messaging efforts

**If given the option, would you maintain your choice, or opt-out?**

**(opt-out meaning that the school food system would remain lunch-box predominant, with no school lunch offering for any students)**

**Figure 7-2: Excerpt from survey of Discrete Choice Experiment description and question example provided to participants**

#### **7.4.4 DCE experimental design**

The experimental design is used to determine the combinations of attribute levels that are presented to participants in the DCE. To reduce complexity and avoid respondent fatigue, a fractional-factorial design was used, exploring main effects<sup>299</sup>. A fractional-factorial design involves the use of a formula to determine optimum combinations of unique choice alternatives, to reduce the number of choice tasks presented to participants. A d-efficient experimental design (using Ngene software<sup>303</sup>) was chosen to achieve greater efficiency in extracting information from respondents and increase statistical efficiency<sup>299, 304</sup>, with design methods following best practice. To generate the initial design, priors were set at close to zero and in the expected direction, as previous research had revealed mixed perspectives relating to the attribute levels, particularly across different socio-demographics.

The number of choice tasks was selected to achieve greater balance. For each of the six attributes, there were either two or four levels included<sup>299</sup>. Balance is achieved when levels appear an equal number of times across all questions, as well as being presented in combination with other attribute levels. Therefore, 12 choice tasks per participant were selected, as it is divisible by the number of attribute levels and the number of attributes to increase potential balance, in addition to being a reasonable number of choice tasks to capture information and not overburden participants<sup>296, 299</sup>. To reduce d-error and increase balance, 24 choice tasks were developed each with two primary options, separated across two blocks of questions. DCE designs with the lowest d-error, developed using Ngene<sup>303</sup>, were extracted for further testing. Balance on these designs was checked on IBM SPSS Statistics software<sup>279</sup> using crosstabs and chi-square. The design with the greatest balance and least significant differences according to chi-square, was selected. Participants were randomly split into a question block when completing the survey, using the randomisation feature on Qualtrics<sup>242</sup>.

#### **7.4.5 Online survey**

The DCE questions were embedded in a larger online survey (Appendix 9.3.4), to capture demographics, complete a quality assurance check on DCE responses and address the aim to identify parent considerations and practices for school food. The survey was accessed online using Qualtrics<sup>242</sup> and took approximately 20-30 minutes to complete. Participation was entirely optional, and all responses were anonymous, with no question response requirements. The survey was available from May to September 2024.

The survey included the following sections:

- Eligibility screener – confirming number of children in primary school, reCAPTCHA, gaining participant informed consent and providing the participant information sheet

- Choice tasks (discrete choice experiment: 12 repeated hypothetical choice decisions, allocated randomly to one of two question blocks)
- Choice scenario status quo (to provide quality assurance)
- Socio-demographic variables (parent and child)
- Attitudinal variables (considerations on school food and current practice)

Choice scenario status quo questions asked participants to choose between the two attribute levels alone, to confirm their preferences. Participants were also asked “How much would you be willing to pay for a school-provided lunch? \$ Per child, per day (AUD)” to explore cost preferences using a direct method. This question was more reflective of the typical way a price would be presented to parents, compared to the choice sets, allowing for validation of DCE willingness to pay findings that indirectly assess financial value from responses. Participants provided responses on a sliding scale from \$0-\$20, for 1) Average price you would be willing to pay for a school-provided meal, 2) If the system was socially priced (e.g., how much would you pay to make sure other children are fed), 3) If for a younger child (5-9 years old), to receive a smaller serve, and 4) If for an older child (9-12 years old), to receive a larger serve. Participants also reported their view on offering a different pricing structure based on family income, with families of low-income paying less.

Socio-demographics included participant gender identity, age, education level, postcode, ancestry and cultural food influences, child dietary requirements, number of children in primary school, caregiving responsibilities and shared roles, and annual household income. Where possible, questions were based on the Australian Census<sup>247, 275, 305, 306</sup>, ensuring validity and enabling comparisons of sample representativeness to the Australian datasets.

Attitudinal variables included interest in school-provided meals (multiple choice and text box response options) and mealtimes of interest, designed by the research team. Multiple-choice questions on interest and concerns regarding a school-provided meal offering were included. Additionally, current practice questions included current estimated financial spend, time taken and person responsible for school food provision. Attitudinal questions were developed using a modification of evaluation questions from the Tasmanian pilot evaluation<sup>154</sup>.

The survey was pilot tested with a convenience sample of parents and stakeholders, including the advisory group of school food stakeholders, to ensure comprehensibility of the DCE tasks, survey questions and duration. Modifications were made to language and survey flow from pilot-testing feedback, with these responses excluded from the formal analysis.

#### **7.4.6 Participants and sample size**

Respondents were parents/caregivers of a child who is enrolled in primary school (i.e., Kinder/reception - grade 6) in Australia. Participants required an ability to comprehend written

English to participate in the survey. Purposeful recruitment aimed to identify a representative and diverse sample of parents/caregivers. This includes participants of diverse cultural backgrounds, gender identity, socio-economic position, education and employment, family size, family structure and living location. The sample was therefore compared to national data on parent populations, available in Appendix Table 9-6, with recruitment strategies iteratively modified to optimise the sample representation.

A range of considerations were made to inform the sample size for this study. There are several sample size recommendations for discrete choice experiments. For this study, recommendations from Johnson and Orme were used.  $N > 500C / (T \times A)^{307, 308}$  *T=number of choice tasks per participant, A=number of alternatives (not including opt-out), C=maximum number of levels.* Including oversampling of 20% to address the opt-out alternative being included, a minimum sample of 100 participants was therefore required for the DCE analysis. However, to capture a diverse sample of caregivers, particularly to enable analysis of socio-demographic factors, an increased sample was targeted.

Recruitment efforts included paid advertisement through Meta<sup>172</sup> and distribution through the research team network. Meta applies data on users to guide targeted advertisements, enabling you to target specific audiences. Meta was directed to advertise the flyer to users who matched demographics of interest, including 'Parents with primary school-age children', living in Australia. To achieve purposeful recruitment, further demographics were specified at different stages of recruitment, such as those identifying as male, specific age ranges, and those who had not completed tertiary education. The use of an online post also enabled distribution by contact organisations and other researchers to their networks of parents and schools. Participants were able to enter a draw to receive one of five Prezzy vouchers (valued at \$50 each) upon survey completion in recognition of their time. Participation was monitored using the demographic questions included in the survey to direct recruitment strategies.

#### **7.4.7 Data preparation**

The complete survey data were imported into IBM SPSS Statistics software<sup>279</sup> for data checking, cleaning and preparation. Any responses flagged by reCAPTCHA security service for suspicious activity or surveys completed in less than five minutes were further examined. This included checking for conflicting demographics or accurate Australian postcodes, with inconsistent or suspicious responses excluded.

To prepare the DCE responses for analysis, data were transformed to obtain stacked choice data, with 24 cases for participants, each line representing one option (12 choice tasks each with two options). For the evaluation including the opt-out the data were transformed to represent a third option per choice scenario (36 cases for each participant), with opt out selection coded as -999 for

each attribute. Opt-out was marked as the choice, with the choice to opt-out being a preference over participants previous choice, aligned with question framing.

Household composition and household income were used to determine equivalised household income, using Australian Bureau of Statistics (ABS) methods (Appendix Table 9-9)<sup>309</sup>. Data were checked against ABS median equivalised household income for representativeness, ensuring the data median and distribution reflected the Australian population. Once representativeness was confirmed, participants were grouped into low and high income based on the median of the sample. Sensitivity analysis on non-reporters of household income (n=40) indicated responses reflected the full population analysis, with no associations with values and opting out of reporting income (i.e., participants opted-out across the population, not reflecting extreme perspectives), therefore data were excluded from the income grouping analysis. Postcode was used to determine participant state/territory of residence and remoteness index<sup>248</sup>. Ancestry was organised according to the ABS Australian Standard Classification of Cultural and Ethnic Groups, 2019<sup>306</sup>. The narrow groups cultural and ethnic groups were used where appropriate to consolidate data (e.g., North-West European).

Parent employment status was used as a proxy to reflect parent time availability, as being time poor is commonly identified as a reason for interest in school-provided meals, as described in this thesis. Parent education level was used as a proxy for parent knowledge, with highest level of education status being associated with higher nutrition knowledge<sup>278</sup>. Other variables were captured due to being flagged throughout this thesis as impactful considerations on food provision and costs (e.g., families living in remote locations may have less accessible and more costly food provision).

#### **7.4.8 Data analysis**

##### **Preferences data analysis**

The primary analysis addressed the first research question, to understand parents' hypothetical preferences for different aspects of a school-provided meal system in Australian primary schools. Analyses were informed by DCE best practice guidelines and adhered to the checklist for conjoint analysis applications in health care<sup>299</sup> and Discrete Choice Experiments to Inform Healthcare Decision Making User Guide<sup>296</sup>. DCE data were analysed using multinomial logit model analyses, on Nlogit<sup>310</sup>. Model goodness of fit was assessed using the log likelihood ratio index, pseudo-R-squared and Akaike's information criterion (AIC). Coefficients are interpreted from choice models as utility weights. Coefficients indicate the direction and strength of a level preference, in comparison to the reference level. Positive values indicate a preference for the non-reference level, with larger utility weights indicating a stronger preference. Confidence intervals were used to support the result interpretation, indicating the range of observed utility weights. Coefficients, 95% confidence intervals and p values were reported, with significance set at 0.05.

The final systematic utility function was specified as:

$$U(\text{Initiative 1}) = \beta_1 \text{Cost} + \beta_2 \text{Nutr} + \beta_3 \text{Menuopt} + \beta_4 \text{Reach} + \beta_5 \text{Sustain} + \beta_6 \text{Enviro}$$

$$U(\text{Initiative2}) = \beta_1 \text{Cost} + \beta_2 \text{Nutr} + \beta_3 \text{Menuopt} + \beta_4 \text{Reach} + \beta_5 \text{Sustain} + \beta_6 \text{Enviro}$$

To complete analyses considering participants who chose to opt-out, multinomial logic model analyses were repeated, with opt-out as a third option. Following testing, no alternative specific constants were built into the model, with these found to not be impactful and reducing model fit.

### **Willingness to pay data analysis**

To address the second research question, willingness to pay was calculated using the DCE. Willingness to pay was calculated using the Krinsky and Robb method<sup>311</sup>. This determined the change in marginal utility between the cost attribute, with the change in utility between each attribute. Additionally, descriptive statistics were used to analyse the direct willingness to pay questions.

### **Socio-demographic data analysis**

To address the third research question analyses were completed comparing participants across socio-demographic groups. Preferences and willingness to pay analyses, described above, were repeated with participants grouped into low- and high-income groups and findings from each group compared. This grouping strategy was chosen to reflect common policy strategies for school-provided meal discounts (e.g., eligibility based solely on household income<sup>225</sup>). Therefore, this analysis method was considered most suitable, in comparison to alternative methods commonly used to capture preference heterogeneity.

Multivariate linear regression analyses were used to further examine the relationship between willingness to pay and socio-demographic factors. The multivariate regression model included parent and family socio-demographic factors of interest and standard willingness to pay for a school-provided meal, per child, per day. This included the independent variables of the responding parent's education level, employment status and gender, and family demographics including the number of children within the family enrolled in primary school, remoteness of the family living location, and equivalised household income. Participants with complete responses to willingness to pay and relevant socio-demographic questions were considered eligible (n=338). The predictor variables were assessed for collinearity with no associations found. Data checking found no extreme outliers. Parent employment status categories were dummy-coded into new variables<sup>280</sup>, with engaged in home duties coded as the reference category, based on hypothesised trends. Gender was dummy-coded, with woman as the reference category. Level of remoteness and education levels, which were ordinal categories, were coded numerically and treated as continuous variables in the regression, with more remote living location and higher education level

being allocated higher numerical values. All other variables were considered continuous for the analysis.

### **Parent considerations and practices analysis**

To address the additional survey aim describing parent considerations and practices around school food using a representative sample, additional descriptive statistical analyses were completed. For the demographic and attitudinal survey questions, data distribution was checked, with mean and standard deviation used where normally distributed, or median and interquartile range when data was skewed.

## **7.5 RESULTS**

The survey was opened by 858 potential participants, with 85 participants excluded due to not being a parent/caregiver of a primary school child or not providing consent. A further 377 responses were incomplete, with participants completing a mean of 29% of the survey prior to exiting. The survey was completed by 396 participants. Following the exclusion of any responses impacted by data errors or suspicious responses, the final sample was 383 participants, with 4596 choice tasks.

Participant demographics are described in Table 7-2. Majority of participants identified as women (90%) who were married or partnered (81%). Participants mostly shared caregiving responsibilities with another caregiver (66%) or identified as the primary caregiver (23.3%). Participants identified their ancestry with the majority identifying as Australian (80%), North-West European (23%), or Australian Aboriginal (4%). Participants were living across Australia and varied in income categories. Most participants lived in Major cities (58%) and were of a high education level, with 82% having a tertiary degree or higher.

Over 30% of parents identified that their child/children had a dietary requirement, most commonly being a sensory or family preference (18%). When described, this was most commonly attributed to Avoidant/Restrictive Food Intake Disorder (known as ARFID) or food preferences relating to food colour and texture. Some parents noted aversions to new or unfamiliar foods. Seven parents described that their child had food preferences relating to autism spectrum disorder, six described their child followed a vegetarian/vegan diet, and four other parents noting their child had challenges consuming food orally, noting the use of supplementation or uses Percutaneous Endoscopic Gastrostomy (PEG) feeds. Allergens and intolerances (14%) commonly included dairy, nuts, and gluten allergies, or lactose intolerance. Five parents noted a cultural dietary requirement, including halal or no pork. Some (15.3%) parents also identified their cultural background influenced the foods provided to their child.

**Table 7-2: Demographics of parent/caregiver survey participants (n=383)**

	<i>N</i>	%*
Age (mean, SD)	39.1	5.5
Gender identity		
Woman	346	90.1
Man	33	8.6
Non-binary/third gender	3	0.8
Prefer not to answer	2	0.5
Relationship status		
Married / de facto / partnered	305	81.1
Single	42	11.2
Divorced	20	5.3
Widowed	3	0.8
Other	6	1.6
Prefer not to answer	7	
Caregiving		
I share caregiving responsibilities with another parent/caregiver.	251	65.7
I am the primary caregiver, but there is another parent/caregiver involved.	89	23.3
I am a single parent and the sole caregiver.	42	11.0
Prefer not to answer	1	
Number in primary school		
1	180	47.0
2	165	43.1
3	25	6.5
4+	13	3.4
Dietary requirements†		
Allergy/intolerance	52	13.6
Cultural requirement e.g., Halal	5	1.3
Other (sensory or family preference)	68	17.8
Ethnicity (can select multiple)		
Australian	306	79.7
Australian Aboriginal	17	4.4
New Zealander	8	2.1
North-West European	90	23.4
Southern and Eastern European	6	1.6
North African and Middle Eastern	4	1.0
South-East Asian	5	1.3
North-East Asian	10	2.6
Southern and Central Asian	3	0.8
Sub-Saharan African	3	0.8
North American	1	0.3
South American	1	0.3
State of residence† n=375		
NSW	83	22.0
SA	81	21.5
VIC	63	16.7
TAS	49	13.0
QLD	48	12.7
WA	44	11.7
NT	5	1.3
ACT	4	1.1
Remoteness†		
Major Cities	218	57.8
Inner regional	112	29.7
Outer regional	38	10.1
Remote/very remote	9	2.4
Parent/caregiver employment		
Employed part-time	155	40.8
Employed full-time	109	28.7
Not currently employed outside of the home	59	15.5
Employed casually	33	8.7
Student	11	2.9
Self-employed	5	1.3
Disabled and/or carer	4	1.1
Maternity leave	2	0.5
Other	2	0.5



	<i>N</i>	%*
Prefer not to answer	3	
Annual Household income		
\$0 - \$499 (\$0-\$25,999)	15	4.4
\$500 - \$999 (\$26,000-\$51,999)	39	11.4
\$1,000 - \$1,999 (\$52,000-\$103,999)	98	28.6
\$2,000 - \$2,999 (\$104,000-\$155,999)	89	25.9
\$3,000 - \$3,999 (\$156,000-\$207,999)	58	16.9
\$4,000 - \$4,999 (\$208,000-\$259,999)	27	7.9
\$5,000 - \$7,999 (\$260,000-\$415,999)	14	4.1
\$8,000 or more (\$416,000 or more)	3	0.9
Prefer not to answer	40	
Parent/caregiver education level		
Completed tertiary education (degree, diploma, certification)	243	63.9
Higher degree (Masters, PhD)	69	18.2
Some tertiary education	36	9.5
Completed high school	23	6.1
Did not complete high school	9	2.4
Prefer not to answer	2	

\*Valid percentage, not including those who preferred not to answer

‡Parent answered if their child/children had any dietary requirements

†6 participants did not provide postcode

### 7.5.1 DCE multinomial logic model results

The primary DCE analysis (Table 7-3) found all attributes had meaningful and significant ( $P < 0.05$ ) influence on parent choice. Nutrition and quality, including provision of a menu that is nutritious and using quality ingredients, compared to a basic menu, was the most important influence on parent choice ( $\beta = 0.71$ ,  $CI = 0.63-0.79$ ). Providing two menu options ( $\beta = 0.47$ ,  $CI = 0.40-0.55$ ), an environmentally sustainable system ( $\beta = 0.35$ ,  $CI = 0.28-0.43$ ), an approach to food including learning and positive messaging ( $\beta = 0.28$ ,  $CI = 0.20-0.35$ ), and universal meal offerings ( $\beta = 0.07$ ,  $CI = 0.00-0.14$ ) were all preferred in comparison to the reference values, at descending importance to parents. A negative cost coefficient ( $\beta = -0.11$ ,  $CI = -0.12- -0.10$ ) indicates parents' preference for lower cost options. Directions of preferences were consistent with the choice scenario status quo questions, with preferences for nutrition and quality (71.7%), two menu options (77.2%), universal access (55.2%), integrated environmental sustainability (80.7%), and integrated school approach to food (70.0%). Comparison between the attribute preferences determined in the status quo questions with the DCE findings indicated that parents likely were making trade-offs in their decisions. For example, while the most participants preferred integrated environmental sustainability compared to other attributes, this was not the most preferred attribute according to DCE findings, indicating parents may hold high face-value, but do not necessarily value sustainability over nutrition when trade-offs must be made.

**Table 7-3: Importance to parents of school-provided meal program attributes using multinomial logit model analysis (n=383)**

Attributes	Coefficient (SE)	95%CI	Relative importance score
<b>Nutrition and Quality</b>			
Basic menu to get food in bellies (ref)	.71667*** (.03890)	.64044 to .79291	1
Menu focus on nutritious food from quality ingredients			
<b>Menu options</b>			
One (ref)	.47846*** (.03881)	.40240 to .55452	2
Two			
<b>Environmental sustainability</b>			
Not integrated (ref)	.35692*** (.03839)	.28167 to .43217	3
Integrated			
<b>School approach to food</b>			
Not integrated (ref)	.27700*** (.03708)	.20433 to .34966	4
Integrated			
<b>Cost</b>	-.11038*** (.00349)	-.11722 to -.10354	5
<b>Access</b>			
Optional (ref)	.07661** (.03681)	.00446 to .14875	6
Universal			

\*\*\*P value <0.01, \*\*P value <0.05

Table notes: ref= reference value

Participants chose to opt-out in 16.4% of choice tasks (n=754 choice tasks). When multinomial logit analyses were completed (Table 7-4) with opt out as a third choice, there was a shift in parent priorities, as less trade-offs were required. Cost ( $\beta=-0.01$ , CI=-0.01-0.00), nutrition ( $\beta=0.06$ , CI=0.01-0.12) and menu options ( $\beta=-0.11$ , CI=-0.18-0.04) became less influential, with participants able to opt-out if these were not delivered according to their preferences. Strength of preference for a universal system increased ( $\beta=0.51$ , CI=0.44-0.58) likely due to greater representation from the strong supporters of school-provided meals, with participants interested in an optional system being those who would prefer to not have a school-provided meal system on offer and thus opting out. Preference for integrating environmental sustainability was lower ( $\beta=0.00$ , CI=-0.06-0.07), with school approach to food becoming a negative coefficient ( $\beta=-0.18$ , CI=-0.25-0.12).

**Table 7-4: Importance to parents of school-provided meal program attributes using multinomial logit model analysis, with opt out option built in (n=383)**

Attributes	Coefficient (SE)	95%CI	Relative importance score
<b>Nutrition and Quality</b>			
Basic menu to get food in bellies (ref)			
Menu focus on nutritious food from quality ingredients	.05828* (.03335)	-.00709 to .12365	4
<b>Menu options</b>			
One (ref)			
Two	-.10972*** (.03339)	-.17516 to -.04429	3
<b>Environmental sustainability</b>			
Not integrated (ref)			
Integrated	.00125 (.03335)	-.06411 to .06661	6
<b>School approach to food</b>			
Not integrated (ref)			
Integrated	-.18876*** (.03340)	-.25422 to -.12331	2
<b>Cost</b>			
	-.00847*** (.00294)	-.01423 to -.00271	5
<b>Access</b>			
Optional (ref)			
Universal	.51070*** (.03362)	.44480 to .57659	1
<b>Opt out</b>			
	-.81928*** (.05951)	-.93592 to -.70263	

\*\*\*P value <0.01, \*\*P value <0.05, \*p value <0.1

Table notes: ref= reference value

## 7.5.2 DCE willingness to pay results

Analysis using the primary DCE response (i.e., prior to opt-out) found parents (n=383) were willing to pay for a change from the reference (standard meal program) to the non-reference value (increased inputs into the school-provided meal program). Parents were willing to pay \$6.47 for a meal that is nutritious and quality, \$4.32 for two menu options, \$3.23 for environmental sustainability embedded in the system, \$2.52 for a whole school approach to food included and \$0.66 for universal meal access (Table 7-5). Status quo willingness to pay questions found parents would be willing to pay a mean of \$6.04 (SD 2.62) for a school-provided meal, per child per day. Parents were willing to pay a mean of \$6.75 (SD 3.64) in a socially priced system, where pricing would contribute to children other than their own being fed, with 61.2% (n=235) of participants agreeing it should be socially priced and therefore low-income families should pay less. Parents would pay a mean of \$4.94 (SD 2.43) for a smaller serve suitable for a younger child (aged 5-9 years) and \$7.34 (SD 3.18) for a larger serve for an older child (9-12 years).

**Table 7-5: Willingness to pay for a change in the level of attributes of a school-provided meal (n=383)**

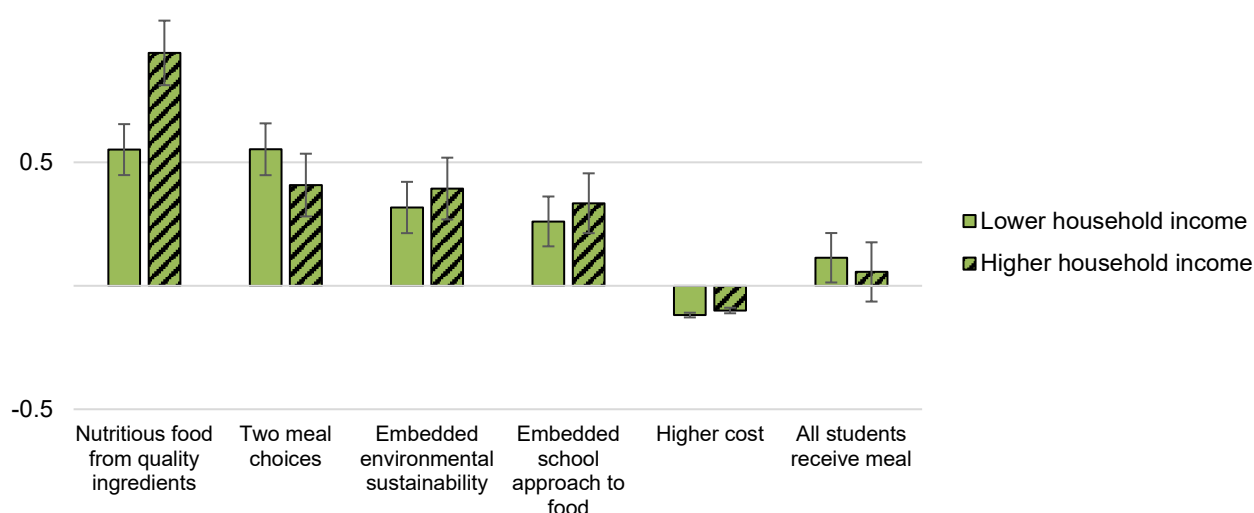
Outcome attributes	Willingness to pay (\$AUD)	95% CI
Nutrition and Quality	\$6.47***	5.78 to 7.17
Menu options	\$4.32***	3.63 to 5.02
Environmental sustainability	\$3.23***	2.55 to 3.91
School approach to food	\$2.52***	1.85 to 3.20
Access	\$0.66**	0.00 to 1.31

\*\*\*P value <0.01, \*\*P value <0.05

Willingness to pay for a change from reference value to the non-reference value

### 7.5.3 Values and willingness to pay results considering socio-demographic factors

When multinomial logit model analyses were completed across the high and low equivalised household income groups, there were differences in the strengths of parent values from the primary analysis (Figure 7-3). While both populations of parents still valued enhanced attributes, respondents of high income had stronger values for a meal that is nutritious and quality ( $\beta=0.94$ ,  $CI=0.81-1.07$ ), environmental sustainability embedded in the system ( $\beta=0.39$ ,  $CI=0.27-0.52$ ), and integrating a whole school approach to food ( $\beta=0.33$ ,  $CI=0.21-0.46$ ), in comparison to those of lower income. Parents of lower household income had stronger value for a universal school-provided meal offering ( $\beta=0.11$ ,  $CI=0.01-1.21$ ) and two menu options ( $\beta=0.55$ ,  $CI=0.45-0.66$ ) than parents of high income.



**Figure 7-3: Coefficient weights of preference to enhanced attributes (non-reference value) for a school-provided meal program attributes, for parents across high and low equivalised household income categories, using multinomial logit model analysis**

Findings represent strength of value for the non-reference value. Error bars reflect 95% CI, all findings significant at <1%, with the exception of all students receiving meal (<5% for lower income, >10% not-significant for higher income).

This difference in values was reflected in the willingness to pay (Table 7-6). The greatest difference in willingness to pay was observed between the parents of high income for a meal that is nutritious and quality (\$9.42), compared to parents of low income (\$4.65), indicating notable differences in financial value of a nutritious meal across income groups.

**Table 7-6: Willingness to pay for a change in the level of attributes of a school-provided meal for parents across high and low equivalised household income categories**

Outcome attributes	High equivalised household income category (n=172)		Low equivalised household income category (n=171)	
	Willingness to pay (\$AUD)	95% CI	Willingness to pay (\$AUD)	95% CI
Nutrition and Quality	\$9.42***	8.04 to 10.81	\$4.65***	3.78 to 5.53
Menu options	\$4.08***	2.78 to 5.38	\$4.67***	3.77 to 5.56
Environmental sustainability	\$3.94***	2.66 to 5.21	\$2.68***	1.80 to 3.55
School approach to food	\$3.34***	2.10 to 4.58	\$2.20***	1.33 to 3.07
Access	\$0.56	-0.66 to 1.78	\$0.96**	0.11 to 1.81

\*\*\*P value <0.01, \*\*P value <0.05

Willingness to pay for a change from reference value to the non-reference value

Multivariate linear regressions showed significant associations ( $P < 0.05$ ) between the amount participants were willing to pay for school-provided lunches, per child per day, with socio-demographic variables (Table 7-7). Number of children in primary school had a significant negative effect ( $B = -0.853$ ) (SE 0.212), ( $P < 0.001$ ), indicating that each additional child attending primary school was associated \$0.85 decrease in willingness to pay. Equivalised household income shows a positive relationship ( $B = 0.001$ ) (SE 0.000), ( $P = 0.003$ ), with higher income being associated with a higher willingness to pay. Remoteness ( $B = 0.078$ ) (SE 0.180), ( $P = 0.664$ ), gender ( $B = 0.219$ ) (SE 0.393), ( $P = 0.577$ ), education ( $B = 0.281$ ) (SE 0.183), ( $P = 0.127$ ) and employment ( $B = 0.262$ ) (SE 0.233), ( $P = 0.262$ ) did not demonstrate significant associations. Directions of associations indicate a higher willingness to pay with more remote living location, reduced employment status, higher education and for male participants.

**Table 7-7: Associations of individual and family socio-demographics with willingness to pay for a school-provided meal offering, per child, per day (n=379)\***

Variable	B	SE B	Standardized $\beta$	p
Equivalised household income	.001	.000	.175	.003
Remoteness	.078	.180	.023	.664
Gender	.219	.393	.030	.577
Level of education obtained	.281	.183	.085	.127
Number of children in primary school	-.853	.212	-.215	<.001
Employment status	-.262	.233	-.066	.262

F=(6,331) =5.653, p=0.001

R= 0.305, R<sup>2</sup>=0.093

\*Multivariate linear regression, n=4 missing willingness to pay data.

#### **7.5.4 Current school food practice**

Many parents identified there was some form of school-provided meal currently available at their child's school. This most commonly was a breakfast (42%), which parents described as being provided through Out of School Hours Care (OSHC) program, run by a charitable program (Foodbank, Oz harvest), or was school run breakfast club. Most parents commonly described these free breakfast clubs or charitable programs as being once or twice weekly, with typical offerings including toast, cereal, and/or Milo (Australian chocolate malt powder drink, most commonly made up with milk). Current recess/morning break (9%) and lunch (18%) offerings included meals available at school canteens/tuckshops or through a partnership with a local café, with many parents noting this was not a daily offering. Seventy parents described a form of school-provided meals currently available, predominantly canteens, cafes, or a school-provided hot lunch being offered once or twice a week. Only two parents identified a current daily school-provided meal offering across their child's school. At other snack times/crunch and sip, some parents noted the provision of fruit for those who were interested. Food offerings after school (12%) were most commonly provided by the Out of School Hours Care.

Current lunchbox packing was most commonly completed by parents (97%). Children assisted or packed their own lunches less frequently (18%) or had a lunch from the school canteen (4%). Majority of parents (55%) noted that this person spent >10 minutes per day making packed lunchboxes. Parents estimated that current lunchbox costs were a median of \$6.00 (IQR 4.00, 10.00) per child per day.

#### **7.5.5 School-provided meal interest**

A strong majority of parents expressed interest in a school-provided meal offering being introduced (93%). Majority of parents identified that lunch would be the mealtime of interest for any school-provided food provision (90%), followed by recess (39%), breakfast (38%) and other snack times (29%). Parents identified what they would look forward to in a hypothetical system, including not having to make lunch (74%), that their child will have a nutritious/quality lunch (73%), lunches will be equal/stigma free (70%), and their child will try new foods (65%). Parents noted the concerns they held about the hypothetical system, including their child not liking the food (61%), lunches being expensive (58%), their child not being given enough food (33%), their child not trying new foods (27%), or not getting food choice (25%).

### **7.6 DISCUSSION**

This study aimed to understand parent preferences for a school-provided meal system for Australian primary schools, understanding if parent preferences differ depending on socio-demographic factors. A survey, including a DCE, was used to understand the preferences of

parents across Australia, synthesising knowledge from a body of school food research to pose an acceptable and feasible hypothetical school-provided meal offering. Participants indicated a potential interest in school-provided lunch for primary school students, valuing a hypothetical offering that provides their children with nutritious and quality food, menu options, integrates environmental sustainability and education, is affordable and universally available. Parents indicated they were typically willing to financially contribute to a school-provided meal offering and were interested in seeing such a program be introduced, if attributes were adequately implemented. These findings can directly inform school food programs within Australia, potentially informing the design of a financially viable co-payment model.

A majority of Australian parents in the study were interested in a school-provided meal offering in primary-schools, conditional on the way the system is delivered. Parent interest was dependent on their priority attributes being offered in the hypothetical system, with some parents indicating a preference to not have a school-provided meal offering if these are not adequately addressed. The overall interest is unsurprising within the transforming school food environment and growing conversations around the potential of a school-provided meal<sup>5</sup>. High interest has also been found in Canada, where similar transformative explorations are underway, with 94% of parents being willing to participate in a school food program found in a comparable parent survey. Within Australia, a recent survey of parents found 53% agreed well-balanced, healthy, free school lunches should be provided at school to all students<sup>161</sup>. This indicates free meals with no flexibility in offering may be a deterrent to parent interest, aligned with the present findings on differing interest depending on system attributes. The need for a system that is carefully designed to ensure acceptability and, thus, program success, is further supported by a review of Canadian evidence<sup>204</sup>. Stigmatisation, communication, food choice and cultural considerations, administration, location and timing, and social considerations were identified as influential themes on Canadian school food program acceptance<sup>204</sup>, with these findings closely aligned with Australian parent preferences and key influences on program interest. As such, in creating an offering that is acceptable to Australian families, it is important to ensure the proposed school-provided meal system closely aligns with parent values, ensuring a meal system is underpinned by nutrition, autonomy, sustainability, education, affordability and equality principles.

Parents recognise the financial value of designing a comprehensive, high-quality school-provided meal program, being interested and willing to invest in an enhanced offering. Parent willingness to pay was aligned with previous Australian research, indicating parents are typically willing to pay between \$4-6 AUD per child, per day<sup>159, 160</sup>. Findings from the present study indicate parents are willing to pay for enhanced attributes, being key pillars in delivering an impactful school-provided meal program, optimising potential outcomes<sup>214, 312</sup> compared to the standard practice reference values. However, enhancement of each attribute can be associated with additional logistical complexities and often higher costs, with many systems internationally facing challenges to provide nutritious, quality food when faced with budget constraints<sup>5, 71, 128, 214</sup>. While school-based food

programs are recognised as being a cost-effective long-term program, large initial and ongoing investment is required to establish school food systems, often from government<sup>115, 313</sup>. Parental willingness to pay for a comprehensive program and attribute enhancements therefore provides initial financial justifications for exploring how these attributes can be appropriately addressed and the potential for a parent/government co-investment model. However, as described by Olstad and Spackman, willingness and affordability to pay for school-provided meals are unique concepts<sup>314</sup>, with further consideration needed to ensure a hypothetical pricing system does not just align with parent values, but their financial capacity. Overall, contextualised findings indicate there is potential to create a financially viable and sustainable system, offering key system attributes conducive to optimum outcomes, using parent financial investment to support the delivery of a quality program.

Findings demonstrate an acceptable school-provided meal system must be tailored to families, to address the differing values held across socio-demographics thereby creating an equitable system. School food is recognised as a potential avenue of addressing health and dietary disparities observed across socio-demographic populations<sup>5, 70</sup>, requiring the program to be designed in an equitable and inclusive way for all populations. While majority of parents valued the included attributes, differing strength of preferences and willingness to pay were observed across household income and varying family profiles. Additionally, parents identified a range of interests and concerns based on personal factors, such as child dietary requirements. Response trends were aligned with family socio-demographics, particularly with families of high income holding stronger preferences and willingness to pay for enhanced attributes such as nutrition and quality. Consideration must be taken on how tailoring can feasibly be achieved in a new school-provided meal system. These differing values could be equitably addressed in program implementation through social pricing structures based on equivalised household income and discounts for number of children in primary school, ensuring all Australian families can access the meal at a price within their means. Findings are consistent with a Canadian study, with the number of household members and household income being associated with willingness to pay. Social pricing structures are increasingly utilised in international models to feasibly increase system equity, alongside individual modifications such as catering to children with diverse dietary needs to provide a safe meal for all students<sup>4, 70</sup>. Therefore, to gain widespread acceptability and address equity concerns, a potential Australian school-provided meal system would require tailoring to different family needs, particularly financial needs. As a result, a school-provided meal offering should not be a one-size-fits-all approach for families, with flexibility and variation across socio-demographics to address equity and acceptability.

This study was the first in Australia to comprehensively explore parent preferences and willingness to pay for a school-provided meal system. Use of the DCE method, including status quo and attitudinal questions, increased the external validity of the findings, allowed for exploration of underlying values and reduced the potential for social-desirability bias in responses<sup>300</sup>.

Consultation with the advisory group of school food stakeholders and pilot testing of the survey



ensured questions were presented in lay language and were easy to complete. Furthermore, the range of data collected allowed for comprehensive analysis and ensured internal validity of results through repeated responses. Limitations include that the population does not reflect the full diversity of Australia, with limited representation from culturally and linguistically diverse populations. Future research should be conducted, in a culturally safe manner<sup>315</sup>, with these populations if implementing a potential school-provided meal offering to ensure their voices are considered in the design and system appropriately tailored. Furthermore, the participants of this study were predominantly mothers. While this reflects the historical role of women being responsible for food provision in Australian households<sup>316</sup>, most parents stated they share caregiving responsibilities with another caregiver. Therefore, co-parent, predominantly fathers, perspectives may not be captured in the findings.

The findings of this study can be used to design an acceptable and financially viable school-provided meal system in Australia. Findings can be utilised by policymakers and school food system stakeholders to understand the demand for and needs within a potential system, aligned with the values of parents as financial investors and system consumers. Particularly, key values identified in this study can be used in marketing and communication strategies, ensuring the discussion of school-provided meal transformations is aligned with the interests of parents. As a result, public acceptability and potential impact of such a system could be improved. Future research needs to continue to consider parent needs for school-provided meals, critical in informing acceptable design and funding structures, exploring the feasibility of addressing these attributes. Willingness to pay estimates can be used to inform financial viability, acceptability and a potential co-contribution model. This is important in ensuring pricing equity for families of varying household income status, as current lunchbox costs are not equitable across socio-economic populations, and parents recognising equitable pricing structures according to income as important. Findings on willingness to pay should be considered within the context of family affordability before implementing policy, to ensure costs are appropriate within family budgets, noting the rising cost of living. Furthermore, future research should engage with students, ensuring their interests are heard and any programs implemented are underpinned by co-design, to ensure perspectives, equity and values are appropriately integrated. Continuing to understand the design of a financial structure, potentially through parent-government co-investment, will be critical in creating a financially viable and sustainable school-provided meal system.

## 7.7 CONCLUSION

This study found Australian parental support for the introduction of comprehensively designed and delivered school-provided meals in primary schools. Parents were interested in a lunchtime offering that provides their children with nutritious and quality food, menu options, integrates environmental sustainability and education, is affordable and universally available. While all

parents valued these attributes, preferences and willingness to pay differed across socio-demographics, including household income and number of children in primary school, indicating the potential for system tailoring to improve acceptability and suitability for different families. These findings can inform the design of a parent-accepted, financially viable co-payment model for transformative school-provided meal programs in Australia.

## CHAPTER 8. DISCUSSION AND CONCLUSIONS

### 8.1 OVERVIEW

This thesis explored the perspectives of Australian parents/caregivers of primary-school children on a potential school-provided meal system. Parent perspectives are important to bring the voices of a key stakeholder group into the current debate on transforming school food in Australia. The aim of this thesis was to understand parent/caregiver perspectives of a school-provided meal system in the Australian context, which was addressed by answering two overarching research questions:

1. What do parents/caregivers value in an Australian school-provided meal system?
2. How do school-provided meal systems need to be tailored to meet various socio-ecological contexts and parent/caregiver perspectives?

Throughout the course of this thesis, my philosophy on school-provided meals has evolved, shaped by both academic inquiry and practical experience. I value action to reduce population health inequities, primarily considering nutrition and food security, while recognising the potential of nutrition action aligned within a broader and considered societal approach. As such, I recognise the potential of school-provided meals as one potential mode of addressing health equity, social inclusion and lifelong population disparities, being a key setting with reach to all children. While school-provided meals will not resolve all existing disparities, they represent a vital component within the broader public health framework of potential government actions. As such, the discussions and conclusions within this thesis are guided by the evidence demonstrating the interest and potential for school-provided meals within Australia.

### 8.2 SUMMARY OF MAIN FINDINGS

Five studies were included to comprehensively understand parent perspectives of a school-provided meal system while considering the feasibility of the research. Firstly, a mixed papers narrative review (Chapter 3) was conducted to synthesise what parents identify as the key features of school food provision models internationally (school-provided meal, lunchbox and canteen models) and their perspectives on school food. This review found benefits and challenges to all school food provision models for parents, influenced by a range of system features that informed how the system was experienced by parents. These included cost, time, effort and convenience, child preferences, nutrition, policy and messaging, eating environment and food education. Priority features influenced parental decision-making on school food provision, forcing parents to make compromises between features to meet their needs. Compromises were also often contextualised with parent values, such as recognising the importance of nutrition, and socio-demographic factors,

such as household income or cultural background, demonstrating the complex socio-ecological influences on parent food perspectives, particularly on the intrapersonal level.

The second study (Chapter 4) built on the review findings demonstrating the way food is prepared and served to children during the school day internationally differs based on socio-ecological factors. An observational study was conducted of seven schools across four countries to understand the design and functioning of the food service of a meal during school, and how this differed across countries and schools, serving different personal situations (i.e., considering socio-ecological factors). Findings were mapped against an iteratively developed school-provided meal food service framework, indicating menu offering, food service system, administration, eating environment, mealtime experience, and post-meal were key stages of the food service, requiring consideration to feasibly deliver a meal. Results showed the need for tailored school food programs, designed appropriate to the country, region and school context, including considering cultural underpinnings and available resources, spanning the settings and policy socio-ecological levels. Furthermore, a positive eating environment and elements of student choice and responsibility were all noted as important principles in a successful school food service. The food service framework developed alongside this research provides a key resource to support the planning of a school food service and can be implemented to apply the findings of this thesis (Appendix 9.3.1).

To contextualise international findings identified in the review and understand priorities of Australian parents in a potential school-provided meal offering, virtual prioritisation workshops were conducted (Chapter 5). Parents considered their values and discussed a wide range of features and concepts they would be interested in seeing within a school-provided meal model. The top five features of most importance to parents were nutrition, cost, stigma considerations, catering to dietary requirements, and sustainability and waste. The findings indicated there are many considerations, including different values, for Australian families when discussing the potential transformation of our school food model. Results demonstrated there is potential interest in a school-provided meal model from parents, if their perspectives are considered. Findings outlined the key considerations needed to design a system appropriate different children, families, schools and regions, indicating the need to adjustments on all socio-ecological levels.

Findings of previous thesis studies demonstrated that cost is a key consideration for food provision, influential on the food decisions made and acting as a critical factor in acceptability of a school-provided meal offering. A secondary analysis was therefore conducted (Chapter 6) to determine what families are currently paying for school lunchboxes in Australian primary schools, and to examine associations between food costs and socio-demographic factors with diet quality. Lunchbox contents had a mean cost of \$4.48 AUD, with higher costs being significantly associated with a higher proportion of energy from unhealthy foods and living in an area of greater disadvantage. The results indicated that lunchbox food costs for Australian families were

comparable to alternative school food service models in Australia and internationally. Results further indicated the cost of food is not the only barrier in providing a healthy school lunchbox, demonstrating a need for cost-considerate initiatives that address food provision challenges and socio-economic disparities faced by families.

Finally, an online survey, including a Discrete Choice Experiment (Chapter 7), was used to explore parent values and trade-offs between priorities, needed to design an acceptable and financially viable system, including differences across socio-demographic groups, informed by previous findings in the thesis. Most participants of the Australia-wide sample expressed interest in school-provided meals (93%) and were willing to pay approximately \$6 per child per day. Parent interest was influenced by system attributes including nutrition and quality, menu options, environmental sustainability, and a whole-school approach to food. This indicated these are key areas parents value in a school-provided meal system. Parents preferred lower cost options but were willing to pay more to ensure the system offered attributes aligned with their values, such as nutritious quality meals, two menu options, and to incorporate environmental sustainability principles. Additionally, parents favoured a socially priced system, increasing equity. Parent preferences differed based on socio-demographics, including household income and number of children in primary school, indicating a school-provided meal model must be tailored to the inter and intrapersonal socio-ecological levels to be widely acceptable.

Findings across all thesis studies contributed to a comprehensive understanding of parent perspectives, demonstrating potential for a school-provided meal system in Australia that is acceptable to parents. Consolidated findings provide a thorough understanding of the first research question, identifying key parent values requiring consideration in the design of a school-provided meal system. Findings demonstrated the importance of integrating varying parent perspectives with the first research question was addressed in the review, workshops, and survey studies. Results demonstrated systems must align with priority parent values to be acceptable, with values influential on parent decision making. Additionally, findings across all studies addressed the second research question, demonstrating the need for factors across all socio-ecological levels to be considered. Different considerations identified indicate a need for system tailoring for various countries, regions within Australia, schools, families and individuals to enable acceptability and feasibility. Consolidated results, in the context of broader literature, provide key learnings to inform the need for and potential design of a parent-accepted school-provided meal offering in the Australian setting.

## 8.3 DISCUSSION OF MAIN FINDINGS

### 8.3.1 Potential for a parent-acceptable school-provided meal offering

This thesis generated an understanding of parent interest in school-provided meals and their perspectives on a potential system, in the Australian context. Findings demonstrated there is potential for a feasible school-provided meal model in Australian primary schools that is acceptable to parents, if the system is comprehensive and appropriately designed. The findings are supported by relevant Australian literature, indicating parent interest in school-provided meals being introduced nationally<sup>159, 160, 161</sup>. However, parent interest appears largely dependent on how the system is described, with a survey of 797 Australian parents finding 53% agreed or strongly agreed to introduction of school-provided meals when the system was framed as universal and free<sup>161</sup>, compared to the higher interest identified in this thesis. This reflects the findings described in Chapter 7, that parent interest depends on what the hypothetical system offers and how it is designed, with parents opting out if the system did not align with their values. Parent acceptability is critical for system uptake<sup>257</sup>, needing majority of families to participate to create a feasible system, with larger participation increasing the cost returns in an economy of scale. As such, the findings on parent acceptability should be integrated into design of potential school-provided meal systems, ensuring alignment with parent values to optimise the impact.

The interests of parents must be considered within the context of other key Australian stakeholder populations, including students, stakeholders across diverse sectors and the general public<sup>105, 158, 228</sup>. Although the current evidence is limited, emerging findings indicate the complex preferences, interests, needs and concerns of these populations in a potential school-provided meal offering, many of which align with the perspectives of parents discussed in Chapter 5. Workshops exploring alternative school food provision models with Australian stakeholders across the school sector identified school lunch prepared onsite using a rotating menu of seasonal produce, minimally processed food, a range of cultural foods, and offering social pricing, as having the highest potential impact and achievability<sup>158</sup>. Additionally, a study with Australian children found interest in a menu with variation and choice, catering to a range of dietary requirements, a social eating environment and interactions about the meal experience they were sharing<sup>228</sup>. Ensuring student autonomy was also identified as valuable in system functioning in Chapter 4 findings. These consistent interests between findings of this thesis with other stakeholder populations indicates the potential for a comprehensive system to address the needs of numerous key stakeholders. Considering the interests across the population can therefore inform how a school-provided meal should be designed and how this transformative action should be marketed and communicated to the public to optimise acceptability.

Findings indicate that Australian parent interest and priorities in a school-provided meal model are aligned with international literature. This was discussed in Chapter 5, determining numerous features identified in the international literature (Chapter 3) were aligned with the Australian parent participant's perspectives, such as nutrition, cost, quality, food access/availability, and time, effort and convenience. As comparable countries are increasingly exploring and piloting national adoption of school-provided meals, parent interest and values can also be compared across similar

contexts. Across regions, parent views are aligned, with interest in a school-provided meal, but concerns identified about how the system is delivered<sup>188, 193, 204, 317</sup>. A Canadian study of 510 caregivers found 94% of parents were interested in a proposed school food program<sup>188</sup>. Parents considered learning opportunities, provision of healthy food, affordability, and adaptability to all be essential in a school food program that met parent preferences<sup>317</sup>. Canadian findings indicated comparable willingness to pay and consistent key aspects of consideration with the findings of this thesis, including catering to dietary needs and integration of food learning opportunities in a universal offering<sup>188, 204</sup>, valuable in informing a financially viable and accepted system. In the Netherlands, a qualitative study found parents acknowledged the benefits of a potential school-provided meal offering; however, the importance of affordability, sufficient eating time and an enhanced food offering compared to lunchbox models would need to be considered to meet their needs and encourage a shift from current provision practices<sup>193</sup>.

In longstanding international school-provided meal systems, evaluations of parent perspectives have found fluctuating support and uptake<sup>128</sup>, in part due to limited integration of parent views into the system design. Findings of this thesis are valuable to ensure parent voices are integrated in the growing school food conversations in Australia, applying the Consumer and Community Engagement Framework for Research<sup>162</sup>. Ensuring parent voices are considered by integrating key attributes identified within this thesis, including nutrition, cost, school approach to food and equity, will be important, particularly in the context of a transformation potentially reducing parent responsibility and autonomy in feeding their children. Adopting findings on parent acceptability into system design will improve the potential public health impact<sup>318, 319, 320</sup>. The findings of this thesis suggest the potential to use parent and key stakeholder perspectives in informing action, with opportunity for future research to continue to empower stakeholders in a community development model<sup>321</sup>.

Overall, this thesis demonstrated the potential for a parent-accepted, feasible school-provided meal model in the Australian setting. Within the context of broader literature, the findings indicate the need for a comprehensive system design, creating opportunity for ongoing co-design and community-led action to ensure initiatives align with parent values to optimise potential uptake and impact.

### **8.3.2 Potential of school-provided meals within the Australian socio-ecological context**

This thesis provides new knowledge on the considerations needed to implement a school-provided meal system within the Australian socio-ecological context. Evidence synthesis indicates that introduction of a school-provided meal system in Australia would require consideration of specific country, school and individual needs to enable an acceptable and feasible system. This thesis applied the socio-ecological framework for nutrition and physical activity<sup>16</sup>, finding a system should be tailored across all socio-ecological levels. Specifically, findings described in Chapter 4 found the

differences needed in the design and delivery of a school-provided meal program based on country priorities and available resources. Australian parents across Chapter 5 and 7 indicated their differing needs for a potential program to be acceptable, including considerations of equity to ensure the system is appropriate for all families. While specific recommendations are addressed in Section 8.4.1, these findings indicate that one size cannot fit all when it comes to a school-provided meal offering.

The need for a tailored approach has been discussed in previous Australian school-provided meal research, with idea generation and prioritisation workshops held with a range of school stakeholders finding the need for variations in the system offering for each type of school<sup>158</sup>. A survey with 797 Australian parents found varied interest and values across different socio-demographics, including higher interest from non-English-speaking parents, and parents with a lower education level<sup>161</sup>. Additionally, a study completed with one classroom of South Australian primary school students found some varied preferences and concerns were present, including dietary requirements, food choices and food service<sup>228</sup>. Thus while thesis findings indicate initial interest in a universal school-provided meal system, an Australian system cannot be uniform across all schools, as established across all stakeholder groups.

Tailoring is a key principle for any population health promotion program, particularly those in the school setting, ensuring the program is appropriate and thus optimising the public health impact. Tailoring of programs within schools has been identified as a necessary but challenging consideration implementation science<sup>322</sup>. Tailoring of a school-provided meal program also aligns with the guidance within the Ottawa Charter for Health Promotion<sup>323</sup>. The World Health Organization describing that programs should be adapted to local needs<sup>323</sup>. Further, health promotion is recognised as requiring coordinated action from sectors, communities and individuals<sup>323</sup>. Use of community perspectives to inform action, in a bottom-up implementation approach, can therefore empower populations and create supportive health promotion environments.

The socio-ecological framework can provide a comprehensive structure to guide successful program design, which considers the many influences on individual behaviour and positioning within a broader environment<sup>163</sup>. A systematic review described how students' consumption of school-provided meals is influenced by multiple intersecting factors across socio-ecological levels<sup>166</sup>. The influence of these factors indicate that for a school-provided meal program to be successful, all systems cannot be the same, requiring specific tailoring to meet the varying needs of students, parents, schools, and countries. This was further highlighted by Moore and colleagues<sup>165</sup>, who described the potential of socio-ecological thinking to inform comprehensive initiatives improving the dietary intake of school children. Findings demonstrate that consideration of socio-ecological levels within school food initiatives can increase effectiveness, acceptability, adoption and maintenance<sup>165</sup>. Additionally, a series of articles from Public Health Nutrition Journal



were collated, highlighting the need for public health professionals to consider the complexity of school food, including across the socio-ecological levels<sup>324</sup>. Thus, school-provided meals should be tailored to offer a more inclusive and impactful public health initiative, aligned with health promotion frameworks and parent perspectives established in this thesis.

The use of tailoring on socio-ecological levels has been demonstrated in pilot programs of school-provided meal programs in New Zealand, Australia and Canada, indicating the potential feasibility of such an approach. In New Zealand, the Ka Ora, Ka Ako | Healthy School Lunches Programme is universal to create a level playing field for all students, but systems are modified based on resources, school population and population values, particularly Māori values<sup>325</sup>. The original program encouraged community engagement to ensure the program was appropriate, while integrating Māori culture, creating social cohesion, with many schools employing community members<sup>136, 325</sup>. Additionally, outcomes and impacts are described as extending through five socio-ecological levels “*child, whānau (family), school, community, and food system*” (p.2.)<sup>326</sup>. Schools in Tasmania, Australia use different food service approaches based on school facilities and resources, with discussion of the challenges of catering to individual dietary requirements and needs. This involves applying an overarching implementation framework, in collaboration with the school, ensuring the program is tailored to the specific school setting. This aligns with implementation guidance for embedding programs within schools<sup>322</sup>. In Canada, the ‘School food programs in Canada - Needs Assessment & Engagement Guide’ outlines considerations in the design of a program, including numerous factors for schools and families to ensure program success<sup>257</sup>. Further, across all these programs, schools have been provided with opportunities to lead their program, including food preparation and management onsite with community members, ensuring food autonomy remains within the community, rather than entirely government led. The tailoring applied in trial programs within Australia and comparable regions is therefore aligned with the parent perspectives established in this thesis, demonstrating feasible strategies to increase equity.

While resources and supports exist in longstanding school-provided meal systems, as discussed in Chapter 4, the need for tailoring indicates that international resources must be modified and tested to ensure appropriateness within the Australian policy context, cultures and communities. Further, this indicates that benefits and impacts described internationally may not be transferrable, needing ongoing exploration to understand the potential impact of a school-provided meal across different populations. While not a key aim of this thesis, the food service framework developed alongside this research can be used to support tailoring in future system design, providing a broad structure for a system and noting the necessary areas for tailoring. Therefore, while there is interest in a school-provided meal system being introduced in the Australian context, such a system must be designed for our population, with the delivery and functioning of the system to differ on a range of different socio-ecological levels to optimise acceptability and feasibility.

### **8.3.3 Informing the design of a feasible Australian school-provided food system**

The findings of this thesis can be positioned within the context of broader literature to inform the potential of a feasible school-provided meal system. Application of a feasibility lens throughout thesis studies, including cost structures, consultation with key stakeholders and varying models of a school food service, have enabled findings to be applied within the real-world setting. Since commencement of candidature, the number and scope of school-provided meal pilots has grown. For example, the Tasmanian pilot program has grown from three to 30 schools, with the program being comprehensively evaluated<sup>151</sup>. As such, the preliminary costs of the pilot program can be compared to thesis findings, recognising if parental willingness to pay is aligned with pilot programs. While specific economic analyses should be conducted to understand the value of a system applying these thesis findings, existing programs can be used in the interim to inform the potential cost feasibility of an Australian school-provided meal program.

Cost is a major consideration outlined consistently throughout this thesis. While many emerging school-provided meal programs introduced in Australia or internationally offer free school-provided meals, obtaining sustainable funding can be challenging, therefore there is a need to consider suitable funding structures. Willingness to pay findings established in this thesis provide a unique and valuable contribution to literature, with findings able to inform the development of suitable cost models. Findings indicated parents were typically willing to pay approximately \$6 per child per day for a school-provided meal. Parents were willing to pay higher values to integrate enhanced system attributes, such as nutritious quality meals, two menu options, and to incorporate environmental sustainability principles. Additionally, willingness to pay was higher than current parent financial investment for lunchbox provision, indicating parents financially value a school-provided meal more than lunchboxes. This is likely due to the increased convenience of a school-provided meal, described by parents in Chapter 3 and Chapter 5. The thesis finding aligns with previous Australian findings establishing parents are willing to contribute, with approximately 96% of parents willing to pay identified in the evaluation of the Tasmanian school food program<sup>151</sup>. However, willingness to pay was lower in the Tasmanian sample, with a mean value of \$3.36<sup>151</sup>. This indicates the potential need for a scaled pricing structure (e.g., social pricing), as discussed in Chapter 5, to achieve an equitable and affordable offering. Additionally, in 2022, an online cross-sectional study explored the perspectives of 359 Victorian parents on a potential school-provided lunch program. Parents were most commonly willing to pay \$5-\$6 per child per day, or less<sup>160</sup>. Therefore, Australian parents are willing to financially contribute to school-provided meals.

To establish potential financial viability, willingness to pay can be compared to the costs of the Tasmanian pilot program, including initial and ongoing costs. The features of the pilot program are aligned with the findings of parent interests within this thesis, particularly workshop discussions in Chapter 5, with the evaluation finding parent acceptability and indicating potential for national roll out of a similar, tailored program with key stakeholder input. Initial costs to set-up programs were a

median of \$13,697 in 2022 and \$10,972 in 2023 per school, with costs ranging from \$881 to \$37,492<sup>151</sup>. In broader program roll out, these costs would likely require funding, separate from parent contributions, due to being substantial upfront costs. Program costs varied depending on the equipment required for the school, contributions to salary support for dietitians and food safety officer, as well as any additional expenses purchased by the school<sup>151</sup>. Equipment requirements were influenced by the optional adoption of an onsite prepared meal, or reheated meal model. This indicates there is potential for different school food service models, such as those described in Chapter 4, to be adopted, reducing initial establishment costs in Australia. Ongoing meal costs in the pilot program in 2023 were a median of \$9.98 per meal, including contributions to the food provider, project management organisation, government department support and to the school to provide the food<sup>151</sup>. Ongoing costs were noted to be influenced by program scale, reducing upon program expansion<sup>151</sup>. As such, parental willingness to pay findings established in this thesis and in the broader literature may not cover all ongoing costs or be independently financially viable with parent contributions alone.

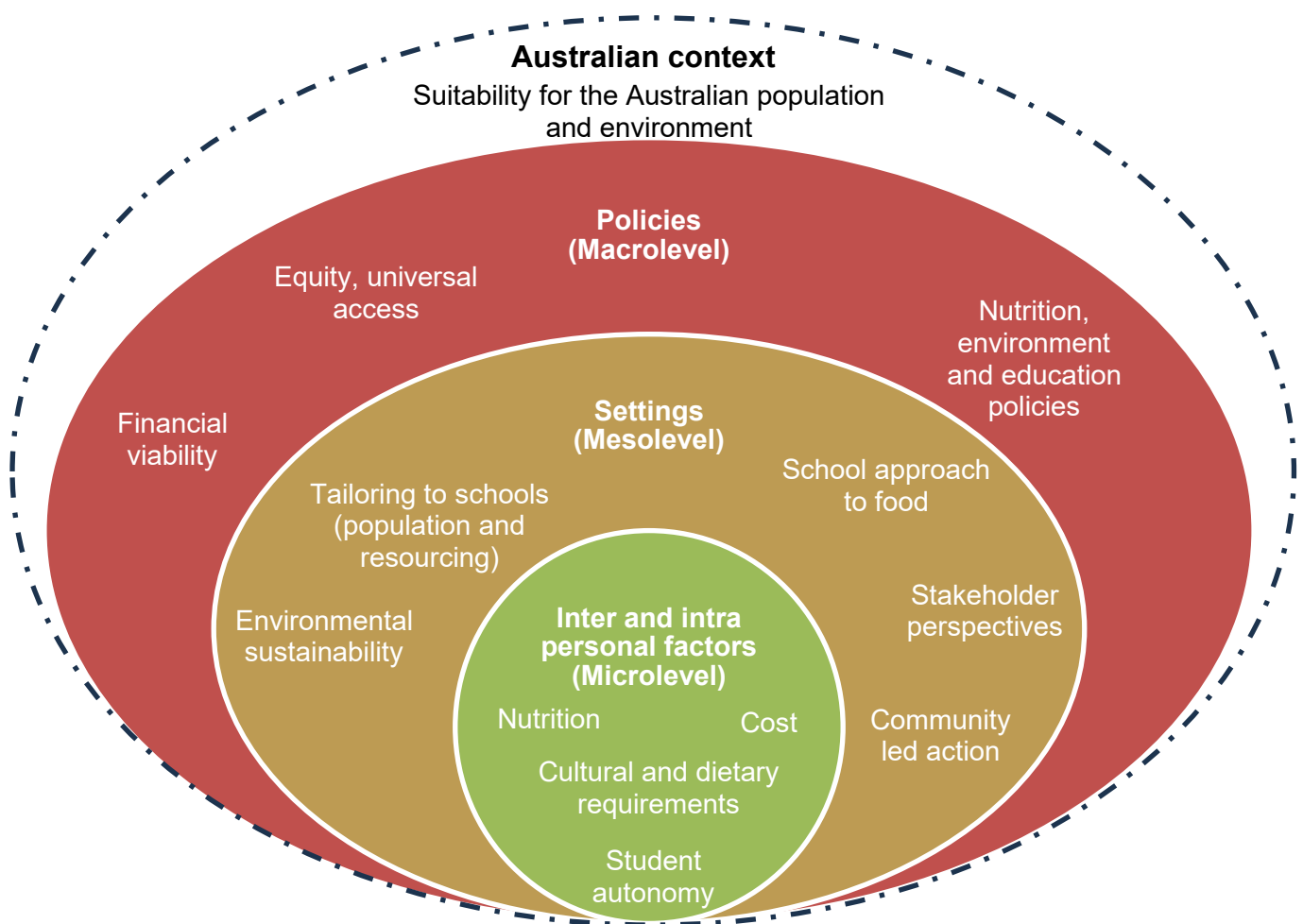
Different pricing structures exist internationally for school-provided meals, including co-contribution between parent and government, or fully parent paid models, with the potential for either of these models to be used to establish and maintain school-provided meals in Australia. A 2024 report by the Global Child Nutrition Foundation found across high income countries, an average of approximately 85% of school-provided meal program funding is provided by government, with 60% of programs worldwide including some form of parent contribution<sup>327</sup>. While a more comprehensive cost analysis is needed to understand the specific funding to support an Australian program at scale, a need for government contribution is likely to, at minimum, establish the program and support initial staffing, refurbishment and equipment costs<sup>5</sup>. However, obtaining government funding to support implementation of school-provided meals is not unrealistic, when recognising the potential cost benefits. School-provided meal cost benefits are attributed to improved health, education and increased productivity across the lifespan<sup>141</sup>, as described by the World Food Programme. Furthermore, a Canadian report described universal free school-provided meals can provide a 2.5x - 7x return in human health and economic benefits in high-income countries<sup>115</sup>. These benefits were recognised by Australian parent participants in Chapter 5, acknowledging the program was a social investment. Free school-provided meals would require substantial initial and potential ongoing government commitment, thus may not be financially viable in Australia. However, socially priced parent payments offer an acceptable and feasible alternative, reducing government costs and achieving broad social benefits.

## 8.4 FUTURE DIRECTIONS

This thesis has contributed to new knowledge on the potential acceptability of a feasible school-provided meal system for Australian parents. The findings can be applied to inform considerations

for policy, practice and future research. Figure 8-1 outlines the key findings of this thesis and directions within the context of the socio-ecological framework, indicating considerations for individuals, schools and within the Australian country context.

To achieve equity while considered pragmatism, I believe school-provided meals should be available to students universally, with proportionate universalism principles applied to achieve greater equity, while still maintaining financial viability. I recognise the challenges and considerations with such a program, with a strong desire for ongoing action to be community led, aligned with my belief on the best practice for public health. As such, knowledge established in this thesis can support a shift towards community led school-provided meal programs, continuing to engage parents and empowering key stakeholders to lead the next stage in this system transformation.



**Figure 8-1: Recommended considerations mapped against the socio-ecological framework**

### 8.4.1 Policy and practice recommendations

The findings of this thesis have indicated areas for policy and practice to ensure an Australian school-provided meal system is aligned with parent values and optimises potential outcomes. The findings are timely as the Overton policy window of discourse shifts, and school-provided meals become an increasingly politically acceptable conversation. While individual chapters highlight recommendations for a potential school-provided meal system that is feasible and acceptable to Australian parents, collation of findings across this thesis indicate the key areas requiring consideration. Key recommendation areas of importance to parents as key stakeholders include nutrition, cost, equity, environmental sustainability, and the school approach to food.

Thesis findings indicated the importance of nutrition in a potential school-provided meal system to parents. Nutrition is a key area for potential success of a school-provided meal program, ensuring all children have access to nutritious food each day, aligned with national guidelines, and addressing food insecurity in the school setting<sup>214</sup>. National policies, such as those successfully implemented within systems in France and Sweden (Chapter 4), would support the alignment of school-provided meals with national dietary guidelines, increasing the public health potential and supporting healthy growth and development for children. Such school food policies are associated with increased fruit and vegetable selection and consumption if implemented correctly<sup>214</sup>. In practice, tools should be developed to support newly introduced school-provided meal systems to adhere to guidelines and prioritise provision of nutritious food, considering cultural diversity and dietary requirements. Poor implementation support and maintenance has hindered the success of canteen nutrition policies across Australia in past decades<sup>282</sup>. Resources to support schools in providing nutritious food could include dietitian support, or menu and recipe guidance to support provision of culturally diverse, age-appropriate, nutritious food with dietary modifications, aligned with national guidelines.

Cost was identified as a critical attribute for parent acceptability and participation in a school-provided meal. Policy can guide a financially equitable pricing structure across Australia, tailored to the individual level, considering the financial means of different families. Offering free or reduced-cost meals can reduce the financial burden of lunchbox provision for families of low household income, providing an avenue to address food insecurity<sup>214</sup>. Willingness to pay findings, combined with an understanding of program costs, can inform an acceptable pricing structure for families of different financial means. There is potential to explore the use of proportionate universalism principles, if creating a universal system, to ensure the system is accessible to those in need, including through cost. Additionally, different food provision models, such as offsite prepared meals, can be used to reduce initial costs for schools who may not be already equipped with adequate resourcing, such as transformable canteen space. This knowledge can inform a potential model of funding, to increase uptake and contribute to greater financial viability. In practice,

schools should ensure pricing structures are hidden from students, reducing potential for stigma in receiving a subsidy.

Policies should include guidance on the universality of school-provided meals. Universal school-provided meal policies can ensure food is universally accessible by students can improve equity and align with parent priorities. Universal free school-provided meal policies have been described as benefitting all students and become increasingly implemented over decades<sup>328</sup>. Ensuring a universal school-provided meals policy is implemented also increases the alignment with the United National Sustainable Development Goals<sup>329</sup>, including education and learning, health and nutrition, and local economies<sup>116</sup>. However, implementation of a universal system must maintain parent autonomy to ensure acceptability. In practice, findings demonstrated that equity can be appropriately addressed through tailoring the universal system across school and individual socio-ecological levels, with tailoring designed collaboratively with stakeholders.

To ensure environmental sustainability and school approach to food are aligned with parent priorities, these should be integrated in policy. Addressing these attributes can contribute to a more comprehensive and impactful school-provided meal system. Policy should guide sustainable food supply chains and reduction of food waste. Principles of school-provided meals should be embedded within the national curriculum and supporting learning around food, with a comprehensive system using a whole school approach to food having greater potential for societal impact<sup>127,132</sup>. In practice, schools should consult their communities to create cyclical systems and optimise sustainability, education, development and social impact for schools and their local community.

Thesis findings also indicated the importance of ongoing integration of parent and key stakeholder voices across the stages of design, implementation, monitoring and evaluation of a school-provided meal system, creating opportunity for community-driven policy and practice actions. Engaging stakeholders in school food action is a key facilitator in program effectiveness, acceptability, adoption and maintenance<sup>165</sup>. Community led action and stakeholder engagement ensures parent autonomy is maintained when undergoing a shift in food provision responsibility, increasing potential acceptability and thus system uptake. Furthermore, parents desired offering meal options in Chapter 7 findings, with this aligned with preliminary research with children<sup>228</sup>. Engaging students within the program, including providing elements of autonomy and responsibilities, can contribute to greater system functioning and contribute to an integrated approach to education. This was established in Chapter 4, and is aligned with parent interests, as described by participants in Chapter 5. Therefore, different food service models integrating parent and child autonomy is necessary in the ongoing exploration of school-provided meals in Australia. Planning a school food service is complex and system delivery is influential on parent and student acceptability. This thesis identified numerous features requiring consideration to implement a feasible and acceptable school-provided meal program. This is further supported by the challenges

faced in pilots of school-provided meal programs in Australia and New Zealand<sup>136, 139, 151</sup>. The food service framework described in Chapter 4 (available in Appendix 9.3.1), developed alongside this thesis, can be used in practice to support in the planning and evaluation of future programs. Involvement of Australian pilot programs in the framework development has enabled planning applications, noting the key stages of the food service influencing the mealtime functioning<sup>221</sup>.

#### **8.4.2 Future research recommendations**

Findings of this thesis indicate the pathway for future school food research in Australia, recognising there is parent interest and potential for a feasible school-provided meal offering, with key recommendation areas for policy and practice. However, additional research is needed to fill key knowledge gaps on national adoption of school-provided meals.

Research conducted within this thesis was constrained by timing, resources and projects to offer a comprehensive learning opportunity, while aligning with external stakeholder interests. As a result of learnings gained over this candidature, I have a stronger understanding of the need for meaningful research engagement for effective public health action. As a predominantly quantitative researcher, this candidature allowed me to gain experience in qualitative methods, as well as understand the complementary nature of research methods to allow immersive and comprehensive exploration. Additionally, while I originally saw the Discrete Choice Experiment as the research endpoint, addressing key questions about parent interest, my research philosophy has shifted from the learnings across my candidature. As a result, a series of new, complex questions have been generated, described throughout this discussion chapter. Aligned with my research philosophy, addressing these questions requires sustained and meaningful engagement with communities, perceiving this as necessary in shaping future research.

This thesis included parents as research participants, capturing their perspectives on a potential school-provided meal offering, as well as parents and other key stakeholders informing the research through an advisory group of school food stakeholders, using the Consumer and Community Engagement Framework for Research<sup>162</sup>. Parent perspectives are valuable in guiding the key considerations of a potential school-provided meal model, resulting in key considerations to address parent needs design and feasible systems with tailoring on socio-ecological levels. However, parent perspectives alone cannot inform a feasible and acceptable school-provided meal system. Future research should consider broader stakeholder perspectives and champion the voices of stakeholders. A diverse range of school food stakeholders, as identified in the stakeholder mapping process (Chapter 2, Table 21), including parents, students, food service staff, school staff, and food supply staff, should be supported in a community co-production approach to lead the design, implementation, monitoring and evaluation of a school-provided meal system. Stakeholders could also be involved in generating research questions, ensuring evaluation measures are relevant and reflect the interests of the community. This creates potential for future

research and action to shift the positioning within the Consumer and Community Engagement Framework for Research<sup>162</sup> to increase consumer responsibility. This shift will ensure a system is acceptable to all stakeholders, increasing potential impact and achievability as an initiative.

Future research should contextualise international evidence on the impacts of school-provided meals, understanding if the findings of systematic reviews<sup>88</sup> would be replicated within the Australian context, through real world trials. Additionally, research should explore if parent paid or co-contribution models would achieve the same preliminary benefits seen in universal, free school-provided meal models, in addition to exploring the feasibility of these models. Conducting hybrid implementation effectiveness trials of school-provided meals would enable exploration of the feasibility and logistics of addressing key recommendation areas of nutrition, cost, equity, environmentally sustainability, and the whole school approach to food. The use of a framework is suggested to guide implementation within the school setting, ensuring the approach remains aligned with evidence<sup>322</sup>. Trials should also measure the feasibility of tailoring implementation for different contexts, acknowledging the potential complexities and cost-effectiveness of various models. Additionally, measures of acceptability within real world hybrid trials would address potential bias introduced in the findings of this thesis, due to the use of hypothetical scenarios. A hybrid trial would allow effectiveness of school-provided meals as a health promotion initiative to be measured, if school-provided meals were provided over a minimum 12 month period, allowing for initial impacts to be observed. Additionally evaluation of implementation strategies can fast-track potential program scale up. Particularly, evaluation should understand the true costs, social impact and financial return from a school-provided meal system within the Australian context using a range of different food service models, through conducting economic evaluations such as a social return on investment analysis. Future research can be guided by the key stages of school food service identified in this thesis, applying the food service framework (Appendix 9.3.1) to inform the considerations in the planning of new, tailored programs and potential stages for process evaluation<sup>221</sup>. This framework should continue to be iteratively developed to optimise the application as a key resource in considering the complexity of school-provided meal program design. These findings would support government investment, understand the social value of the program and allow for successful roll out of programs across Australia.

### **8.4.3 Strengths**

This thesis was the first in Australia to comprehensively explore parent perspectives on a school-provided meal system, with numerous strengths of the research. The research methodology adopted in this thesis was innovative in engaging parents in a range of strategies, including surveys, workshops and within an advisory group, informing a potential acceptable and feasible system. Each chapter captured a unique research study, with an individual aim, establishing significant original contribution to knowledge and iteratively contributing to consecutive studies. Consolidation of studies allowed the thesis aim to be comprehensively addressed.



Thesis studies followed vastly different methods, with a range of qualitative, quantitative and multi-methods studies each individually analysed and interpreted, providing a more comprehensive understanding of the parent perspective. The use of different methods supported participation from diverse parent populations, for example, the online survey being more accessible for busy families or those who are more comfortable with written English, enabling flexible participation, in comparison to a group workshop. Recruitment strategies for two studies included parents across Australia using virtual methods, striving to capture a representative sample, while one of the studies included schools internationally, allowing a diverse range of school food service models to be captured.

Research captured within this thesis was informed by two frameworks, the socio-ecological framework for nutrition and physical activity<sup>16</sup> and the Consumer and Community Engagement Framework for Research<sup>162</sup>. These frameworks were strategically applied throughout the research to strengthen research methods and application of findings. Frameworks ensured the numerous complex influences on food provision decisions made by parents were considered and parent voices were amplified and used to inform research methods. To further apply the Consumer and Community Engagement Framework, an advisory group of school food stakeholders, including parents, was engaged, following a comprehensive stakeholder mapping process. This advisory group informed all research conducted, to ensure the findings relate to a feasible school food system and provide parents with the opportunity to inform the research. As a result, the individual and cumulative evidence generated through this thesis demonstrates key priority areas for parents in a potential school-provided meal offering. These findings therefore offer valuable direction in the design of a feasible system that is accepted by consumers and considers the complex socio-ecological factors influencing food provision.

#### **8.4.4 Limitations**

Findings within this thesis should be interpreted in the context of numerous considerations. Limitations of each research study have been discussed within the corresponding chapter and should be considered when interpreting or implementing findings. Additionally, it is important to consider the overall limitations of this thesis, particularly when using findings to inform recommendations for future school-provided meal offerings.

While studies aimed to recruit representative samples, there are limitations to the diversity captured across the research studies. While families from diverse income categories participated in Chapter 5 and Chapter 7 studies, and some participant diversity was captured across Chapters 3 and 6, due to the collation of international literature, there was limited diversity from culturally and linguistically diverse populations. As a result, diverse perspectives may not be accurately represented in the overall findings of this thesis. Implementation of the research findings within culturally diverse populations should therefore be strongly accompanied by co-design and program

tailoring, ensuring school-provided meal programs are directly informed by the populations they serve, aligned with the Consumer and Community Engagement Framework for Research<sup>162</sup>.

Studies within this thesis may be impacted by participation bias. Parents with strong views on school food are more likely to participate, particularly parents in strong support of school-provided meals. This may mean the findings are not an accurate reflection of the general population, representing a parent population with stronger values on school-provided meals. Researcher bias may have also influenced the findings, although this was mitigated through ongoing reflexive practice throughout numerous studies, collaborative analysis and discussions with research supervisors, collaborators and advisory group members, and transparent research practices.

Ongoing research should target minority populations that are traditionally underserved in population research methods, to ensure all voices are heard in school food conversations. This is critical in the context of system tailoring, needing to understand what a system should offer to be acceptable to families of varied cultural and financial backgrounds. Particularly, future Australian research must engage Aboriginal and Torres Strait Islander communities to ensure co-design and best practice principles are integrated. This strives to maintain community autonomy in the initiatives that are designed and introduced, including through using Indigenous methodologies aligned with best practice guidelines for engaging Aboriginal and Torres Strait Islander Peoples and communities<sup>315</sup>. Further, this thesis focuses solely on the parent population, limiting the applications of findings into practice, requiring further research to understand the perspectives of broader stakeholders identified in Chapter 2, Table 2-1.

Finally, the use of hypothetical questions to understand parent perspectives on a school-provided meal system may not have captured all the complexities of decision making in actuality. As a result, findings may not represent parent decision making in a real world situation. Ongoing research with parents must be conducted to address this, ensuring action is aligned with true parent perspectives.

## 8.5 CONCLUSIONS

This thesis provided a unique contribution to understanding of parent perspectives on a school-provided meal system in the Australian context. The findings indicate that there is potential for a parent accepted and feasible school-provided meal model to be introduced in Australian primary schools. Such a system transformation would be acceptable to parents if the model was appropriately designed, addressing key values such as nutritious, quality food, menu choice, environmental sustainability, integrated learning opportunities and universal accessibility. Parent views should be considered alongside those of other key stakeholders, whose perspectives were found to be aligned, and successful examples of international school-provided meal programs to increase uptake and impact. Additionally, findings demonstrated that a system in Australia would

need to consider specific country, school, and individual needs, recognising that one size does not fit all when it comes to a school-provided meal offering. Key tailoring findings included pricing flexibility for different family profiles and designing school food offerings according to school facilities, population and needs (i.e., considering socio-ecological context influences). Future research should continue to explore the potential of a school-provided meal model in Australia, while programs implemented should integrate key attributes prioritised by parents, with the potential for a community-led approach informing ongoing action. Overall, the thesis findings can provide the evidence to inform transformative policy action, ensuring parent perspectives are considered in the growing conversations about school-provided meals in Australia.

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# APPENDICES

## 9.1 ADDITIONAL ACTIVITIES DURING CANDIDATURE

### Publications relating to PhD project (available in 9.2)

1. **Manson, A. C.**, Golley, R. K., & Johnson, B. J. (2025). Global parent perspectives on school food service internationally: A mixed papers narrative review. *Nutrition & Dietetics* <https://doi.org/10.1111/1747-0080.12926>

#### 2 citations

2. **Manson, A. C.**, Johnson, B. J., Middleton, G., Evans, C., Dunbabin, J., Rossiter, J., Nicklaus, S., Sundin, A., Sundin, N., & Golley, R. K. (2024). Getting school-provided meals to the table: an international multiple-case study of school food service. *Health Promotion International*, 39(6), daae177. <https://doi.org/10.1093/heapro/daae177> (Q1 journal)

#### 3 citations

3. **Manson, A. C.**, Golley, R. K., Dutch, D. C., & Johnson, B. J. (2025). “Not just students in need”: Findings from a nominal group technique study of what parents want in an Australian school-provided meal system. *Australian and New Zealand Journal of Public Health*, 49(2), 100221. (Q1 journal) <https://doi.org/10.1016/j.anzjph.2025.100221>

#### National 9 News interview

#### 3 citations

4. **Manson, A. C.**, Johnson, B. J., Wolfenden, L., Sutherland, R., & Golley, R. K. (2024). Unpacking the cost of the lunchbox for Australian families: a secondary analysis. *Health promotion international*, 39(1), Article daad194. Advance online publication. <https://doi.org/10.1093/heapro/daad194> (Q1 journal)

#### Altmetric of 69, top 5% of outputs, 7 citations

#### Flinders University CNHS Best HDR Publication Award

#### National media release, 7 News interview, Radio interviews

### Publications and reports during candidature relating to other projects

1. **Manson, A. C.**, Johnson, B. J., Smith, K., Dunbabin, J., Leahy, D., Graham, A., Gallegos, D., & Golley, R. (2022). *Do we need school meals in Australia? A discussion paper*. Flinders University. <https://doi.org/10.25957/rqer-r406> (public report)

#### Altmetric of 315, 9 citations, 3548 downloads

2. Johnson, B. J., Chadwick, P. M., Pryde, S., Seidler, A. L., Hunter, K. E., Aberoumand, M., Williams, J. G., Lau, H. I., Libesman, S., Aagerup, J., Barba, A., Baur, L. A., Morgillo, S., Sanders, L., Taki, S., Hesketh, K. D., Campbell, K., **Manson, A.**, Hayes, A., . . . on behalf of the, T. C. (2025). Behavioural components and delivery features of early childhood obesity prevention interventions: intervention coding of studies in the TOPCHILD



Collaboration systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, 22(1), 14. <https://doi.org/10.1186/s12966-025-01708-9> (Q1 journal)

#### 1 citation

3. **Manson, A. C.**, Johnson, B. J., Smith, K., Dunbabin, J., Leahy, D., Graham, A., Gallegos, D., & Golley, R. (2024) The potential of school-provided meals for Australian schools. *JHEIA*, 28(1), 23-33.

#### 2 citations

4. Bell, L., **Manson, A.**, Zarnowiecki, D., Tan, S. N., Byrne, R., Taylor, R., Zheng, M., Wen, L. M., & Golley, R. (2024). Development and validation of a short dietary questionnaire for assessing obesity-related dietary behaviours in young children. *Maternal and Child Nutrition*, Article e13613. <https://doi.org/10.1111/mcn.13613> (Q1 journal)
5. Watson, A., Maher, C., Golley, R., Dumuid, D., **Manson, A.**, Tomkinson, G., Frayssse, F., & Olds, T. (2023). Children's activity and diet behaviours in the summer holidays versus school year. *Pediatric Obesity*, 18(7), Article e13029. <https://doi.org/10.1111/ijpo.13029> (Q1 journal)

#### Altmetric of 167, top 5% of outputs, Media, 13 citations

6. Dutch, D., Bell, L., Zarnowiecki, D., Johnson, B. J., Denney-Wilson, E., Byrne, R., Cheng, H., Rossiter, C., **Manson, A.**, House, E., Davidson, K., & Golley, R. K. (2024). Screening tools used in primary health care settings to identify health behaviours in children (birth–16 years); A systematic review of their effectiveness, feasibility and acceptability. *Obesity Reviews*, Article e13694. Advance online publication. <https://doi.org/10.1111/obr.13694> (Q1 journal)

#### 6 citations

7. Johnson BJ, Middleton G, Hunter SC, Dutch DC, **Manson AC**, Golley RK. (2023) Navigating the Early Years System in South Australia; Desk-based mapping of transition points and touchpoints. Report commissioned by Wellbeing South Australia.

### Presentations relating to PhD project

1. **Manson A**, Golley R, Brown V, Johnson B. What do school meals need to bring to the table? A Discrete Choice Experiment exploring parent values for a school-provided lunch offering in Australia. *ISBNPA 2025* (Oral presentation).
2. Exploring Australian parent perspectives of an acceptable school-provided meal system, Final Thesis Review, College of Nursing & Health Sciences, Flinders University, Adelaide, Australia, Oct 2024 (Oral presentation)
3. **Manson AC**, Johnson BJ, Smith K, Dunbabin J, Leahy D, Graham A, Gallegos D, Golley R. Do we need school provided meals in Australia? *Home Economics Institute of Australia National Conference 2024* (Oral presentation)

4. **Manson A**, Golley R, Sutherland R, Wolfenden L, Johnson B. Unpacking the lunchbox: what is the cost to Australian families? *ISBNPA 2023* (Oral presentation)
5. **Manson A**, Golley R, Johnson BJ. Parent views on food in schools: a review of the literature. *ISBNPA 2023* (Poster presentation)
6. Exploring Australian parent perspectives of an acceptable school-provided meal system, Confirmation of Candidature, College of Nursing & Health Sciences, Flinders University, Adelaide, Australia, Oct 2022 (Oral presentation)
7. **Manson A**, Golley RK and Johnson BJ (2022). Exploring parents' interest and motivations for school provided meals in Australia. *Dietitians Australia National Conference 2022* (Oral presentation)

#### **5 citations**

#### **National media release, 7 News interview**

8. Keynote Speaker at the Home Economics Institute of Australia Curriculum Inspiration Day (2022)

#### **Media exposure**

National media story, Exploring parent perspectives of a school-provided lunch program, 21<sup>st</sup> July 2024

- Interview on PhD research findings, shared in a Nine News National story

Interview on 'South Aussie with Cosi' on Annesley Budding Lunch Program, August 2024

Flinders University Media Release, 'Back to school and it's time to unpack the cost of lunchbox options', 31<sup>st</sup> January 2024. Available at: <https://news.flinders.edu.au/blog/2024/01/31/unpacking-school-lunchbox-costs/>

- 30 items across TV (e.g., 7News nationally), radio (e.g., ABC, 5AA), digital, print and social media, with a cumulative potential reach of 817,250 and an ASR or AUD \$333,733.
- Focused on results from PhD research and expert commentary
- Interviewed by 7News Adelaide for a TV segment, ABC for numerous radio segments, and provided quotes for print media

Article in The Conversation, 'Australian schools are starting to provide food, but we need to think carefully before we 'ditch the lunchbox'', 6<sup>th</sup> November 2022. Available at:

<https://theconversation.com/australian-schools-are-starting-to-provide-food-but-we-need-to-think-carefully-before-we-ditch-the-lunchbox-193536>

- 41,044 reads across 10 countries, shared by 12 publishers.

Flinders University Media Release, 'Parents back introduction of school meals in Australia', 16<sup>th</sup> August 2022. Available at: <https://news.flinders.edu.au/blog/2022/08/16/parents-back-introduction-of-school-meals-in-australia/>

- 229 items across television, radio (e.g., 5AA, ABC), digital and print media (e.g., The Advertiser and Herald Sun) incorporating research publications and expert commentary.
- The coverage reached a cumulative audience of more than 2.8 million, with an ASR of AUD \$307,805.
- Interviewed by 7News Adelaide for a TV segment

### **Awards, scholarships and grants**

- HDA Travel and Development Grants (2025, \$1000)
- Best HDR Publication, Flinders University College of Nursing and Health Sciences (2024)
- Flinders University Student Association Professional Development Grant (2023, \$620)
- Flinders University Higher Degree by Research International Field Trip Grant (2023, \$2,500)
- International Society of Behavioral Nutrition and Physical Activity Children and Families Special Interest Group Travel Award (2023)
- King & Amy O'Malley Trust Postgraduate Scholarship (2022-2024, \$9,500pa)
- Australian Government Research Training Program Scholarship (2022-2025, \$33,000pa)

### **Professional service and development**

- Higher Degree by Research Student Representative, Flinders University College of Nursing and Health Sciences 2023-2025
- Flinders University College of Nursing and Health Sciences HDR honours working group 2023-2025
- Flinders University College of Nursing and Health Sciences Research quality committee 2023-2025
- Flinders University Student profile for Staying in the Loop blog 2025
- Flinders University Instagram takeover 2024
- Flinders University promotional TikTok videos 2024
- Flinders University College of Nursing and Health Sciences promotional video for HDR recruitment 2023
- Organising Caring Futures Institute stall at Flinders Foundation Family Fun Day 2023
- Flinders University blog post recapping the international field trip experience 2023
- Interview for Flinders in Touch 2022
- Student supervision for school food projects– Placement Educator for Nutrition and Dietetics Placement students, informal supervision of Honours and PhD students, primary supervisor of a Summer Internship student, volunteer lecturer 2023 – Current



- Collaboration with Adelaide metropolitan schools to support design and implementation of school-provided meal programs 2022 – Current
- Podcast interview, HDR Brews, on PhD research 2022
- Community engagement through student research project interview participation 2021-Current
- Home Economics Institute of Australia, South Australia Branch executive committee member 2021-Current
- Reviewer for highly ranked and Q1 journals including: 'BMC Public Health', 'Public Health Research & Practice', and 'Journal of Nutritional Science' 2022-Current
- Eastern Metropolitan Hub Group co-leader for Home Economics Institute of Australia, South Australia Branch SA 2022-2023

### **Key experiences**

- PhD Industry Engagement Internship with School Food Project, including interstate visit to Berrima Public School to understand their school food program 2023-2025
- International field trip to UK, Sweden and France, 2023
- Visit to Tasmania - School Food Matters, understanding their pilot program implementation and observing school-provided meals, 2023
- Visit to University of Newcastle school health promotion research team to support research collaboration, 2023

### **Key skills training**

- Home Economics Institute of Australia Conference attendance, Adelaide, Australia, 2024
- Food service management for dietitians course, Dietitians Australia, 2023
- ISBNPA Conference attendance, Uppsala, Sweden, 2023
- Preventive Health Conference attendance, Adelaide, Australia, 2024
- Human ethics information session, Flinders University, 2022
- National Centre of Implementation Science webinar - Knowledge Translation in Action: Research and Case Studies, 2022

## 9.2 PUBLICATIONS DURING CANDIDATURE

### Chapter 3: Nutrition & Dietetics

**Published manuscript: *Global parent perspectives on school food service internationally: A mixed papers narrative review*<sup>173</sup>.**

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#### REVIEW

Nutrition & Dietetics WILEY  
Journal of Dietitians Australia

# Global parent perspectives on school food service internationally: A mixed papers narrative review

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#### Abstract

**Aims:** The views of parents/caregivers about food programs in schools internationally is not well understood. This review aimed to synthesise what parents/caregivers identify as the key features of school food programs and their perspectives of these programs globally.

**Methods:** A mixed papers review was undertaken with a systematic search (January 2024) and screening of three databases (Scopus, Web of Science, PubMed). Eligible studies captured parent/caregiver perspectives across all school food models. Study findings were extracted using Bayesian methods to translate quantitative findings into qualitative data. Data was deductively categorised to identify features of school food models, and separately themed to identify parent perspectives.

**Results:** Twenty-six eligible studies were identified from 11 countries. Fifteen features were identified, including cost, time, effort and convenience, child preferences, nutrition, policy and messaging, eating environment and food education. Parent perspective themes were: child is the priority, lunchbox procurement, preparation and provision is challenging, school-provided meals have strengths and limitations, and parents acknowledge they are central to feeding. An overarching theme was that compromises must be made to meet the needs of family members, when parents make decisions on school food.

**Conclusions:** This review found that globally parents perceive benefits and challenges to school food programs, regardless of provision model, with a range of features that influence parent acceptability. Considering parent/caregiver perspectives when developing or changing school food provision models is likely to increase caregiver acceptability, supporting children to engage with health promotion efforts.

#### KEYWORDS

child health and development, health promotion, nutrition education, parent/caregiver perspectives/views, school food

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## 1 | INTRODUCTION

Food choices are established during childhood and adolescence and play a role in supporting growth, health and development.<sup>1</sup> Schools create a unique health promotion setting, with reach to most children internationally regardless of socio-economic and cultural circumstance, spanning key developmental years.<sup>2</sup> The opportunity for health promotion is facilitated by school being a key setting where children eat and can learn about food. The importance of schools in health promotion has been identified by school stakeholders.<sup>3</sup> Schools also have potential to act as a social safety net, ensuring all children have equitable access to nutritious food. The potential of schools has been recognised in previous interventions, utilising this setting to influence children's food behaviours and knowledge.<sup>4–8</sup> Food availability is influential on the formation of dietary habits,<sup>9</sup> with healthy food exposure and provision during school being associated with improvements to dietary intake and healthy food preferences.<sup>10,11</sup> Further, implementing other health promotion initiatives alongside food provision can optimise the initiative success, such as embedding relevant nutrition education within the curriculum.<sup>11,12</sup>

Internationally, different provision models exist for providing food to children during school hours. The most common models include home packed, school canteen, school-provided, or a combination of these models, all of which create different school food environments and influence outcomes for children's health, knowledge and development.<sup>12–15</sup> A home packed model relies on food being prepared for the child at home and brought to school. Food provided in a home packed model is often referred to as a 'lunchbox' or 'packed lunch'. A lunchbox model places responsibility on parents/caregivers, hereon referred to as parents, responsible for purchasing and paying for suitable food, and packing food, or ensuring food is packed by the child.<sup>16,17</sup> This model enables parents to have control over the foods available to the child during school, with ability to cater to food preferences and allergies.<sup>18</sup> Some schools that use a lunchbox model also offer options for purchase from a canteen/tuckshop or similar catering facility.<sup>15</sup> These offerings can be ad-hoc and presence varies greatly between schools, therefore have been classified separately to school-provided meal models. School-provided meal models, which offer children a meal each school day, exist in many countries with the aim of reducing incidence of food insecurity and acting as a food provision safety net.<sup>19</sup> School-provided meal models are widely recognised as beneficial in improving nutrition and reducing incidence of food insecurity by international organisations, including the World Health Organisation, World Food Program and the School Meals Coalition.<sup>2,20</sup>

A school-provided meal model can be designed to meet the needs of schools, nutrition guidelines and families in a financially viable/sustainable way.<sup>15,21</sup> This includes varying features of school-provided meal models (e.g. optional or universal school meals), integration with classroom health education and sources of funding (e.g. parent paid, government funded and charitable organisation funded),<sup>15</sup> which can influence program participation, sustainability and impact. Increasingly, countries such as Australia, Canada and New Zealand which traditionally relied on a home packed model have been exploring and trialling transitions to adopt a school-provided meal model.<sup>22–25</sup> These transitions have been driven in part by the challenges experienced by parents, with an increasing presence of mothers engaged in the workforce and the rising cost of living resulting in limited time, money and increased burden of packing the lunchbox.

While school food models differ in which stakeholder is responsible, parents are one of the largest stakeholder groups in school food systems, acting as key decision makers.<sup>26</sup> While children act as the beneficiary of the school food system, consuming school food, parents influence this experience through decisions on meal participation, food provision and funding meal expenses. However, little is currently known about the aspects most important to parents across varied school food systems. Limited previous reviews have focused on lunchbox or school meal programs in isolation,<sup>27</sup> with no reviews discussing international parent perspectives across a range of school food models, including the perspectives of parents on a potential shift from a lunchbox model to a school-provided meal model.

To ensure school food systems are appropriately tailored to the needs of parents as food decision makers and best supporting children's health and development, parent voices must be heard. Particularly, understanding the features of school food systems which are important to parents can help guide food service staff, practitioners and policy makers on the key components to create an acceptable system. Pinpointing these important features can inform the critical co-design points to meet the needs of families when undergoing improvements or transitions to school food services. Further, broadly understanding parent perspectives, particularly exploring parent experiences and views on school food internationally, provides valuable insight into the complex influences of parent acceptability. For regions exploring a transition between food service models, these perspectives should be understood and used to guide consumer-informed programs. Therefore, this study reviewed the literature to address the questions: What do parents identify as the key features of school food models? And what are parents' perspectives of school food?



## 2 | METHODS

A narrative review was selected as it provides scope to identify and synthesise what parents think about school food, including across different school food provision models, and what features of school food models they consider important, supported by a systematic search process. A mixed papers review method was used to capture a wide range of research designs, including qualitative, quantitative and mixed-methods papers.<sup>28</sup> This involved the use of a convergent integrated methodological approach, using data transformation, to combine quantitative and qualitative data aligned with JBI Manual for Evidence Synthesis 2024.<sup>29</sup> Diverse evidence was therefore eligible for inclusion, maximising the findings in comparison with single method reviews.<sup>30</sup> The reporting of this manuscript is informed by Preferred Reporting Items for Systematic reviews and Meta-Analyses reporting guidelines.<sup>31</sup> Ethics approval was not required for this review.

The research team brings together expertise in public health, school food, and experience in the Australian primary school system as a parent. The research team met regularly to support the primary reviewer to engage in reflexive practice, collaboratively review each research stage, and use consensus methods to mitigate the influence of researcher biases. Research was also conducted in consultation with an advisory group of school stakeholders, including parents, to support research transparency and ensure research conduct was aligned with population needs.

The search terms used were developed through identification of key words in relevant literature and test searching. The searches aimed to identify literature on parent perspectives and the cost of school food to families internationally. Papers focusing on school food cost were identified to inform a separate piece of work,<sup>32</sup> therefore were excluded during screening and results are not captured in this manuscript. A systematic search was performed on 23 May 2022, in Scopus, Web of Science and PubMed databases, following a series of test searches. The search was repeated on 23 January 2024 to capture recent publications. Studies older than 25 years were excluded in the screening process, to capture more contemporary perspectives. See Appendix S1 for example search strategy.

Papers were eligible if they investigated perspectives of caregivers on food provided or consumed by school aged children during school time and in English language. The inclusion and exclusion criteria are available in Appendix S2. School aged children was defined as children attending primary, middle or high school (or alternatives) typically aged between 4 and 18 years.

All search results were imported into Covidence systematic review software (Veritas Health Innovation Ltd., Melbourne) where duplicates were removed. Title and abstract screening, and full text review was completed by one reviewer, using the pre-defined selection criteria in Appendix S2, with a sub-set of ~15% of results checked by a second reviewer.

Included studies were extracted into a pre-structured Microsoft Excel spreadsheet by one reviewer and checked by a second. The extraction spreadsheet was developed and piloted with several studies to ensure brevity. Items extracted included study characteristics, such as primary aim, study type, participants, measures, outcomes, limitations and results. The school food provision model was identified and categorised as a lunchbox, school meal or canteen model, to align with the reporting within papers and enable exploration of hypothesised differences across these models. To answer the research questions, all results relating to school food systems as experienced or described by parents were extracted. Extracted findings included qualitative data, which consisted of themes, thematic descriptions, quotes and descriptions of quotes, and quantitative data, including agreement scales, voting on barriers/facilitators and other parent responses to survey questions. Summaries of findings provided by the authors were also extracted, where original results were not presented. Only findings that were attributed to parent participants were extracted. Extracted data was duplicated, creating a 'features' dataset and a 'perspectives' dataset, used for each analysis method. Following analysis, the results were cross-referenced to ensure terminology was consistent.

To address the first research question, a deductive categorisation process occurred to identify the specific features of school food models that parents referred to across studies, with new features identified iteratively. This question strived to understand what creates a school food system, with features were defined as the aspects of systems which were influential in the functioning or experience of a system. The final list of features was organised and defined separately by two reviewers who reached consensus in collaboration with a third reviewer.

Analysis of the second research question was guided by a thematic analysis process of the extracted data, following data transformation. This question strived to understand the perspectives of parents on school food broadly. Extracted quantitative results were collated according to the Bayesian methods, attributing a qualitative description to translate quantitative data.<sup>30</sup> This allowed for all data types to equally inform the analysis in a mutually compatible format and conduct an integrated synthesis.<sup>29,30</sup> Translations were formed using the available quantitative results, for example, considering

percentage agreement and standard deviation to understand the presence of mixed perspectives. Translation was also facilitated by qualitative evidence in mixed-methods studies and author interpretations in the included papers. All findings in qualitative format were collated for data familiarisation and inductive data coding processes, using an iteratively developed data codebook (Appendix S3). Codes were grouped into initial themes, which were refined and named in a collaborative process between authors. Cross-referencing between the perspectives and features found that the features were the key driving force behind many parent perspectives, therefore feature terms are used in the presentation of themed findings.

One reviewer rated study quality using the AXIS critical appraisal tool.<sup>33</sup> This tool was chosen as it measures a range of potential limitations and cross-sectional study design methods, for quantitative and qualitative studies. This allowed identification of the quality of study reporting and thus provided an indication of study quality, based on the responses to AXIS checklist items. Comments were made about any further analyses of the study quality, such as bias or representation.

### 3 | RESULTS

From a total of 2480 records, 26 papers were eligible, reporting on 24 studies (Appendix S4). The characteristics of the included studies are presented in Table 1, with 13 qualitative, five quantitative and six mixed methods studies. Studies were from Australia ( $n = 6$ ), US ( $n = 5$ ), UK ( $n = 3$ ), Canada ( $n = 2$ ) and New Zealand ( $n = 2$ ), with the remaining studies from the Netherlands, Germany, Greece, South Africa, Uruguay and India. Studies described a range of food models, with results capturing perspectives on lunchbox ( $n = 19$ ), canteen ( $n = 5$ ) and school-provided meal models ( $n = 9$ ), including the potential transformation between models ( $n = 3$ ).

While most studies were of adequate quality, some studies did not contain comprehensive reporting of study methods, when assessed against the AXIS criteria (Appendix S5). Ethical approval was not reported in three studies, with sampling strategies being unclear or not representative of an appropriate population in six studies. Further, three studies did not acknowledge study limitations. However, all studies reported results for described methods and no conflicts of interest were reported. In the context of this review, methodological limitations include the risk of reporting bias from the original authors influencing the present interpretation, and limited sample size reducing representativeness, due to the inclusion of pilot studies.

Addressing the first research question, 15 features of school food models were identified (Table 2). The features identified were cost of food, time, effort and convenience, nutrition of food, parent responsibility/control, child preferences, policy and messaging, food quality, eating time, food access/availability, child input—preparation or dining, quantity, food safety, variety, eating environment, and food classroom education.

Most features were universally identified regardless of school food model. Features were influential on parent perspectives, with features described by parents as barriers or facilitators in different school food models. Features varied greatly in how they were delivered, resulting in parents reporting diverse experiences. The most commonly described features were the cost of food, time, effort and convenience, and nutrition of food. These features were identified across papers as being highly influential in parent acceptability and often framed as a barrier when delivery of the feature was not aligned with parent needs.

Thematic analysis of parent perspectives across the included studies identified four themes and one overarching theme. These themes were: child is the priority, lunchbox procurement, preparation and provision is challenging, school-provided meals have strengths and limitations, and parents acknowledge they are central to feeding. The overarching theme was the parent perspective that compromises must be made to meet the needs of family members. Themes are described in text with examples from the literature, with the codebook and definitions available in Appendix S3.

The first theme identified was *the child was the priority*. Child preferences were described by parents as influential on decisions relating to lunchbox contents, participation and system critiques. Parents identified a desire to pack or purchase foods which children would look forward to, making meal breaks an enjoyable experience or 'treats', regardless of the healthiness of the food.<sup>34–37</sup> Two studies identified parents providing food according to child preferences to reduce food waste.<sup>37–39</sup> Child preferences often acted as the influential factor in which model was adopted by families. This included children not enjoying school meals resulting in lunchbox provision,<sup>35,40–43</sup> or contrastingly, children's enjoyment of the meal being the reason for participation.<sup>40,41</sup> Some parents described their child as being a picky eater, and therefore, the need for suitable meals to ensure they are fed,<sup>44</sup> while others identified that child preferences had broadened following exposure to new meals at school.<sup>43</sup> Further, parents described lunchbox provision as enabling catering to specific preferences.<sup>16,18,37</sup>

One sub-theme observed was the impact of *peer influence on child preferences*, playing a role in children requesting food items to appear 'cooler' or align with



TABLE 1 Summary of characteristics and aims of included parent perspective studies.

Study, country	Study design, population and methods	Aim/research question	School food model explored <sup>a</sup>
Lunchbox predominant models			
Alcaire et al., <sup>45</sup> Uruguay	Cross-sectional qualitative study Children attending public and private schools, unrelated Mothers from social media who have school-aged children Projective techniques on children's conceptualization of snacking in school, and children and mothers' barriers and facilitators for healthy snacking, 2018 <i>n</i> = 1183 mothers	(1) To explore children's conceptualization of school snacking (2) To identify children and mothers' perceived barriers and facilitators to healthy snacking in the school environment.	Lunchbox and canteen
Aydin et al., <sup>56</sup> Australia <sup>b</sup>	Cross-sectional mixed-methods study, results reported across in two publications Parents of children attending primary school in Australia Online survey on perspectives on food and nutrition in schools, closed and open-ended question on school meals, 2021 <i>n</i> = 787	(1) To identify the Food and Nutrition Education topics that parents consider should be taught (2) To explore their ideas to improve the current status of Food and Nutrition Education in the school curriculum and examine the likely predictors of the perceived importance of these Food and Nutrition Education topics.	Lunchbox and canteen
Aydin et al., <sup>49</sup> Australia <sup>b</sup>	Cross-sectional mixed-methods study, results reported across in two publications Parents of children attending primary school in Australia Online survey on perspectives on food and nutrition in schools, closed and open-ended question on school meals, 2021 <i>n</i> = 787	(1) To explore Australian primary school parents' views of the provision of free lunches at schools and, particularly, the barriers to it. (2) To investigate the associations between parents' demographic and personal characteristics and their views regarding free universal school lunches.	Lunchbox and school meal potential
Bathgate and Begley, <sup>38</sup> Australia	Cross-sectional qualitative study Parents and guardians of young children (aged 5–7 years) attending low Socio-Economic Status schools in metropolitan Perth Focus groups on perspectives on packing lunches, 2005–2006 <i>n</i> = 58	(1) To describe the factors affecting school food selection by parents of young children attending low Socio-Economic Status schools in Perth and recommend the features of resources parents need to make healthier choices.	Lunchbox
Burton et al., <sup>54</sup> Australia <sup>c</sup>	Cross-sectional mixed-methods study, results reported across in two publications Parents/primary caregivers of primary school-aged children and primary school teachers from Government, Catholic and Independent schools Online closed and open-ended survey for teacher or parent on eating duration, lunch supervision, school food environment, including food provision venues and policies, 2019–2020 <i>n</i> = 402 parents <i>n</i> = 123 teachers	(1) To gain an understanding from teachers and parents about the amount of time children are given to eat their lunch and whether they believed that it was sufficient. (2) To understand the views of teachers and parents regarding schools' responsibilities for monitoring school lunch boxes and role-modelling positive eating behaviours.	Lunchbox and canteen
Casado and Rundle-Thiele, <sup>17</sup> Australia	Cross-sectional qualitative study Carers/guardians of primary-school-aged children in Queensland Online survey on barriers and benefits of lunchbox packing and contents, 2014 <i>n</i> = 876	(1) To investigate children's school lunchboxes and explore the influence of carer's perceived benefits and barriers towards healthy eating on the food contents packed for lunch.	Lunchbox

(Continues)

TABLE 1 (Continued)

Study, country	Study design, population and methods	Aim/research question	School food model explored <sup>a</sup>
Gupta et al., <sup>47</sup> Canada	Cross-sectional quantitative study Parents'/caregivers' of children attending a Saskatoon Public School Division elementary school in grades 1–8 Online questionnaire including attitudes and willingness to pay for school food programs, 2019 <i>n</i> = 510	(1) To elicit parental willingness to participate and pay for a universally offered School Food Program as well as factors that determine their decision.	School meal potential
Hansen et al., <sup>52</sup> South Africa	Cross-sectional quantitative study Caregivers of learners, aged 6–12 years, from Quintile 5 public or independent schools in Bloemfontein Questionnaire on nutritional knowledge, attitudes towards food and practices of the learners and/or caregivers, year of data collection not stated <i>n</i> = 1286	(1) To investigate sociodemographic variables and caregivers' attitudes that impact on healthy eating and the provision of healthy breakfast and school lunchboxes.	Lunchbox
Hawthorne et al., <sup>16</sup> Canada	Cross-sectional mixed-methods study Parents and students from 19 elementary schools, London, Ontario Parents responsible for packing lunches completed a survey and classroom observation of packed foods to explore lunch-packing behaviours, barriers and facilitators, 2011–2013 <i>n</i> = 321 parent-child dyads	(1) To compare parents' reported behaviours regarding the food they pack in their child's lunches with what was actually packed. (2) To explore parents' self-identified barriers and facilitators to providing a packed school lunch for their child.	Lunchbox
Maher et al., <sup>34</sup> Australia	Cross-sectional qualitative study Families with a primary aged school child between 5 and 12 years in Victoria Two interviews with each family, including children and parents on school food messages, year of data collection not stated <i>n</i> = 50	(1) To understand and analyse the inextricable connections between family relationship and food practices as they intersected with the messages children were taking away from health and food experiences and programmes within schools.	Lunchbox
Nanayakkara et al., <sup>53</sup> Australia <sup>c</sup>	Cross-sectional mixed-methods study, results reported across in two publications Parents/primary caregivers of primary school-aged children and primary school teachers from Government, Catholic and Independent schools Online closed and open-ended survey for teacher or parent on eating duration, lunch supervision, school food environment, including food provision venues and policies, 2019–2020 <i>n</i> = 402 parents <i>n</i> = 123 teachers	(1) To gain an understanding from parents and teachers about the types of food provision practices and venues, and the food-related policies and rules operating in primary schools in Australia. (2) To investigate the differences in the types of food provision practices and venues, and the policies and rules based on the location of schools (urban vs. rural) and type of school (government vs. non-government).	Lunchbox and canteen
Nanayakkara et al., <sup>55</sup> Australia	Cross-sectional quantitative study Parents with a child attending primary school in Victoria Online survey exploring lunch provision practices, perceptions of the healthiness of school lunches, and barriers to providing healthy school lunches <i>n</i> = 359	(1) To explore Victorian parents' perceptions of their current practices and barriers in providing school lunches for their primary school children.	Lunchbox

TABLE 1 (Continued)

Study, country	Study design, population and methods	Aim/research question	School food model explored <sup>a</sup>
Rathi et al., <sup>48</sup> India	Cross-sectional mixed-methods study Parents of year 9 students and Biology and Home Science teachers from five private English-speaking schools in Kolkata School Food Landscape Questionnaire included closed and open-ended questions to measure the food and nutrition situation in schools, 2016 <i>n</i> = 280 parents <i>n</i> = 32 teachers	(1) To examine the perspectives of teachers and parents about the current school food environments and their views of possible future healthy school food environments and policies.	Lunchbox
Rongen et al., <sup>44</sup> Netherlands	Cross-sectional qualitative study Parents, principals, teachers and children at primary schools in Amsterdam and Ede Interviews and focus groups on perceptions of current system and potential school meal model, 2017, part of "the Healthy School lunch" project <i>n</i> = 9 principals <i>n</i> = 15 teachers <i>n</i> = 33 parents <i>n</i> = 197 children 5–12 years	(1) To explore the perceptions of children, parents and school staff towards both the current school lunch system and the development and implementation of school lunch provision within primary schools in the Netherlands.	Lunchbox and school meal potential
Teevale et al., <sup>50</sup> New Zealand	Cross-sectional mixed-methods study Students who participated in the Obesity Prevention in Communities (OPIC) project Parents completed a quantitative questionnaire on school lunch habits, 2005–2006 <i>n</i> = 4216 OPIC participants randomly selected for qualitative interviews on school lunch provision habits and perspectives, students and parents included <i>n</i> = 68 (33 students, 35 parents from 30 households)	(1) To investigate the school lunch food habits of socio-economically deprived groups of Pacific adolescents by weight status (i.e., obesity and healthy weight adolescents).	Lunchbox and canteen
Watson-Mackie et al., <sup>39</sup> Australia	Cross-sectional qualitative study Parents/caregivers of primary school students in Victoria Semi-structured interviews on lunchbox preparation and food choice views, 2021 <i>n</i> = 10 mothers	(1) To explore parental experiences of packing lunchboxes for their children, information schools provide on lunchbox preparation and consider the potential barriers some mothers experienced that impacted their ability to pack lunchboxes they consider healthy.	Lunchbox
Combination models (i.e. concurrent optional school meal and lunchbox)			
Cappellini et al., <sup>37</sup> United Kingdom	Cross-sectional qualitative study Mothers of primary school children aged 9–11 from two primary schools in Surrey and West London Photo-elicitation interviews, including two interviews and focus groups to discuss lunchbox packing behaviours and perceptions, year of data collection not stated <i>n</i> = 30	(1) To explore mothers' practices and perceptions regarding preparing lunchboxes for their children.	Lunchbox
Ensaff et al., <sup>35</sup> United Kingdom	Cross-sectional qualitative study Parents of children attending four primary schools in an urban local authority, who	(1) To explore parents' perceptions and practices related to packed lunches, their	Lunchbox

(Continues)



TABLE 1 (Continued)

Study, country	Study design, population and methods	Aim/research question	School food model explored <sup>a</sup>
	provide packed lunch on most days of the week Focus groups on packed lunch practices, 2014–2015 <i>n</i> = 20	experience of providing a packed lunch, and the role of children in these.	
Harman and Cappellini, <sup>36</sup> United Kingdom	Cross-sectional qualitative study Mothers of children aged between 9 and 11 years old from one primary school in Surrey Photo-elicitation interviews, including two interviews and a focus group, on lunchbox discourses, 2013 <i>n</i> = 11 mothers	(1) To discuss the different discourses at play within the discussion of lunchboxes including being a good (middle class) mother; negotiating home food in school; and responding to children's requests.	Lunchbox
Lindquist et al., <sup>18</sup> United States	Cross-sectional qualitative study Parents of elementary school aged children, Mississippi Focus groups on motivations for packing lunches, 2018–2019 <i>n</i> = 27	(1) To learn more about motivations for packing lunches, barriers to child involvement, and possible resources to encourage parents to involve children in packing their lunches.	Lunchbox
Meier et al., <sup>41</sup> United States	Cross-sectional quantitative study Six rural Midwestern schools Parents of middle school students completed an online survey on lunchbox and school meal use and perceptions, 2016–2017 <i>n</i> = 576	(1) To explore parents' perceptions of the National School Lunch Program (2) Understand if parent perceptions of school lunch vary by their children's participation in the Free and Reduced-Price School Meals program.	School meal and lunchbox
Obeng-Gyasi et al., <sup>40</sup> United States	Cross-sectional mixed-methods study Parents of school children in Indiana, who are immigrants Closed and open-ended questions on food and school lunch choices, 2017 <i>n</i> = 52	(1) To examine food choices among immigrant families with school-aged children who live in Indiana, including immigrant parents' reasons for allowing their children to eat school lunch and the role that the schools can play in satisfying the nutritional needs of the children.	School meal and lunchbox
O'Donnell et al., <sup>51</sup> United States	Cross-sectional qualitative study Students of colour and their caregivers across four midwestern high schools Student focus groups and caregiver interviews, 2019 <i>n</i> = 47 students <i>n</i> = 24 caregivers	(1) To use qualitative research methods to assess facilitators and barriers to participating in the school meal program among high school adolescents of colour.	School meal
Sobek et al., <sup>42</sup> Germany	Cross-sectional quantitative study 34 public and private schools in Leipzig Data from Leipzig School Nutrition Study Survey completed by parents of grade 4, 6, 7 and 8 students on school meal perspectives, 2018–2019 <i>n</i> = 1037	(1) To investigate the current utilisation rates of school lunch in a German city and the associated factors, including both the parents' and the students' perspectives. (2) To investigate associations between school lunch participation and students' weight status.	School meal
School meal trials (school meals provided as a program or trial)			
Dalma et al., <sup>46</sup> Greece	Cross-sectional qualitative study Parents of children attending 14 elementary and secondary public schools in low socio-economic status regions which received the DIATROFI (The Program on Food Aid and Promotion of Healthy Nutrition) programme	(1) To qualitatively identify the perceptions of both parents and students towards healthy eating and related barriers and their experience of a school feeding programme.	School meal

TABLE 1 (Continued)

Study, country	Study design, population and methods	Aim/research question	School food model explored <sup>a</sup>
	Focus groups on perceptions following a school feeding programme, 2013 <i>n</i> = 22 parents of elementary school students <i>n</i> = 22 parents of junior high school students		
McKelvie-Sebileau et al., <sup>43</sup> New Zealand	Cross-sectional qualitative study Family (whānau), student and school principals from four schools participating in Ka Ora, Ka Ako, School meal program Interviews and focus groups on perspectives of the Ka Ora, Ka Ako program, 2021–2022 <i>n</i> = 18 students <i>n</i> = 34 family members <i>n</i> = 4 principals	(1) To assess the impact of the introduction of healthy free school lunches from family (whānau), student and school principal perspectives.	School meal

<sup>a</sup>The table organised according to current school food model, which may differ from the model explored in the study.

<sup>b</sup>Publications emerging from the same methods.

<sup>c</sup>Publications emerging from the same methods.

social norms in lunchbox provision.<sup>18,34,38,45</sup> Peer influences had mixed impacts, with some peers encouraging healthy eating, while others influenced acceptance and rejection of foods. Parents described their child was “made fun of” for food items packed in lunchboxes.<sup>18</sup> Other parents whose children participated in a school meal program trial described the social benefits, including inclusion, avoidance of discrimination and positive peer influences on healthy food consumption.<sup>46</sup>

The second theme was the *strengths and limitations of school-provided meal systems*. Perceptions varied across the literature, being highly dependent on the school food system and family situation, influenced by the previously described features. Parents participating in trials of school-provided meals or discussing a hypothetical system had positive views on a prospective system, acknowledging the potential of school meals for equity and convenience.<sup>43,44</sup> However, parents consistently noted challenges which would need to be addressed in the design of the system, many being aligned with the system features including cost, nutrition, convenience, quality and quantity.

Cost was a major consideration with numerous school-provided meal affordability related codes identified within this theme. Participants of one study who received free school meals in the US described the meal being free as a reason for uptake.<sup>40</sup> Other studies found participation would be more likely if the lunch was free of charge<sup>42</sup> and that school meals were poor value for money.<sup>37</sup> This was similar to parents in Saskatoon, Canada, who were less willing to participate in a school food program as price increased.<sup>47</sup> Parents discussing a potential school meal model introduction identified that

school lunches should not exceed current packed lunch expenses, and offer something more than the current packed lunch system.<sup>44</sup> Further, parents of children receiving a free meal were more likely to consider school lunch to be better than food which was made at home, when compared to those not receiving a free school meal.<sup>41</sup>

Conflicting parent perceptions surrounded the nutrition of school meals, including the health promotion implications. Some parents raised concerns about the healthiness of school meals, describing being uncertain of the ingredients and others perceiving school lunch as having too much sugar and fat.<sup>40</sup> Others discussed that canteen offerings were considered unhealthy, with majority of parents agreeing that home-prepared packed lunch is healthier than food supplied in the school canteen,<sup>48</sup> or flagging concerns around the definition of healthy.<sup>49</sup> However, parents from a school meal trial found it promoted healthy eating.<sup>46</sup>

Both school-provided meals and canteens were perceived positively for their convenience,<sup>40,44,50</sup> described as relieving the burden of food preparation.<sup>46</sup> Convenience was an enabler for parents, with parents in one study describing time to pack food was the reason for school meal uptake.<sup>41</sup> Similarly, convenience was cited as a reason for providing money for canteen purchases rather than preparing lunchbox foods.<sup>50</sup> Parents enjoyed the variety offered by school-provided meals, contrasting to the repetitive foods provided in the lunchbox,<sup>18,40</sup> while others critiqued the repetitive menu on offer in some schools.<sup>51</sup>

Quality and quantity were negatively perceived by parents in some school meal systems. Some parents

**TABLE 2** Features identified in included parent perspective studies.

[illegible]

TABLE 2 (Continued)

Feature	Definition	Bathgate and Begley <sup>38</sup>	Burton et al. <sup>54</sup>	Cappellini et al. <sup>37</sup>	Casado and Rundle-Thiele <sup>17</sup>	Ensaiff et al. <sup>35</sup>	Hansen et al. <sup>52</sup>	Harman and Cappellini <sup>36</sup>	Hawthorne et al. <sup>16</sup>	Lindquist et al. <sup>18</sup>	Maher et al. <sup>34</sup>	Rathi et al. <sup>48</sup>	Watson-Mackie et al. <sup>39</sup>	Alcaire et al. <sup>45</sup>	Aydin et al. <sup>56</sup>	Namayakkara, Booth, et al. <sup>53</sup>	Namayakkara et al. <sup>42</sup>	Teevale et al. <sup>50</sup>	Meier et al. <sup>41</sup>	Obeng-Gyasi et al. <sup>40</sup>	Aydin et al. <sup>49</sup>	Gupta et al. <sup>47</sup>	Kongen et al. <sup>44</sup>	Dalma et al. <sup>46</sup>	McKevlie-Sebleau et al. <sup>43</sup>	O'Donnell et al. <sup>51</sup>	Sobek et al. <sup>46</sup>
Food access/ availability	Availability of food for procurement locally or at home					X			X					X	X	X											
Food safety	Handling, preparing and storing food to reduce the risk of foodborne illnesses	X						X	X	X							X				X						
Variety	Having a range of different food items, rather than repeated items each school day								X	X				X						X		X				X	
Quantity	Amount of food provided/needed to feed children						X	X		X									X				X				
Eating environment	The school food eating environment and as a social setting	X	X							X																	
Food classroom education	Education for students surrounding nutrition and food in school curriculum											X			X									X			

**Note:** Studies grouped according to the school food model relating to the features described.  
Abbreviations: C, canteen; L, lunchbox; SM, school meal.



perceived the quality of school lunches negatively<sup>18,36,51</sup> with meal quality being a reason parents were dissatisfied.<sup>42</sup> Further, quantity was a concern for some parents, with perceptions that school-provided meals did not provide enough food, were inconsistent or their child would eat enough,<sup>18,36,41,44</sup> with one parent stating that “for a growing boy ... it is not enough food”.<sup>36</sup>

The third theme was *lunchbox procurement, preparation and provision is challenging*. Families identified the challenges associated with resourcing and logistics, including financial constraints or cost as a barrier for packed food provision,<sup>16,17</sup> with many perceiving healthy foods as having an increased cost.<sup>18,38,52</sup> Some healthy foods were described as inconvenient to prepare to eat.<sup>38</sup> However, parents across numerous studies expressed they still tried to pack a healthy lunch despite barriers.<sup>37,44,52</sup>

Time and convenience of food preparation was captured within this theme and discussed by parents across a range of studies, acting as a barrier in lunchbox models.<sup>16,17,52</sup> Time to prepare healthy options was a barrier to providing healthy food.<sup>18</sup> Parents identified lack of time/opportunities to cook, convenience and lack of availability of foods at home as potential reasons children may bring unhealthy snacks to school.<sup>45</sup> Studies identified interpersonal factors related to lunchbox behaviours, noting that full-time workloads limited the capacity of mothers to prepare lunchbox foods.<sup>39</sup> Additionally, caregivers with a higher income, living with a life partner and older caregivers perceived lunchboxes as being a greater workload when compared to their demographic counterparts.<sup>52</sup>

Several parents discussed the considerations resulting from school food policies, including healthy lunchbox, allergy, food safety or canteen policies.<sup>16,35–37,48,53</sup> One Australian study found lunchbox policies guided which foods could/should be packed and needed to be avoided (e.g. unhealthy items, allergens), as well as avoiding packaging waste and preventing food sharing.<sup>53</sup> There were mixed perspectives on such policies described across studies, with some parents deeming lunchbox policies as reasonable,<sup>48</sup> while others disobeyed the rules and disliked monitoring.<sup>36,37</sup> Parents expressed they felt judgement from other parents or school staff if their lunchboxes were not deemed adequate in terms of parent effort, seemingly due to lunchbox social norms and social media influence.<sup>39</sup>

Parents expressed concern about the time allocated for children to consume their lunchbox food.<sup>35,38,54,55</sup> Burton and colleagues found that in Australia, most parents reported ≤10 min was allocated for eating lunch, with many parents describing this as inadequate.<sup>54</sup> As a result, parents described the need to pack foods which can be quickly consumed and still met child needs.<sup>35,36</sup> Parents expressed a desire to increase allocated eating

times, to enable social eating and mindful eating, while expressing concern about impacts on playtime.<sup>54</sup>

The fourth theme was *parents acknowledge they are central to feeding*, with parents valuing their role in food provision. A common reason parents choose to pack lunch was the opportunity to monitor consumption and having greater input into the foods consumed by the child. Parents described home-packed lunches as a way of knowing what the child was consuming, ensuring the food was healthy<sup>41</sup> and allowing parents to adjust food provision accordingly.<sup>35,36</sup> This was also described as an opportunity to have greater control on the child's diet.<sup>18,37</sup> For some parents, desire for monitoring of food contributed to their decision to opt-out of school meal models.<sup>41</sup>

In lunchbox predominant models, parents positioned themselves as the decision-makers about the foods consumed by their child, indicating their perceived importance of this role,<sup>34,45,54</sup> while one study found parents described older children being responsible for their own lunchbox packing.<sup>50</sup> Additionally, some parents also identified a need for free school meals for “other children”, indicating the need for food availability for families in tough times, but not themselves,<sup>49</sup> deeming they are capable of adequate food provision.

Parents discussed their, or other parents, knowledge around food as an important aspect of the food system, noting the value of parent knowledge in healthy food provision. One study found that parents believed they were in need of education<sup>56</sup> while another found parents were concerned about identifying healthy, convenient foods.<sup>38</sup> Contrastingly, most parents in one study identified their nutrition knowledge as “adequate” to “very good”.<sup>16</sup> Harman and Cappellini found mothers embraced healthy eating guidelines and demonstrating healthy eating and cooking knowledge,<sup>36</sup> with a desire to provide the best for their child and use thoughtful food provision to demonstrate love and care.

The overarching theme observed across the data was *compromise* made by parents based on their priorities. Many parents discussed how they chose between and prioritised different features, with many citing the school food model, their family situation or personal beliefs/values as socio-ecological factors influential in their compromise. Many parents described having to choose between two aspects they care for, including a balance between their role as a parent and their child's preferences.<sup>38</sup> Compromise between nutrition was made to meet parent's desire for their child to enjoy the food.<sup>34</sup> Nutrition was also traded for convenience based on the parent situation,<sup>39</sup> with parents providing food which was pre-prepared and required minimal labour, over healthy foods which may have a longer shelf life and

demand greater labour for preparation.<sup>38</sup> Disobeying policy was also justified through the ethics of care and desire to provide food which would be enjoyed by the child.<sup>36,37</sup> Compromises were made based on cost, with some parents spending more on healthy foods, while others prioritised spending less money and justified unhealthy purchases.<sup>18,38</sup> Further, parents appeared to compromise on the desire to have a school-provided meal program once cost increases,<sup>47</sup> likely making trade-offs between their priorities. A desire to reduce food waste and therefore money wasted was also discussed, cited as an additional reason for prioritising to child preferences and compromising on provision other food items, such as healthy food products.<sup>37,38</sup>

#### 4 | DISCUSSION

This review identified the features of consideration to parents for school food models globally and explored what parents think about different school food models. Collated findings demonstrate that there are benefits and challenges for all school food models, influenced by a range of system features that informed how the system was experienced by parents. Priority features were influential in parental decision making on food provision, requiring parents to make compromises to meet their needs, based on their values and situation, demonstrating the socio-ecological influence of the system on parent food behaviour. This review builds on previous evidence, including a 2020 scoping review of experiences, perceptions and habits of parents packing school lunches.<sup>27</sup> Use of Bayesian methods and exploration across all school food models provides a unique in-depth insight into the school food environment internationally.

There are benefits and challenges experienced by parents across all school food service models. The range of perspectives indicated that there is no one perfect school food model delivered internationally for parents as key stakeholders, with various challenges reducing parent acceptability across the lunchbox, canteen and school meal models described. The results showed patterns of strengths and limitations from parents in different models depending on system features and how those were delivered, which influenced their food provision decisions. This is consistent with a recent review of factors contributing to Canadian school food program acceptance, which found that the ways in which programs are delivered and promoted can have a significant impact on the perceptions and support of parents.<sup>57</sup> Distinct strengths included the convenience and potential affordability of school meals and the enabling of lunchboxes for parent monitoring of intake and catering to child

preferences, which is consistent with previous reviews.<sup>3,27</sup> Many of these features acted as challenges in the opposing model, with many models lacking an appropriate middle-ground of all features which meets the needs of their parent population. This was evident for parents who were exposed to multiple food service models within their school, or participating in a trial, who acknowledged the conflicting benefits and challenges to all models. Features that were misaligned with parent needs, such as high costs and limited time, created challenges in provision of nutritious food to children, therefore, impacting health promotion opportunities including dietary intake, food education and habit formation. To optimise the acceptability and thus health promoting opportunity for school food models, such challenges for parents must be addressed. Therefore, while no school food service model is perfect, consideration should be made in future research and school food programs to ensure all models incorporate key features, such as child preferences, convenience, nutritious food and reasonable cost to optimise parent acceptability.

Compromise was identified as an overarching theme, with parents prioritising features based on the delivery of the school food model, their personal beliefs and family situation. Parents had to make trade-offs based on their priorities, as many school food systems did not adequately address the numerous identified features important to parents. Parents' beliefs and personal situation influenced the features most important to them, causing mixed acceptability of the school food systems. The priorities varied within each country, as shown within Australian findings, and regardless of school food system implemented, indicating how different experiences can be for parents within each system. These influences and considerations are aligned with the levels described within the socio-ecological framework for nutrition and physical activity,<sup>58</sup> noting the policies, settings, inter- and intra-personal factors which influence food decisions. Intra- and inter-personal factors had a reciprocal influence on one another, including compromising on their values and nutrition knowledge to ensure the happiness of their child, or parents who are time-poor needing convenient lunchbox food options.<sup>39</sup> This is aligned with the findings of the Canadian review of school food program acceptance, with authors concluding that parents' perceptions and acceptance of programs is influenced by cultural and regional factors, and may transform over time.<sup>57</sup> Therefore, findings indicate that school food service across countries does not and cannot use a one-size-fits-all approach, with a need for tailoring of each feature specifically to families based on their socio-ecological situations, contributing to greater acceptability.



This review had several strengths. The inclusion of all study types allowed for a comprehensive examination of the research questions. The use of standardised methods enabled the review to be replicable and transparent. Bayesian methods for translation of quantitative data, adhered to established guidelines, improved the scope of the review. However, a limitation is that translation can only occur on the available reported data, which may be limited. Particularly, majority of included studies did not explore perspectives between demographic groups, limiting capacity for analysis of perspectives and demographics internationally. Further limitations include that only one reviewer conducted the study selection and extraction, which may have introduced potential biases or errors in the study selection process, however, this was addressed through sub-set checking by a second researcher and discussion among the research team. The limited scope of the search strategy, including use of three databases and only capturing studies published in English, may have also restricted the generalisability of the review findings or resulted in the omission of relevant studies. Critical appraisal demonstrated several studies poorly reported methods and lacked acknowledgment of study limitations. Many studies had limited sample sizes or sampled participants only from specific population groups. It is acknowledged that the results of this review are a reviewer summary of the author-presented results of included studies. Therefore, these findings may not be an accurate reflection of all parent perspectives within that school food model.

The review findings can be used to inform future research and optimisation of school food systems. Ongoing research should explore the priority features of parents in school food systems and how this influences parent decision trade-offs and compromises. Further, understanding the specific needs of different parent populations, for features such as cost, provides valuable insight to enable tailoring of school food models to the socio-ecological needs of the population. While student perspectives were outside of scope for this study, due to interest in parents as food providers, future research should collate child perspectives as recipients of school food, understanding how systems can meet the needs of students and their families. Awareness of the factors influencing school food program acceptance can aid in the evaluation, planning and optimisation process of future programs, such as those emerging in Australia, Canada and New Zealand.

This review found that parents perceived that there are benefits and challenges across all school food models. There are a broad range of features that influence parent acceptability of a school food model. Further research is needed to understand the nature of these priorities and how they differ according for

different families. These findings reiterate the importance of considering parent perspectives in the optimisation of school food models to increase acceptability, ensuring the system meets family needs through considering their priority features. Integrating parent perspectives within school food provision models is likely to support families to engage with the program and thus nutrition promotion efforts.

#### AUTHOR CONTRIBUTIONS

All authors were involved project conceptualisation and research design. ACM completed the search, screening and data extraction, checked by BJJ and under academic supervision of BJJ and RKG. All authors contributed to the analysis and interpretation of the findings. The manuscript was drafted by ACM and critically reviewed and approved by BJJ and RKG. The authors confirm the content has not been published elsewhere. Dr. Georgia Middleton is acknowledged for expert contributions to the review methodology.

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#### CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

#### ETHICS STATEMENT

Ethics approval was not required for this review.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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## Article

# Getting school-provided meals to the table: an international multiple-case study of school food service

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## Abstract

A school food service, which is the way children access food during the school day, is one of the many aspects in creating a health-promoting school environment. School-provided meal services differ greatly, depending on the country, region and school contexts, however, there is limited understanding of the diverse meal delivery within these settings. Therefore, the aim of this study was to understand different school-provided meal systems across different countries and contexts. This study used a qualitative, naturalistic observation, using an interpretative epistemology and a multiple-case design to explore food service across seven schools, mapped against a school meal food service framework. This included three schools with an established school-provided meal system (England, France and Sweden) and four schools with emerging school-provided meal systems (Australia). Mapping captured findings across the domains of Menu offering, Food service system, Administration, Eating environment, Mealtime experience and Post-meal. Results demonstrate the need for tailored school food programmes, designed appropriate to the country, region and school context, including considering cultural underpinnings and available resources. Furthermore, a positive eating environment and elements of student choice and responsibility were all noted as principles important in a school food service. This knowledge can be used to inform planning of future systems, particularly for regions transitioning into a school-provided meal model, and those looking to implement improvements to existing systems.

**Keywords:** school food, school meal, food service, eating environments, nutrition, childhood

## Contribution to Health Promotion

- A school food service contributes to a health-promoting environment, providing nutritious food access, conducive to learning and establishing lifelong health.
- The delivery of a school-provided meal can support child autonomy, build positive food environments and programme tailoring to the community.
- Findings can inform changes to existing programmes or used in new school-provided meal service design, creating a health promotion intervention.

## INTRODUCTION

Children internationally typically spend their formative years in schooling, commonly consuming daily meals in this educational setting. Food eaten at school influences children's learning, health, growth and development, and is a key health promotion opportunity (World Health Organization, 2020).

A school food service, which is the way children access food and drinks in this setting, is one of the ways to create a health-promoting school environment (World Health Organization, 2020). A school food service can enable all children to have access to nutritious food before, within or after school time, supporting their learning (Golley *et al.*, 2010) and establishing lifelong health and positive food relationships.

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Improving the delivery of a school food service is a common intervention to improve the health-promoting environment of a school, within the broader school food system (Cullen *et al.*, 2007).

Internationally, different food service models exist for the provision and access of food to students during school hours. The predominant food service models in schools are home-packed meals and school-provided meals (The School Meals Coalition, 2022). The structure of school-provided meals at lunchtime varies greatly. Many countries have national school feeding programmes, collaboratively supported by government and industry, which allow students access to school-provided breakfast and/or lunches. Other jurisdictions have additional *ad hoc* provision models or programmes, such as food relief or charity food provision, which often provide free food for students who may be experiencing food insecurity. Commercial food offerings provide food for students to purchase, e.g. canteens/tuck-shops (small food shops within a school) or vending machines (Harper *et al.*, 2008). Contrastingly, some schools provide students and families with the option to leave school grounds during breaktimes, to consume a meal at home or purchase food from an offsite food service. Many schools offer a combination of these food service models, incorporating both home-packed foods and a form of school-provided food offering, allowing families to choose, or receive a subsidized or free school-provided meal for families in need (Harper *et al.*, 2008; Lucas *et al.*, 2017; Colley *et al.*, 2019; Hock *et al.*, 2022).

The World Food Programme (WFP) reported that approximately 418 million children benefit from school-provided meal programmes, including breakfast, lunch or snack provision; acting as one of the largest social safety nets in the world (World Food Programme, 2023). Further benefits were summarized in a systematic review of universal school-provided meals, finding positive associations between free meals and diet quality, food security and academic performance (Cohen *et al.*, 2021). School meals have been attributed with increased potential to achieve health, development, equity and sustainability benefits compared to other models (UNESCO, 2023; The School Meals Coalition, 2024). The food service of school-provided meals, including menu composition rules, is often tailored to meet the needs of communities, countries and cultures, while conscious of the available capacity and resources of the schools, resulting in highly variable food services internationally.

Globally, school-provided meals, hereon used to describe a meal provided by the school or associated organization for students to consume on the school site within school hours, mainly being lunchtime meals, are recognized as a key avenue for equal, nutritious food provision, which has the potential to reach all students (World Health Organization, 2020). The current evidence on school-provided meal service can be contextualized using the socio-ecological framework for nutrition and physical activity (von Philipsborn *et al.*, 2016). Previous evidence has described the macrolevel context of school food, understanding and comparing the differences between and within countries, the factors such as a policy that leads to different food service models, and the nutrition of meals offered (Harper *et al.*, 2008; Aliyar *et al.*, 2015; Lucas *et al.*, 2017; Juniusdottir *et al.*, 2018; Zarnowiecki *et al.*, 2018). Extended description of national case studies has emerged, exploring each jurisdiction in depth (Research Consortium for School Health and Nutrition, 2024). A comparison of school food

programmes across 18 countries recognized the cultural and economic differences in countries which interrelate with the school food programme of that region (Harper *et al.*, 2008). There is also research on the inter- and intra-personal micro context of school food, exploring experiences and perspectives of meal participants and stakeholders, including students, parents and staff, across different countries, understanding the acceptability of the food provided and school food systems (Mason, 2020; Hock *et al.*, 2022; Bryant *et al.*, 2023; Dahmani *et al.*, 2024; Marty *et al.*, 2024). Furthermore, Oostindjer *et al.* (Oostindjer *et al.*, 2017) utilized a cross-national comparative framework, positioning the role of school meals as a tool for health, including history, opportunities and challenges.

Previous comparisons have noted the vast difference in school food environments across different countries, finding there is no uniformity in the provision of school-provided meals across high-income countries (Aliyar *et al.*, 2015). However, limited evidence focuses on the individual school meso-level, understanding feasible examples of school-provided meal service systems and the complex steps which successfully interplay for meal delivery and the creation of a health-promoting school environment. While evidence captures the home food service process of packed lunch provision (Casado and Rundle-Thiele, 2015; Cappellini *et al.*, 2018; O'Rourke *et al.*, 2020; Watson-Mackie *et al.*, 2023), including the strengths and challenges in such a model for food providers, particularly mothers, there is limited exploration of the school-provided meal context. As there is substantial and often complex variation across countries and contexts, understanding differences in feasible examples can provide crucial information for increasing functioning or designing a new school-provided meal service. This is important as there is growing interest in the adoption of school-provided meals across countries including Australia, Canada, New Zealand and Norway, high-income countries that have traditionally relied on home-packed lunches brought into school. As such, the aim of this study was to understand different school-provided meal service systems across different countries and contexts, using a food service framework.

## METHODS

### Study design and methodology

This study is a qualitative, naturalistic observation, using a multiple-case design. The research question is a provocation, an open-ended question used to promote critical thinking. Similar observational methods have been used in previous research to understand the interactions of students within school mealtimes (Mason, 2020). It allows for the creation of new, critical perspectives and generates new thinking adverse to social norms, using an interpretative epistemology. Provocation can be used to isolate a particular concept for critical examination, with the researcher documenting the new knowledge in a systematic way (Pangrazio, 2017).

The research strived to explore what was occurring in each unique school-provided meal service system, situated within the cultural and historical context of that jurisdiction, using case study methodology. The aim was not to provide an overall description of school food systems representative of an entire region or regions, which can be found elsewhere (Research Consortium for School Health and Nutrition, 2024). Methods and reporting are aligned with

the COREQ checklist (Tong *et al.*, 2007) and case study selection methods described by Stake (Stake, 1995) where appropriate, with the use of key stakeholders to inform case study sites, and selection of cases which are hospitable to the inquiry.

### Positionality statement

The research team brings together expertise in public health including public health nutrition (A.C.M., G.M., B.J.J., R.K.G., S.N. and C.E.), school food (R.K.G., A.S., N.S., S.N., C.E., J.R. and J.D.) and firsthand experience of the school system as a parent (R.K.G., A.S., N.S. and S.N.). The data collection team, comprising of A.C.M. and G.M. are white female English speakers with no children and approached this research from a background in public health and dietetics. A.C.M. has experience conducting research exploring school food in Australia and is trained in food service. G.M. is an experienced qualitative researcher, with a focus on shared mealtimes and eating environments, and experience conducting observational research. The data collection team engaged in reflexive practice informed by an inquiry cycle, to promote reflections and conversations between the research team to mitigate the influence of biases and assumptions on the interpretation of results. The analysis team also included B.J.J. and R.K.G., both white females experienced in public health research, dietetics and school food nationally and internationally.

### Sample

Various countries were included to capture different school food service models across a range of contexts, including a range of historical underpinnings. This resulted in a scope of schools within Australia, England, France and Sweden.

Schools were eligible for inclusion in this study if they did not cater to a specific population (e.g. specialist schools) and included mid-day mealtimes where children consume a school-provided meal. Schools with different historical contexts or settings which influence the functioning and feasibility of food service systems were intentionally captured. Individual schools were included in the study following identification and selection by key stakeholders from each country or region, including school food researchers, government or not-for-profit staff members (Crowe *et al.*, 2011).

All schools provided permission for the observer to access the school site, and a school representative consented to the observer presence at mealtime to observe and note the school food system. This resulted in a sample of seven school food services, four from Australia and one from England, Sweden and France, with one mealtime observed at each school. Four schools were captured within Australia due to the current transitional status of the school food system and lack of evidence describing the highly variable meal service systems. Australian schools were included to capture diverse governance, mealtime structures and meal frequencies, providing evidence on how a food service can be delivered in a transitioning context. Data collection focused on the food service system and its functioning, with no observation of individuals, and no personal identifiers or information captured on individuals. Ethics approval was not required, due to being a naturalistic system observation without any human participation in the research (National Health and Medical Research Council, 2023).

### Data collection

Data collection included field notes and sketches of a school mealtime and dining space, observing the food service system employed within schools in different schools and countries, with the support of a data collection tool (see below). A.C.M. and G.M. piloted the tool together prior to beginning data collection. The piloting allowed for training against the tool and acted as a reflexive exercise in pushing assumptions and biases. Pilot results were compared to establish face validity.

To understand the food service, the observer attended the school during a mealtime, with six observations conducted by A.C.M., and one observation conducted by G.M., between June and November 2023. Both researchers have the Australian Department of Human Services Working with Children Checks, which were presented to schools as requested. The observer was identifiable, and staff were alerted to their presence and their purpose at the meal. School representatives or key stakeholders provided country and school context to the researcher, as well as translating key information to English for observations in Sweden and France. System observation was undertaken in an unobtrusive manner, aiming to capture the typical mealtime using a naturalistic study design.

### Data collection tool

A feature identification tool (Supplementary File 1) was developed by the researcher/s following an international literature review of parent perspectives on features of school food models. The tool provided prompts of the different features of school food systems, including the context of the food service, cost, messaging (e.g. healthy eating posters) in the eating space, length of eating, how food is accessed by students during the meal, the convenience and quantity of food provided, and the food environment where the meal was consumed (dining hall vs. classroom for example). The tool prompted descriptions of layout and facilities, aided by birds-eye sketches of the physical spaces, inclusive of food preparation and dining areas, and the flow of the system during mealtimes, ensuring all elements of the food service were captured. Posters and messaging on display in the dining areas were recorded, and translated by school representatives or key stakeholders in Sweden and France. All field notes were exchanged and checked for accuracy and objectivity between the data collection team (A.C.M. and G.M.), to ensure data were true to naturalistic observation and to limit the impact of observer bias on interpretations.

### Data analysis

Field notes and sketches were collated and translated into case studies of each school-provided meal observation. Using an interpretative lens, the case studies narratively described the food service and mealtime adopted in each school, flowing through the mealtime as a user may experience it. The case study approach, as described by Crowe *et al.* (Crowe *et al.*, 2011), allows for an 'in-depth, multi-faceted understanding of a complex issue in its real-life context'. Case studies have therefore been contextualized with a summary of the school-provided meal history in the relevant country, collated from the literature and anecdotal evidence. This context was also combined with the relevant food service context data. The case studies were written by A.C.M. and checked by G.M. and B.J.J. for consistency and objectivity. Stake's checklist for assessing the quality of a case study was applied to ensure



the case study reporting was appropriate for readers (Stake, 1995) as described by Crowe *et al.* (Crowe *et al.*, 2011) (Supplementary File 2).

To address the research question and allow comparison between different school food systems, the data captured in the case studies were inductively coded using a descriptive coding method on NVIVO 1.7. One researcher (A.C.M.) independently coded, which was then reviewed by a second researcher for accuracy (B.J.J./G.M.). Common concepts were then mapped against the draft school food service framework (Manson *et al.*, 2024), forming sub-domains. In brief, the framework included context, budgeting, menu offering, food service system, administration, eating environment, meal-time experience and post-meal domains, each relating to a key stage of school-provided meal service. These domains and mapped sub-domains were then compared between case studies to interpret the consistencies and differences in the food service systems.

## RESULTS

Of the seven case study schools, six were conducted in primary schools and one in a high/secondary school (Table 1, Supplementary File 3). The case studies captured schools over a range of country and food service contexts, as summarized in Table 1, including a range of pricing, universality and historical contexts. This included three schools with established school-provided meal systems (England, France and Sweden) and four schools where school-provided meal systems are emerging (Australia).

Codes from case studies were organized into 25 sub-domains, which were mapped to six relevant domains from the food service framework, (i) Menu offering, (ii) Food service system, (iii) Administration, (iv) Eating environment, (v) Mealtime experience and (vi) Post-meal (Figure 1). Context and budgeting domains were not identified from the case studies. Domains and sub-domains are described using extracts from case studies.

### Menu offering

Three sub-domains identified from the case studies were mapped under the menu offering domain; dietary requirements, food offering and serves and portions. Menus can be understood in relation to the country context, with national or regional nutrition guidelines in place across France, Sweden and England which inform all food which should be served within that jurisdiction. For example, food quality guidelines in France which guide components of the meal and frequency of foods, ensuring children's nutritional needs are met while considering environmental and social sustainability. In Sweden, guidelines focus on meals being tasty, safe, nutritious, eco-smart, pleasant and educational, including student involvement and pedagogic meals.

Many systems offered food to cater for a range of dietary requirements, providing alternatives or meal options which enabled participation from children with dietary requirements. While others had no noted service of alternative dishes suitable for dietary requirements, such as the case studies from France, Tasmania 1, 2 and 3.

**Table 1:** Context summary of the case studies ( $n = 7$ )

Case study	Country context <sup>a</sup>	School context	School food service context	Cost structure (to families)
England	Established school-provided meal system	Public primary school West London	Meal available daily for all students	Pricing based on household income and year group. Free for all students in reception, years 1 and 2 <sup>b</sup> , free in some regions for years 3–6 (e.g. London)
Sweden	Established school-provided meal system	Public primary school Uppsala	Meal available daily for all students	Free for all students up to 16 years <sup>a</sup>
France	Established school-provided meal system	Public primary school Dijon	Meal available daily for all students	Social pricing based on household income <sup>a</sup>
South Australia	Predominantly lunchbox system, trialling school-provided meal system as an alternative to a canteen/tuck-shop offering	Independent primary school Adelaide	Trial programme Optional participation Meal available once weekly for all students	Flat cost for all families
Tasmania 1	Predominantly lunchbox system, trialling school-provided meal system	Public primary school Wider Hobart region	Trial programme Optional participation Meal available once weekly for all students	Free <sup>a</sup>
Tasmania 2	Predominantly lunchbox system, trialling school-provided meal system	Public high school (primary school located nearby) Northern Tasmania	Trial programme Optional participation Meal available once weekly for select year levels, rotating	Free <sup>a</sup>
Tasmania 3	Predominantly lunchbox system, trialling school-provided meal system	Public primary school Wider Hobart region	Trial programme Optional participation Meal available daily for all students	Free <sup>a</sup>

<sup>a</sup>Government (national and/or local) subsidies.

<sup>b</sup>Further country context is provided in Supplementary File 3.

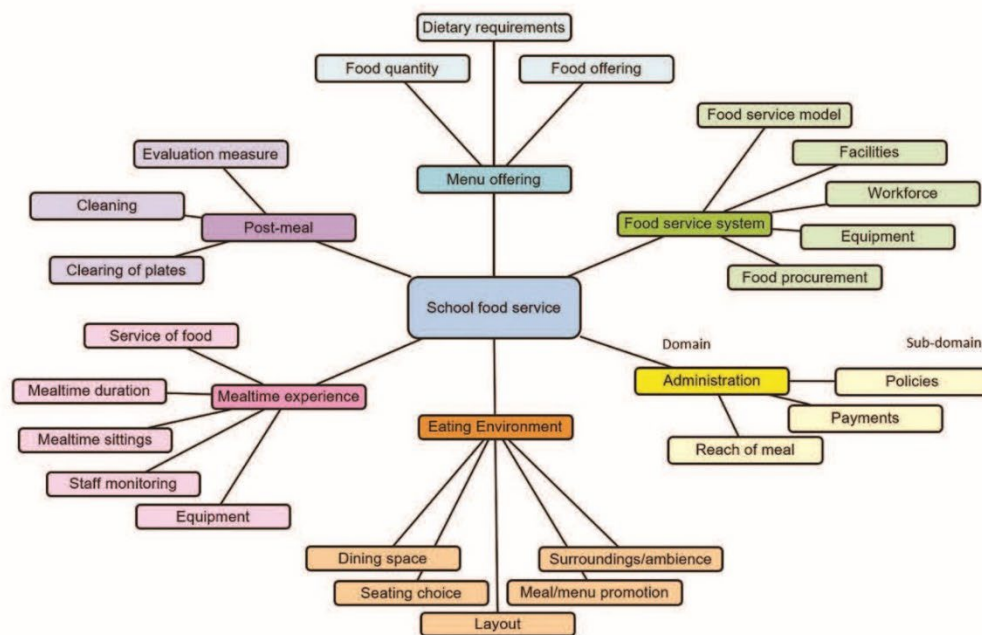


Fig. 1: Map of school food service coding.

*Special meals are provided for students with specific dietary requirements on separate plates...—South Australia case study*

*There are no alternative meals or special diet meals provided.—Tasmania 2 case study*

Menus served across all case studies typically consisted of a larger dish as the main meal component, accompanied by vegetables, fruit and/or dessert, with water and milk available or brought by students in water bottles. The main meal was typically a common dish within that country and provided a range of food groups, including a vegetable, protein and carbohydrate element. The food captured in case studies is considered age-appropriate in terms of ingredients, size and nutrition. In France, the meal consisted of five courses, while most other case studies described one or two courses.

*... slow cooker filled with butter chicken curry, rice cooker of white rice...—Tasmania 3 case study*

*[main meal consists of]...bouchées de poulet rôties (roast chicken)... and œufs pochés sauce milanaise (egg with cream sauce)... served alongside légumes méditerranéens (Mediterranean cooked vegetables) ... and baguette...—France case study*

Choices between menu offerings were available in many case studies, including between main meal options, sides or toppings. When choice was available for main meals, this usually consisted of two protein options. While some case studies described providing only one main meal, the inclusion of

optional cheese and fruit allowed students to still have choice in the foods they ate.

*Food service staff ... ask students their choice between the options of the day and ... portion size...—England case study*

Food quantity included different portion sizes and number of serves for students. Portion size options were offered across several systems, providing students with choice regarding the quantity of food. Students in all meal systems, except for England, were offered the choice to collect more food or additional serves.

*Additional serves of baguette and vegetables are readily available upon request.—France case study*

### Food service system

Within the food service system domain, five sub-domains: food service model, food procurement, facilities, workforce and equipment were identified. The food service model differed greatly across case studies depending on the facilities available. Main meals were prepared offsite and delivered in South Australia, Tasmania 3 and France case studies, using a cook-chill food service model, while the remainder prepared all food onsite from ingredients and served in a cook-fresh model. Food service model and procurement method were related to the availability of resources, whether case studies had an onsite kitchen facility for food preparation, or had a satellite kitchen, which is a kitchen only resourced for reheating and serving food that has been pre-prepared elsewhere. Regardless of the differing models used, all case studies still delivered a school meal successfully and timely.

*The food is prepared in the attached kitchen; prepared, cooked and served on the same day.—England case study*

*The curry served has been delivered frozen to the school, after being prepared in a centralised kitchen.—Tasmania 3 case study*

All systems used a workforce, including staff members and students. Different workforces were allocated various responsibilities for meal preparation across the case studies. While in one case study some students were preparing food in the kitchen as a learning experience, other case studies had a meal, prepared by a team of food service staff.

*Students in the high school hospitality class prepare the food for this school meal during the pre-lunch lessons.—Tasmania 2 case study*

*Food service staff place the trays of chicken and vegetables onto the tables...—France case study*

When not acting as a food preparation workforce, students were sometimes allocated responsibilities which contributed to the food service flow.

*... students ... with the corresponding laminated number go up and retrieve the dessert component...—South Australia case study*

Schools provided a range of equipment to support the food service system, ranging from disposable items to ceramic, glass and metal plates, cups and cutlery.

### Administration

Sub-domains mapped to the administration domain included policies, payments and reach of meals. Food safety policies and practices were displayed to guide school-provided meal programmes in a few case studies.

*A small whiteboard states the allergens present in the meals ... Students enter through the main entrance and pass by a hand-hygiene station...—Sweden case study*

Across all case studies, no payments were observed being made by students. The relevant context indicates that while payments are made for many of these systems, they are not at the mealtime, meaning there was no indication of who may have been a recipient of a subsidized or free meal in the England and France case studies.

*A teaching assistant staff member uses an iPad to tick off student names. No payments are made by students and it is unknown who receives free school meals.—England case study*

Within each system, there was variation in the reach of the meal and observed participants. This included universal systems, where all students present were participating in the meal, or combination systems, where some students ate from their home-packed lunch in the same meal area. This can be understood alongside the country context, with some jurisdictions utilizing a combination of models for food provision and enabling optional participation, leading

to packed lunches alongside school-provided meals. Other jurisdictions, such as France, prevent packed lunches in school canteens, with the exception of children with food allergies.

*Only students who are participating in the meal come into the dining room...—France case study*

*At mealtime, those who are not participating in the school meal can collect their lunchbox and choose a seat at the tables.—Tasmania 1 case study*

### Eating environment

Eating environment domain captured the dining space, layout, seating choice, surroundings/ambience and the meal/menu promotion sub-domains. Meals were served and consumed in dedicated, multi-purpose and/or repurposed spaces. This included school halls, classrooms or outdoor spaces, often used for multiple purposes across the school day and adjusted for purpose with furniture and décor. The use of a multi-purpose or repurposed space was shown in the four Australian case studies, none of which included a purpose-built dining room for a school-provided meal service, in contrast to their international meal counterparts. This relates to the country context, describing the trial nature of the school-provided meal offering in the included Australian schools.

*... students from one classroom file out into the courtyard space, bringing their water bottles and collecting a plastic stool from a stack by the door as they enter... another classroom remains in their room, collecting their hand-made placemat from the teacher and placing this on their group desks—Tasmania 3 case study*

*The meal occurs in a large dining room, previously a boarding house dining room and kitchen—South Australia case study*

Many meal spaces had an attached kitchen, with a service counter and window between the eating and preparation spaces.

*... dining room is conjoined with the large kitchen facility, where food is prepared.—England case study*

Meal spaces were furnished with shared tables, for students to eat meals collectively. Across many case studies, students were provided with choice in where to sit, with guidance from adults for younger students as required.

*Students enter the dining room and find a seat, guided by teachers into groups or empty spots—Tasmania 1 case study*

All meal spaces included an element of natural lighting, with large windows often overlooking the garden or play areas. Many meal spaces were decorated with additional items, such as tablecloths and flowers.

*Large windows and glass doors overlook play areas on one end of each room and let in natural light.—France case study*



*A bunch of pink and white flowers in a glass jar sits in the middle of each table.—Tasmania 1 case study*

Information was displayed in most of the meal spaces, including information about the school food programme, allergy information, food education and health promotion information, food procurement (i.e. paddock to plate) and food seasonality. While informative, this content also acted as room décor and contributed to the aesthetics of the meal space.

*Posters displayed on one wall shows images of the foods which are best grown in each month.—Sweden case study*

*... a series of posters describe different menu items and ... the rituals and time that should be implemented to help students at mealtime.—Tasmania 2 case study*

### Mealtime experience

Relevant sub-domains mapped to the mealtime experience domain included the service of food equipment (including plating), staff monitoring, mealtime duration and mealtime sittings. Service of food and plating responsibilities varied greatly across case studies. Meal service responsibility ranged from staff plating food and serving this food directly to students at tables, or students plating and self-serving their own food. In addition to responsibility for their own meal, students often had assorted roles in assisting or supporting the staff members to serve other students as a volunteer work-force.

*... bowls are filled with pasta and salad and are placed at the kitchen window. From here the bowls are collected by volunteer older students or classroom teachers, who deliver this to each waiting student...—Tasmania 1 case study*

*Students collect a ceramic plate from the beginning of the buffet area, then proceed along the line, self-serving the food they are interested in.—Sweden case study*

Staff or adults were present in all case studies, assisting with the food service or monitoring student behaviour.

*Staff monitor the meal for behaviour and ensure food is being appropriately shared, providing assistance where required.—South Australia case study*

All mealtimes were less than 30 minutes in duration, with the exception of the case study in France who sat down for approximately 40 minutes for their multi-course meal, aligned with cultural eating norms. Case studies showed most food services had several staggered mealtimes within the same dining space. Students spent time playing before or after the mealtime.

*After about 15 minutes most students are finished eating and head outside to enjoy their playtime.—Tasmania 1 case study*

*This process repeats, with students leaving once they are finished and different year levels beginning their mealtime in a staggered fashion throughout breaktime.—Sweden case study*

### Post-meal

Clearing of plates, cleaning and evaluation measures were all mapped to the post-meal domain. After students finished eating, all case studies described students contributing to the post-meal tidying or clean up. This contribution ranged from students stacking their plates at the table for staff to collect, to students being responsible for disposing of food waste.

*Once students are finished eating, they stack their own dirty dishes in a pile on the table, helping the staff to clear these onto the trolley to be cleaned in the kitchen ...—France case study*

*Once they are finished eating they bring their bowl and fork to a clean-up area, where they scrape the waste from their meal into a bucket, stack their bowl on a table and place their fork into a tub.—Tasmania 1 case study*

*Food waste is scraped into the bin by students, and then cutlery, plates and cups are placed in their designated tray.—England case study*

Once students complete their responsibilities, the cleaning of the dishes and dining room is typically the responsibility of staff.

*After the students leave, staff quickly collect the share plates, returning them to the kitchen space, and pick up any large pieces of food from the floor...—South Australia case study*

*Students stack their cutlery and crockery into a dishwasher tray which sits in the window between the kitchen and dining room, where a staff member is washing the dishes as they are collected.—Sweden case study*

Two case studies captured an evaluation strategy of the described food service. France included a satisfaction rating scale, and a weighed food waste measure in the Sweden case study, showing the students and staff how much food waste had been produced from that meal. This is understood within the country contexts, indicating the focus on reducing food waste in these well-established meal programmes.

*There is an opportunity for students to provide feedback on the main meal which was served, using a smile scale button outside the door.—France case study*

*Once they are finished eating, food and other waste is scraped into a bin station, with separate bins signed for food waste or other, such as serviettes. The bin is automatically weighed, indicating the amount of food waste which has been collected that day.—Sweden case study*

### DISCUSSION

The present study addresses a gap in the literature by describing how food service systems for school-provided meals are delivered internationally with differing contexts. Case studies were developed through naturalistic observation and an interpretative epistemology to explore individual food services. The case studies were mapped within a school food service framework, relating to domains of Menu offering, Food service system, Administration, Eating environment, Mealtime experience and Post-meal. This allowed for an



understanding of how food services can function and exist across various school settings, related to the country context and school facilities. The results showed the food service of school-provided meals was not uniform, however many case study schools created a health-promoting eating environment using information and meal promotion, decoration of dining spaces and social eating, and empowered students with choice and responsibility.

Variation was found across the food service systems examined, with different systems all able to deliver a consistent end-product, of a nutritious and age-appropriate lunchtime meal provided within a school setting. The study findings highlight that there is no consistent profile of a school-provided meal programme. Numerous factors influence the variation observed, including the historical context, resources and facilities and the programme goals and cultural underpinnings. The history outlined in the country context had a clear influence on the food service described in the case studies. Particularly, there is a contrast between the established school-provided meal contexts and the developing Australian school-provided meal trials. The established systems captured in the present study predominantly introduced school meals as a mode of food welfare stretching back to the early-mid 1900s (Oostindjer *et al.*, 2017). This decades-long offering has allowed for school facilities to be purpose-built, food service systems to be well established and funding models to be in place to adequately support the functioning of a sustainable system. Contrastingly, the developing systems appear constrained by resources and funding, resulting in a limited programme reach, a need for multi-purpose dining spaces and occasional use of students as a workforce. This is unsurprising, as limited resources and funding have been acknowledged as a challenge for schools in Australia, New Zealand and Canada when transitioning to a school-provided meal service (Vermillion Peirce *et al.*, 2021; Manson *et al.*, 2022; Ruetz *et al.*, 2023), resulting in varied and flexible offerings within each school. The programmes delivered are also related to the cultural underpinnings and government priorities of the high-income countries included. This includes the recognition of feeding children as a public priority contributing to the universal, free meal offering in Sweden (Osowski and Fjellstrom, 2019), while the importance of French food culture acts as a driving force for the 5-course meal structure, extended mealtime and restaurant-inspired meal format (Avallone *et al.*, 2023). This demonstrates a combination of intrinsic factors, such as school facilities (e.g. onsite kitchen, dedicated dining space), and extrinsic factors, such as policy, funding and culture, can influence on the required system. Meaning no one size can fit all when it comes to the design and delivery of a school-provided meal, even within one country or region. As a result, this reiterates the need for consideration of the specific context when developing a school-provided meal programme, while establishing the goal of the programme to appropriately prioritize resources.

With an increasing understanding of the role that school mealtimes play in learning, habit formation and food relationships, as well as the need for child acceptability (Oostindjer *et al.*, 2017; Baines and MacIntyre, 2019; Illøkken *et al.*, 2021), school-provided meal programmes have needed to evolve into much more than just a feeding programme, transforming the school approach to food. This is well distinguished into three phases of school meal programmes, by Oostindjer *et al.* (Oostindjer *et al.*, 2017). The current position was captured

by The WFP, describing school feeding programmes as ‘platforms through which important complementary education, nutrition and health activities are delivered’ [(World Food Programme, 2023), p. 26]. This is aligned with the health-promoting schools principle, which situates schools as a safe setting for living, learning and working (World Health Organization, 2020), with the eating environment important in creating a learning environment to form positive relationships with food. Despite variations in the established or developing nature of the programmes, all case study schools demonstrated modes of achieving a broader approach to food. This included creating a positive eating environment and mealtime experience conducive to child wellbeing, with information and meal promotion, decoration of dining spaces and social eating. The lack of visible payments anonymized any eligibility for free and subsidized meals, which have been associated with stigma and shame (Gagliano *et al.*, 2023), supporting an equitable, safe and wellbeing promoting environment for meal participants. This considered approach regardless of the stage of implementation demonstrates the importance of positive and health-promoting approaches to food needed to deliver a modern school food service.

Elements of student choice and responsibility were present across all school food service systems in various ways. In every case study, students were provided with choice, whether it was around seating, two meal items, portion size, additional servings or when they could leave to begin playtime. These choice elements align with the ‘limited or guided choices’ definition described by Vaughn *et al.* (Vaughn *et al.*, 2016), providing appropriate choices for the child, being reasonable within the situation, which is a commonly utilized practice by parents (Loth *et al.*, 2018). Students had responsibility for the meal service across each system, including serving, cooking, clearing/scraping plates or cleaning, contributing to an ownership of the programme functioning. While student choice and responsibility were consistent principles in every case study, the extent to which these were emphasized varied, with staff present in all systems, to provide support or hold responsibility for other roles. Child choice and responsibility are key concepts for child acceptability of a school-provided meal system. Previous research with children describing a hypothetical school meal scenario found children consistently referred to the choices and roles they would hold, including seating choice, food or beverage choice and cleaning responsibilities (Coulls *et al.*, 2023). In the present study, choice and responsibility which was limited or guided provided an opportunity for students to have autonomy over the programme, while still exposing them to new experiences integrated into the programme delivery. For example, allowing children to choose between two healthy food options, balancing autonomy while ensuring children are exposed to a nutritious meal. These principles of child food autonomy have the potential to facilitate student engagement and incidentally create a learning experience about food service. Autonomy-supportive practices have been associated with healthier food choices for children (Costa and Oliveira, 2023) and have the potential for broader positive effects, such as developing healthy food habits and including influencing the intake of broader society (Oostindjer *et al.*, 2017). As such, the adoption of student choice and responsibility principles across all case studies demonstrates the importance for this in the delivery of a school food service model and contributes to the creation of a health-promoting environment.

The current study findings should be understood in the context of the strengths and limitations. The observational study design allows exploration of the school food system and how it functions, capturing a unique and consistent understanding of the system functioning than might be possible with other data collection methods, such as interviews. The non-experimental naturalistic nature allows observation in the natural environment without intervening or manipulating any features, strengthening the external validity of this research. Observational research avoids the potential confirmation bias which may be present in interviews, allowing the researcher to observe and interpret from an outsider perspective. While this limits subjectivity, observational research still poses a risk of observer bias influencing the results and interpretation. To mitigate this, reflexive journaling with the use of the inquiry cycle and cross-checking by other researchers at each stage of the data collection and analysis was used to reduce the potential influence of observer bias and acknowledge the role and influence of the researcher as part of the research.

The naturalistic design poses notable limitations, as not all factors within a system are visually observable and therefore important elements can go undetected. This may include the costs, administration and adoption of the food service, which influence the system functioning. Furthermore, this study was limited in its scope due to the in-person data collection and focus on high-income countries. Therefore, the findings do not capture the breadth of variation which may be seen over a wider range of countries at different income levels with varied government priorities, or other countries undergoing school food transitions, such as New Zealand and Canada. It is also important to note that while there was variation in resources available across the case studies, this variation must be considered relative to the level of privilege these countries have over others with alternative financial contexts (Aliyar *et al.*, 2015).

Future research could continue to explore school food models using a food service lens. Often an overlooked component of the programme, this research has demonstrated the influential impact food service delivery has on the system. This includes understanding the ways a food service can function and how challenges are addressed when resources are limited, to ensure a school-provided meal can still be provided. Ongoing work should explore the perspectives of stakeholders on food service of school-provided meals, understanding which of the domains plays a critical role in system acceptability and feasibility. Particularly exploring what sub-domains are most important to parents/caregivers and students, as key stakeholders, to provide further insight into the components needed for the design of highly acceptable programmes, including the reach of the programme, cost and eating environment.

## CONCLUSION

This research provides an understanding of how food service can be delivered, relevant to the context, in schools with varied facilities and resources. Particularly, this provides examples of feasible school-provided meal programmes and the domains which play a role in system functioning. The findings build on existing research of school-provided meal systems across countries, focusing on the food service on the school level, demonstrating how these highly variable systems can function to achieve a collective end goal. Results demonstrate the need for tailored school food programmes, designed appropriate to the context in which it exists. Furthermore, positive eating

environments, appropriate levels of child choice and responsibility were all noted as principles important in a successful school food service and can contribute to an environment conducive to health promotion. This knowledge can be used to understand what is feasible in school food service, informing the planning of future systems, particularly for regions transforming into a school-provided meal model, and those looking to implement improvements to existing systems.

## SUPPLEMENTARY MATERIAL

Supplementary material is available at *Health Promotion International* online.

## AUTHORS' CONTRIBUTIONS

A.C.M., R.G., B.J.J. and G.M. were involved in project conceptualization and research design. A.C.M., S.N., C.E., J.R., J.D., A.S. and N.S. contributed to developing the country context and recruitment. A.C.M. and G.M. collected the data. A.C.M. analysed the data and drafted the manuscript. R.G., B.J.J. and G.M. checked data analysis and provided academic supervision. All authors interpreted the results, contributed to, read and approved the final manuscript.

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## CONFLICT OF INTEREST

While A.S., J.D. and J.R. receive salary from schools offering school meals or supporting organizations, these authors were not involved in data collection or analysis. No competing funding was received to support this project.

## DATA AVAILABILITY

The datasets used and/or analysed during the current study are available in the supplementary files.

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**Published manuscript: “Not just students in need”: Findings from a nominal group technique study of what parents want in an Australian school-provided meal system<sup>230</sup>.**

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## “Not just students in need”: Findings from a nominal group technique study of what parents want in an Australian school-provided meal system

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### Abstract

**Objective:** Interest in national adoption of school-provided meals is growing across Australia; however, parent perspectives are not well understood. This study aimed to understand the most important features of a potential school-provided meal system to parents of primary school children in Australia.

**Methods:** Virtual Nominal Group Technique workshops with Australian caregivers of primary school-aged children were held to identify, discuss and prioritise features. Discussions were noted and collated collaboratively with participants, with quotes collected. Top voted features were scored using relative importance.

**Results:** Five workshops with 25 total participants identified 28 diverse features, with interest in a comprehensive, well-designed system. Priority features were nutrition (importance score 0.46), cost (0.42), stigma considerations (0.32), catering to dietary requirements (0.29) and sustainability and waste (0.25).

**Conclusions:** Findings demonstrated the diverse considerations for a parent-accepted school-provided meal. Prioritised features align with initiatives internationally and locally, indicating feasible strategies to inform an acceptable Australian school food transformation.

**Implications for public health:** Provision of universally available, accessible and nutritious meals aligns with parent values and creates opportunity for public health impact. Findings can be used to inform the design of school food programs, supported by implementation strategies used internationally and locally, conducive to optimum child and parent health outcomes.

**Key words:** health promotion, childhood nutrition, parent/caregiver, perspectives, school meal, food provision

### Introduction

Children will consume over 2000 lunches at school across their years of schooling.<sup>1</sup> This means that schools, and particularly school lunches, provide a unique health promotion opportunity with reach to all children, regardless of socio-economic circumstance and cultural background.<sup>2</sup> Internationally, children access lunch at school via many different models, including lunches packed at home (i.e. lunchboxes, packed lunch) and school-provided lunch or meal(s).<sup>3,4</sup> Additional models include food relief provision, and commercial food offerings, e.g. canteens, vending machines and local businesses.<sup>4</sup> The model of school food influences the food environment and health promotion opportunities, while placing

responsibility on various key stakeholders, including parents/caregivers (i.e. those responsible for the care of children, hereon referred to as parents), schools, government and non-government organisations.

Universal school-provided meals, where all children in a school are provided a school lunch, can deliver benefits in children's health, development, wellbeing, education and equity.<sup>5</sup> School-provided meals are associated with better diet quality compared to a packed lunch.<sup>6</sup> School-provided meals reduce parent burden in purchasing and packing lunches, reduce the complexity of school nutrition promotion activity, and are a social safety net for all children, with approximately 50% of children globally receiving school-provided

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meals.<sup>7</sup> Countries including Australia, Canada and New Zealand that historically follow a predominantly home-packed lunch model are increasingly exploring the potential of transforming to a school-provided meal model, with various meal programs emerging over recent years.<sup>1,3,8–10</sup>

Previous research has explored the perspectives of Australian stakeholders, including primary school students, education staff, health promotion staff and food industry staff, finding support and identifying key considerations for school-provided meals.<sup>11,12</sup> However, a system transformation would require a shift in the social norms of food provision, from solely a parent responsibility towards a shared community responsibility, with potential to relinquish parent responsibility in feeding their child.<sup>13,14</sup> As parents are a large stakeholder group and primary food providers,<sup>15</sup> including financially, consultation is required to ensure a potential school-provided meal system would be acceptable to parents and maintain their autonomy in their child's food provision. While emerging evidence indicates parent interest in a school-provided meal offering,<sup>16–18</sup> there is limited understanding of the system components parents would be most interested in, hereon referred to as the features. Understanding what features are a priority to parents can inform policymakers of what school meals need to look like and why, enabling the tailoring of new school-provided meal systems to meet families' needs and paving the next steps for school food transformation. Therefore, this study aimed to understand the most important features of a potential school-provided meal system to parents of primary school children in Australia.

## Methods

### Study design and methodology

To understand Australian parent perspectives, this study used the nominal group technique (NGT) design to collect cross-sectional quantitative and qualitative data. The NGT process is a structured variation of small-group discussions or focus groups.<sup>19</sup> It is a collaborative consensus process designed to prioritise ideas amongst a small group. The NGT process is a resource-efficient method, allowing for the inclusion of a diverse range of participants in a low-burden workshop that is short in duration, in comparison to interviews and surveys.<sup>20,21</sup>

The NGT workshops sought to explore, contextualise and reach consensus on findings to the Australian parent population and school food transformation environment from an international literature review.<sup>22</sup> The review synthesised globally what parents/caregivers identify as the key features of school food models, including 26 studies from 11 countries.<sup>22</sup> The features identified in the review are indicated in Table 1.

The present manuscript is reported according to the requirements of the strengthening the reporting of observational studies in epidemiology statement for cross-sectional studies.<sup>23</sup> This study was approved by the Human Research Ethics Committee of Flinders University (5812). All participants provided informed consent prior to participating.

### Participants

Eligible workshop participants were Australian parents of primary school-aged children (aged between 4–12 years) who were fluent in written English. The workshops were advertised using targeted, paid

Meta adverts and flyers distributed through several organisations, community groups and schools. Participants expressed their interest using a brief online survey via Qualtrics, which confirmed eligibility, collected socio-demographics and availability. Postcode was used to determine participant state/territory, remoteness and Index of Relative Socio-economic Advantage and Disadvantage 2021 (SEIFA) (an Australian index considering income, education and employment in specific living areas, therefore indicating the social and economic well-being in that region) using Australian Bureau of Statistics data.<sup>24,25</sup> Participants were then contacted via email and/or phone to schedule workshops. Participants were provided an AUD\$10 Prezzee voucher to reimburse internet expenses following workshop completion.

### Positionality statement

The research team brings together expertise in public health (ACM, DCD, BJJ, RKG), school food (ACM, BJJ, RKG), and experience in the Australian primary school system as a parent (RKG). The data collection team consisted of white females with no children, therefore, did not approach this research with personal experience of parenting or cultural adversity. All research is also conducted in consultation with an advisory group of school stakeholders, including parents and educators, to ensure the research methods are appropriate and inclusive for participants, while enabling transparency in analyses. Careful consideration was taken to mitigate the influence of the researchers on parent participants during the workshops, through neutral positioning and reflexive meetings held between the research team to bracket assumptions, reflect on findings and reduce the influence of bias during data analysis.

### Instrumentation

The NGT process was conducted within virtual 1.5-hour workshops using Microsoft Teams (Version 1.0; Microsoft). The workshop was held by two researchers, one who facilitated (ACM) and the other who scribed notes and provided attendees with any technical support (DCD). Workshops were audio-recorded, which was later transcribed using Fireflies AI transcription service (Fireflies) and checked by a researcher for accuracy (ACM).

Participants were provided context of the current school food system in Australia, a summary of school-provided meal systems internationally and introduced to a potential school-provided meal system in Australia at the beginning of the workshops. The research aim and findings of the previous review, including the 15 parent-identified features of school food systems internationally and their definitions were described by the facilitator. Presentation of the existing features at the beginning of the NGT process provided participants further relevant context, examples of 'features' of school food to assist with participant understanding and was time efficient to reduce participant burden. Participants were prompted to consider if there were 'any other important features of an Australian school-provided meal system that aren't included?'. Participants then completed the four NGT stages: brainstorming additional features; recording features; discussing features; voting on ideas,<sup>20,26</sup> further described in Supplementary file 1.

Following the discussion phase, the final list of features was collated and transferred to a Qualtrics questionnaire and shared with participants for voting. Participants voted on the most important features to make a school-provided meal system acceptable to them

as a parent/caregiver. Participants voted for a total of five features, selecting one feature per rank position. Votes were scored, with the top-voted item from each participant receiving a score of 5 points, the second voted item receiving 4 points, etc.<sup>20</sup> The total scores for each feature were summed, and the top five scored features were shared with participants, providing an opportunity for further comment. Data captured from each workshop included a list of features, definitions and discussion points, audio and chat transcripts, and voting scores on features.

### Sample size

Best practice guidelines for NGT studies recommend aiming for 6-8 participants per workshop.<sup>11,20,21</sup> The number of workshops is based on the principle of data saturation, the point at which additional workshops do not provide new insights, themes or information related to the phenomena of interest.<sup>27</sup> The aim was to conduct a minimum of three workshops, with 7-10 participants scheduled per workshop, to account for non-attendance.

### Data analysis

#### Analysis of qualitative data

Qualitative data consisted of feature lists, definitions and workshop discussion points, and workshop transcripts. Discussion points were summarised within workshops by the scribe and therefore checked by participants live in workshops, ensuring qualitative summaries accurately reflected the discussion. Data checking by ACM was conducted at the end of each workshop to understand data saturation. Data saturation was defined as no new features identified and consistency in the discussion of the features for at least two sequential workshops. Identical features identified in multiple workshops were collated following each workshop. Collation of newly identified identical features across different workshops was aided by the cross-checking of features between workshops with participants to confirm if features and definitions were identical, followed by discussion between ACM and DCD. All features were then collated to form a comprehensive list of all features and definitions, from all workshops.

Following completion of all workshops, transcripts were reviewed by ACM to confirm the workshop discussion notes and identify key quotes. Quotes capturing the workshop discussion points were extracted to ensure the parent voice is accurately presented.<sup>28</sup>

#### Analysis of quantitative data

Quantitative data consisted of the voting scores used to determine the overall importance score and therefore identify the priority features. Voting scores included the 1) total votes across all workshops and 2) top five ranked features clustered by workshops and scored, which were combined to form 3) overall importance. This allowed consideration of the influence of workshops on conversation clustering and individual perspectives.<sup>20</sup> As informed by the qualitative data, scored votes for collated, identical features were combined.

- 1) The total score across all workshops was used to calculate the importance score for participants.

*Importance score by participants = total score from individual votes / (total participants (24) x maximum score per person (5))*

- 2) Total scores from workshop rankings were used to determine the importance score, relative to the number of workshops it was raised in.

*Relative importance score clustered by workshops = total score from workshop ranking / (number of workshops feature was discussed in x maximum score per workshop (5))*

- 3) Overall importance considered both the individual and workshop-clustered importance scores, used to determine the overall rankings of the items, out of a maximum value of one.

*Overall importance = (Importance score by participants x 0.5) + (Relative importance score clustered by workshop x 0.5)*

## Results

### Sample characteristics

Eighty-eight participants completed the expression of interest survey. While 48 eligible participants stated they were available at the workshop day/times and scheduled into a workshop, 40 participants did not respond to communication or were unavailable to participate in a workshop and therefore were lost to follow-up. Five workshops were held, with a total of 25 participants attending (4-9 participants per workshop). No new features or unique information was identified following analysis of the transcripts 4 and 5 when compared to the initial three transcripts. While all participants contributed to the feature identification and discussion, captured in the qualitative data, 24 contributed to the quantitative voting, due to technology challenges for one participant.

Most participants (n=19/25) identified as women and were married/de facto/partnered (n=19/25), living in major cities (n=21/23) across five Australian states. Nine participants were born outside of Australia or self-identified as culturally diverse. Most participants worked part-time (n=14/25) and were highly educated, with the majority having completed tertiary education (n=15/25) or a postgraduate degree (n=6/25). Participants lived across areas of varying levels of socio-economic advantage, with participants from each quintile of socio-economic advantage (SEIFA). Household income ranged, with seven participants with a household income between \$20,800-\$90,999 and 11 with an income of \$91,000+. Further participant characteristics are available in [Supplementary file 2](#).

### Features

Participants were presented with 15 pre-identified features and definitions from the literature. Participants discussed existing features and identified new features, resulting in 28 total features. [Table 1](#) describes the 16 most important features, definitions and importance rankings. Top-ranking features and related items are discussed in text with key quotes, with all other features and additional quotes summarised in [Supplementary file 3](#).

When voting, participants prioritised the non-negotiable features required for a school-provided meal system to function, in addition to a range of features they view as important in their acceptability. The top five features of highest importance were nutrition, cost, stigma considerations, catering to dietary requirements, and sustainability and waste. Features that were commonly voted on included a range of new features such as stigma considerations, catering to dietary



requirements and sustainability and waste, as well as features from the literature review. Parents discussed a wide range of features and concepts they would be interested in seeing within a school-provided meal model. While not top priorities, all features identified can be considered important to parents and parents acknowledged features were often interrelated and relied on one another.

### Top 5 ranked features

#### Nutrition

Nutrition was the top-ranked feature, with an overall importance score of 0.46. Nutrition was consistently discussed as an important feature, ranking within the top five features in four of the workshops. Nutrition was consistently described as needing to be a focus of the program and was required to make school-provided meals acceptable.

Nutrition was often discussed by parents alongside quality, which was a top ten ranking priority. Parents desired food that was both nutritious and of good quality, with some noting the differences in the definitions of these features.

Nutrition was framed as food that supported a 'mind-body connection', meaning it supported concentration and learning for the classroom. Parents described the importance of consuming nutritious food on educational outcomes. This was discussed as contrasting with current food relief or canteen programs, which parents discussed as being focused on quantity and using donated foods and not focused on nutrition or quality.

*"...one of the struggles I have ... the ways that food relief is provided is that it's often just getting carbohydrates because it's cheap and ... available. But what we actually need in bellies for brains is a wide range of quality fresh fruit, vegetables, protein..."*  
— #15, Mother, workshop 3

The Australian dietary guidelines and the creation of new nutrition guidelines for school-provided meals with dietitians were discussed.

*"I guess it would be good to have nutrition profile be matched to the growth stage of the child/their needs. eg protein and calcium etc"* — #9, Mother, workshop 1, message in meeting chat

Parents noted their interest in having balance when it came to the nutrition of food, including items on the menu that aren't nutritious but contribute to the enjoyment of the meal, such as cake. This relates to creating positive food relationships and not restricting children or teaching them that foods are 'bad'.

#### Cost

The cost of meals was of high importance to parents, with an overall ranking of 2 and a score of 0.42, consistently discussed across all workshops, and ranked as a top priority for three of the five workshops. Many parents discussed the need for such a system to be affordable for all families. Parents identified their need for the price of food to be aligned with a measure such as household income. Government contribution or subsidies were positioned as a key enabler for this. Achieving equity across different schools and within each school was a key consideration.

*"With funding I think if it is part or wholly 'parents pay' I think it should be like CCS [Child Care Subsidy] - parents pay based on income"* — #8, Mother, workshop 1, message in meeting chat

Concerns were also raised by some parents about making sure all those in need are captured by the income measure used and how you

can ethically distinguish need, noting eligibility challenges in existing systems. Other parents posed the potential for voluntary contribution, paid alongside school fees. Cost was also discussed in relation to the potential benefits that can be achieved through a school food provision system being available at a lower cost than lunchboxes.

*"If you've got four kids and all four kids need lunches ... then that's a lot of money. If a school can provide that and take that off of a parent who is financially struggling, then that could mean a world of difference ... for them."* — #24, Mother, workshop 5

Funding for schools and the need for additional budgets to allow for such a system to be implemented was acknowledged by parents, including staffing costs. However, parents acknowledged that investing in a school-provided meal system would be money well spent.

#### Stigma considerations

Stigma considerations was a new feature identified, ranked third on importance, with an overall score of 0.32, and identified in three workshops. This included considerations centred around preventing emotional harm and supporting positive food relationships. It was defined as the provision of food that doesn't influence shame, dignity and agency. One parent described this as *"increasing equity and removing shame"* (#25, Mother, workshop 5).

School-provided meals were posed as a potential way to achieve greater equity across society. However, parents also considered the risks associated with school-provided meals, including for eating disorders or judgement of quantities consumed.

Concerns were linked to the school food policy and messaging, which was ranked 9 and scored 0.20. These concerns centred around nutrition messaging, including monitoring of children's intake, staff imposing right or wrong quantities, or providing nutrition opinions and categorising food as good and bad. Parents noted a system would need to address these aspects to prevent stigma.

*"... having teachers come and say you have to eat the healthy food before the unhealthy food is really unhelpful... So my concerns are ... around ... the policy and messaging..."* — #19, Mother, workshop 4

Bullying was described by parents as being prevalent in current lunchbox systems, with shaming of lunchbox contents. School-provided meals were posed as a potential way to reduce feelings of shame and support positive food relationships, if delivered correctly.

*"... having [school-provided meals] ... so that then children aren't being shamed for what's in their lunchbox, shaming the children, shaming the parents ... That'll create a healthier relationship with food that will reduce the risks of eating disorders and risk of bullying, risk of ... rejection from peers and things like that."* — #24, Mother, workshop 5

Concerns were raised surrounding current food relief practices in Australia and New Zealand and the association with shame, resulting in reduced uptake. Parents noted the importance of ensuring no one is aware who receives free meals to address potential shame if using a subsidised pricing model, with any potential payments occurring behind the scenes.

#### Catering to dietary requirements

Dietary requirements were ranked fourth, with an overall importance score of 0.29. Dietary requirements were originally captured as a



Table 1: Summary of parent prioritised features of a potential school-provided-meal system in Australian primary schools.

Feature	Definition	Number of workshops feature was discussed in	Priority ranking per workshop					Total number of participants voting on feature	Total score from individual votes	Importance score by participants	Total score from workshop ranking	Importance score clustered by workshop	Overall ranking
			1	2	3	4	5						
Nutrition of food	The perceived nutritional quality of food (based on the Australian dietary guidelines)	5	3	1	2	4	4	24	43	0.36	14	0.56	1
Cost of food	Financial costs of providing food	5	2	1	3	3	24	24	43	0.36	12	0.48	2
Stigma considerations	Provision of food doesn't influence shame, dignity and agency	3	-	-	2	3	12	12	20	0.17	7	0.47	3
Catering to dietary requirements	Requirements related to child health, i.e. allergies or intolerances, related to the child's medical history	3	-	3	3	-	16	16	21	0.18	6	0.40	4
Sustainability and waste	Procurement considerations and management of food waste in the food environment	3	-	4	-	2	12	12	12	0.10	6	0.40	5
Food access/availability	Reliable access to food and food readily available when needed	5	3	3	5	2	24	24	17	0.14	8	0.32	6
Quality	Quality of food items, including freshness	5	1	1	2	24	24	24	25	0.21	5	0.2	7
Time, effort and convenience	Non-financial resources required for food procurement, preparation and provision	5	4	2	24	24	24	20	20	0.17	6	0.24	8
School food policy and messaging	School food policy, including healthy eating and packaging policy, teacher monitoring and school food rules	5	2	2	4	24	24	18	18	0.15	6	0.24	9
Food safety	Handling, preparing and storing food to reduce the risk of foodborne illnesses	5	-	1	24	24	20	20	17	0.17	5	0.20	10
Variety	Having a range of different food items, rather than repeated items each school day	5	4	4	3	24	15	15	15	0.13	5	0.20	11
Food classroom education	Education for students surrounding nutrition and food in school curriculum	5	4	4	4	24	13	13	13	0.11	4	0.16	12
Catering to child preferences	Child food preferences, enjoyment and restricted/selective eating	5	4	5	5	24	17	17	17	0.14	3	0.12	13
Eating environment	The school food eating environment, including room setup and area as a social setting	5	5	5	5	24	15	15	15	0.13	2	0.08	14
Parent/caregiver engagement	Parent involvement in food provision and monitoring of child intake	5	4	4	24	24	10	10	10	0.08	2	0.08	15
Eating time	Time allocated specifically for eating in school breaktimes	5	5	5	24	24	13	13	13	0.11	1	0.04	16

New features indicated in *italics*.

In addition to these features, *Mind-Body connection, Cooking/preparation facilities, Child input – preparation or dining, Quantity, Community engagement, Flexibility, Cultural considerations, Employment opportunities, Resourcing arrangements, Government school meal program policy, Food sourcing, and Champion/Advocate* were raised in a single workshop or received a score of <5.

component of child preferences, with limited findings from the literature review on dietary requirements.<sup>22</sup> However, parents recognised this as a separate feature across three workshops and noted the importance in the Australian context. Dietary requirements were defined as requirements related to child health, i.e. allergies or intolerances, related to the child's medical history, which parents discussed as being a safety issue and posed as a non-negotiable, but challenging consideration.

One parent described how dietary requirements were addressed at their previous hospital workplace and the challenging feasibility of catering to all requirements. Dietary requirement discussion was followed up with discussion of cultural considerations, including kosher and halal diets. These features were all discussed as necessary considerations in designing an inclusive and appropriate menu.

*"We're really lucky in this country that we have such a social and culturally diverse country that there would be so many options that would have to be available ... you'd have to cater for so many allergies and medical conditions and preferences..."* - #18, Mother, workshop 4

Parents discussed that the menu should be diverse and include a range of different food items, including different cultural foods, also relating to the variety and cultural considerations features. International examples were referenced, including the United Kingdom, where a menu was offered that addressed dietary requirements and catered to child preferences with offering a large number of options. However, catering to preferences of children was a lower-ranked feature (13<sup>th</sup>), with parents conscious of the value of exposure and learning around different foods, providing a beneficial learning experience in the school setting.

*"... I'm a little bit wary of too much catering to preferences because I think it's been really good for my children to be exposed to new foods, and if you ask them what they want to have for lunch they will tell you the same thing all the time because they know they like it and it's a safe food..."* #8, Mother, workshop 1

#### Sustainability and waste

Sustainability and waste was a new feature identified, ranked 5<sup>th</sup> with a score of 0.25, raised in three workshops. It was defined across workshops as procurement considerations and management of food waste in the food environment.

School meals were recognised as having the potential to be more environmentally friendly through reducing individual food packaging, commonly used in lunchboxes. Parents discussed the ways a school-provided meal program could be sustainable, such as using locally sourced food and 'seconds' of food products, including imperfect vegetables.

*"... the supermarkets reject a whole heap of food because, like, it's too big or too small or wrong colour or whatever ... they're still perfectly fine to eat, but maybe they could use that because it's preventing food wastage"* - #14, Father, workshop 3

Discussions for addressing food waste included the potential to repurpose food for those in need through charitable donations, composting organics or making leftovers available for families to purchase.

*"I would love to be able to ... do something with the leftovers or buy leftovers and take them home as a family meal or something like that ... because I think that would sort of a) alleviate wastage or b) if your kids liked something..."* - #2, Mother, workshop 1

## Discussion

This study identified and prioritised the features that parents of primary school-aged children consider important for a school-provided meal system. Prioritisation indicated nutrition, cost, stigma, dietary requirements and sustainability and waste were of highest priority for Australian parents, being critical in forming an acceptable school-provided lunch offering. The features can be contextualised against existing international school-provided meal programs and emerging movements, internationally and locally. These findings can inform innovation efforts in Australia to provide school-provided meals, ensuring the system is available and accessible for all students and food provided is conducive to student's health, growth and development.

Priority features align with recently growing considerations in school-provided meal programs internationally. Particularly modern transitions of school food programs, integrating health and sustainability, considering community and societal impacts, with programs optimised to increase potential benefits.<sup>29</sup> Internationally, increasing recognition of stigma and sustainability over the previous decade has resulted in implementation of universal free meals in California and Maine<sup>30</sup> and increasing recommendations for cashless systems in the United Kingdom to limit subsidised meal stigma.<sup>31</sup> These actions address similar stigma and cost concerns described by parent participants in the present study. International sustainability actions include sourcing local food and limiting waste production in Sweden and France to reduce the environmental impact,<sup>29,32,33</sup> and policy alignment with the Sustainable Development Goals in Canada.<sup>34</sup> Such successes indicate aligned priorities of the present findings with actions in existing school-provided meal systems, providing strategies that can feasibly be implemented in newly adopted systems transforming from packed lunch provision.

Findings can also be positioned within the Australian literature exploring the views of other stakeholders and parent populations. Results align with previous workshops with Australian stakeholders, including education staff, health promotion staff and food industry staff,<sup>11</sup> identifying school lunch prepared onsite using a rotating menu of seasonal produce, minimally processed food, and a range of cultural foods, offering social pricing, as having the highest potential impact and achievability.<sup>11</sup> This aligns with the discussions in the present study, with parents recognising the diversity of the population<sup>35</sup> and the need for an inclusive meal system. Research exploring the Australian child perspective on a hypothetical school-provided meal<sup>12</sup> found children described a menu with variation and choice, noting the need for catering to diverse dietary requirements.<sup>12</sup> Students described the eating environment, including space to eat the food and social interactions about the meal experience they were sharing,<sup>12</sup> closely aligning to the features discussed in our study. Additionally, majority of Australian parents would be interested in a school-provided meal offering, according to survey findings,<sup>17,18</sup> with comparable barriers discussed in one study, including cost, equity, health, preferences and conditions and responsibility.<sup>17</sup> This alignment of the consistent parent perspective with other stakeholders indicates some key considerations to meet population needs in Australia, critical in informing the transformation of the school food system.

### Implications for public health

Findings indicate the importance of involving parents to ensure their needs as key stakeholders are met, holding a central role in children's diets as the primary food providers. Transitioning to a school-provided meal model in current parent-provided systems would shift responsibility and can reduce parent autonomy. As with many public health initiatives, parents, students and other stakeholders must feel the system aligns with their priorities and therefore are more likely to invest and participate. Creating a system, underpinned by policy, which integrates stakeholder perspectives and aligns with their needs can enable the success of a potential school-provided meal, gaining buy-in and increasing uptake from families, described in the Needs Assessment & Engagement Guide for school food programs in Canada.<sup>36</sup> Future research should continue to explore parent interest and engage students to ensure their voices are heard, particularly across population groups and on various socio-ecological levels (i.e. considerations on the individual, school, state and national levels), to create a system suitable for all families.

The present study has demonstrated the considerations in developing a parent-accepted transformation to existing school food systems. These findings can be used by policymakers, schools and health professionals as an initial roadmap to the design of school food programs that centre the needs of parents. Particularly ensuring systems consider providing universally available and accessible, nutritious meals that meet the needs of parents as key stakeholders and strive for improving equity in food provision. The results emphasise the potential of using existing international examples as an initial framework and tailoring appropriate to the parent needs, ensuring learnings are taken from successful tried and tested models that are successful in health promotion wherever possible to increase feasibility, acceptability and impact on public health.

### Strengths and limitations

A strength was the NGT method, informed by literature, allowing all participants to contribute and results collating all participant views.<sup>19–21</sup> Collation of findings on a shared document during workshops allowed participants to participate in the analysis, reducing researcher bias on interpretation. Data saturation demonstrates that adequate data were collected to support interpretations. Limitations included that parent participants represent a slightly higher level of advantage and education than the general parent population, so views may vary with alternate population groups. Therefore, it is recommended that future research of school food initiatives should continue to engage parents, using co-design to ensure appropriateness, particularly for diverse populations. Additionally, while the grouping of ideas into features enables identification of focus areas for future research, parents found features were not unique and many features were associated with one another, noting challenges with prioritisation.

### Conclusion

This study demonstrated the potential of school-provided meal programs for parents, including the priority areas of nutrition, cost, stigma, dietary requirements and sustainability and waste. Findings align with previous research on school-provided meals and growing Australian stakeholder perspectives, indicating the potential for using learnings from existing programs. Further research to understand

priorities across different population groups is needed to design a school-provided meal program that is tailored and meets the needs of each family.

### Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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### Ethical approval

This project was performed in accordance with the ethical standards laid down in the Declaration of Helsinki and was approved by the Human Research Ethics Committee of Flinders University (5812).

### Author contributions

All authors were involved project conceptualisation and research design. ACM and DCD conducted the workshops. ACM analysed the data and all authors contributed to the analysis and interpretation of the findings. The manuscript was drafted by ACM, who has responsibility for final content, and all authors critically reviewed and approved the final manuscript.

### Data sharing

Data described in the manuscript, code book, and analytic code will be made available upon request pending ethical approval.

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## Appendix A Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.anzjph.2025.100221>.

Article

# Unpacking the cost of the lunchbox for Australian families: a secondary analysis

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## Abstract

Ninety per cent of Australian school children bring a home-packed lunch to school, with 44% of the food consumed during school hours being unhealthy. Among other factors, cost is a key consideration for food provision; however, the costs to Australian families are not well understood. Therefore, we aimed to determine what families are currently paying for school lunchboxes in Australian primary schools and to examine associations between food costs and socio-demographic factors with dietary quality. An audit of local retail outlets was used to determine the food costs of lunchbox contents. Costs (AUD) were adjusted for inflation as of early 2023. The lunchboxes of 1026 children aged 4–12 years at 12 Catholic primary schools in New South Wales, Australia, were assessed at the start of the day, using photography assessment methods and a validated School Food Checklist. The mean cost of lunchbox contents was \$4.48 AUD (SD 1.53), containing a mean energy of 2699 kJ (SD 859), with 37.3% (SD 23.9) of energy sourced from unhealthy foods. Multiple linear regression analyses found that the strongest predictors of higher lunchbox cost ( $P < 0.05$ ) were a higher proportion of energy from unhealthy foods ( $B = 0.016$ ) and lower Socio-Economic Indexes for Areas ( $B = -0.178$ ), when controlling for child socio-demographics. The results indicated that lunchbox food costs to Australian families are comparable to alternative school food service models in Australia and internationally. Results demonstrate the cost of food is not the only barrier to providing a healthy school lunchbox. Demonstrating a need for cost-considerate systematic interventions addressing food provision challenges and socio-economic disparities faced by families.

**Keywords:** packed lunch, primary school, school food, nutrition, cost

## BACKGROUND

Childhood is a key stage for the development of healthy dietary habits. Dietary intake and food choices are established during childhood and adolescence, supporting growth and development (Mikkilä *et al.*, 2005). There are multifaceted influences on child health and development, including parent knowledge and beliefs, time and resource availability and socio-economic position (Anderson and Butcher, 2006; Rosenkranz

and Dzewaltowski, 2008), making these factors important considerations for health promotion. Additionally, food insecurity is associated with developmental consequences and can contribute to reduced academic performance (Jyoti *et al.*, 2005).

School is a key health promotion setting, playing a critical role in the establishment of health and dietary intake habits during developmental years. Children internationally consume approximately one third of their daily energy intake during school hours,

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#### Contribution to Health Promotion Statement

- The school food environment is critical in health promotion, supporting food relationships, knowledge and dietary habits across the lifespan.
- Cost is an important consideration for Australian families, being identified by parents as a barrier in lunchbox food provision.
- Exploring demographics related to food knowledge, income and time for food preparation, which may be related to food costs can help inform tailored interventions to support populations.
- This study fills an evidence gap that is important to inform effective public health interventions to improve children's diet quality in schools, demonstrating the potential of alternative provision models as a cost-comparable alternative.

regardless of the food service model (Harrison *et al.*, 2013; Tugault-Lafleur *et al.*, 2017; Colombo *et al.*, 2020; Manson *et al.*, 2021). Hence, food consumed in school is important in dietary habit formation and an opportunity for health promotion. Food consumed by Australian children during school is typically sourced from home in a lunchbox, used by approximately 90% of students (Zarnowiecki *et al.*, 2018) or purchased from an onsite canteen/tuckshop. Other students may receive a meal from a lunch or food relief program; however, there is currently no universal safety net for food-insecure families or to address the dietary quality of children. Lunchboxes of primary school aged children are ordinarily packed by the parent/caregiver or student at home, to be consumed across the school break times (e.g. morning and midday eating breaks). However, Australian children's school-time diets are currently profiled by a high intake of unhealthy foods (Sutherland *et al.*, 2020; Manson *et al.*, 2021), which are foods and beverages higher in energy, saturated fat, added sugars and/or sodium (National Health and Medical Research Council, 2013). This is consistent with the typical dietary quality of lunchboxes and packed lunches observed in the UK, Canada and the USA (Caruso & Cullen, 2015; Tugault-Lafleur *et al.*, 2017; Haney *et al.*, 2023). Further, the five food groups (National Health and Medical Research Council, 2013) are rarely consumed from lunchboxes during the school day, with vegetables, dairy and alternatives and meat and alternatives being consistently under-consumed in lunchbox systems internationally (Caruso and Cullen, 2015; Manson *et al.*, 2021; Haney *et al.*, 2023). As a key health promotion setting identified by the World

Health Organization (World Health Organization, 2020), it is important to explore the factors related to school-time dietary quality to best support positive health and development outcomes and contribute to supporting lifelong health promoting dietary habits.

The cost of food is one of many considerations faced in lunchbox food purchasing and preparation by parents (Bathgate and Begley, 2011; Casado and Rundle-Thiele, 2015; Maher *et al.*, 2020; Watson-Mackie *et al.*, 2023). Literature investigating the perspectives of Australian parents when preparing lunchboxes has found food costs to be a commonly reported barrier, along with considering child preferences, limited time available for preparation, need for convenience and food safety concerns (Bathgate and Begley, 2011; Casado and Rundle-Thiele, 2015). Parent perceptions of these barriers have been discussed in relation to socio-demographic factors and family characteristics, including time availability, knowledge and disposable income availability (Harman and Cappellini, 2015; Hansen *et al.*, 2023; Watson-Mackie *et al.*, 2023). Barriers including cost may have varying influence on families across socio-demographics. To improve the dietary quality of lunchbox contents, the impact of food costs and the relationship between food costs and key demographic factors, including parent time availability, knowledge and socio-economic position, must be understood. This understanding could inform population-tailored public health strategies to alleviate the barriers to school food provision and improve the dietary quality of Australian children.

While the costs of canteen items in Australian schools have been described in previous research (Woods *et al.*, 2014; Wyse *et al.*, 2017; Billich *et al.*, 2019), little is known about the food costs of Australian school lunchbox provision. International studies have explored school-provided meal and lunchbox costs (Harper *et al.*, 2008; Caruso and Cullen, 2015; Wollny *et al.*, 2015; Bruckmayer *et al.*, 2021; School Nutrition Association, 2022), however Australian-specific studies are essential to reflect the unique food culture, school environment and food supply of this country. Therefore, the aims of this study are to determine what parents/caregivers are currently paying for food and beverage items in the lunchboxes of Australian primary school children and to examine associations between lunchbox food costs, socio-demographic factors and dietary quality.

## METHODS

### Study design

This study is a secondary analysis of cross-sectional data collected as part of a 2017 study in Newcastle, New South Wales (NSW), Australia (Sutherland *et al.*,

2020). Data collection and initial data preparation were completed by research staff at the Hunter New England Local Health District. The study was conducted according to the guidelines laid down in the Declaration of Helsinki and approval was obtained from the Hunter New England Human Research Ethics Committee (reference number 06/07/26/4.04), the University of Newcastle (reference number H-2008-0343) and the Maitland Newcastle Catholic Schools Office. This study is reported according to the requirements of the Strengthening the Reporting of Observational Studies in Epidemiology Statement for cross-sectional studies (von Elm *et al.*, 2007).

## Data source

### Setting

Data were collected from February to March 2017, across 12 catholic primary schools located in the Hunter region of Newcastle, NSW (Sutherland *et al.*, 2020). The Hunter region includes major cities and regional areas. The region is characterized by a higher proportion of the population from low socio-economic backgrounds. These data were collected as the baseline assessment as part of a pilot study for the SWAP IT intervention to target food provided in the lunchboxes and physical activity of primary school children (Sutherland *et al.*, 2019).

### Participants

Schools were eligible for inclusion in the study if they were a primary school, with over 120 enrolments and used the communication app 'Skoolbag', which has a large population reach and allowed for the SWAP IT intervention to be administered (Sutherland *et al.*, 2019). Only Catholic schools were included as the population for the broader factorial trial, with ethics approval granted by the Maitland Newcastle Catholic Schools Office (Sutherland *et al.*, 2019). Schools were excluded if they were participating in any other nutrition-based research studies, were a secondary school, or catered exclusively to children with special needs. School principals were contacted by Health Promotion Officers, who are employed within a population health service to support schools with health policies and programs, working collaboratively with research staff (Wolfenden *et al.*, 2017), via letter and follow-up phone call, with interested schools providing informed consent in a face-to-face meeting. Eligible schools were invited until 12 schools accepted the invitation to participate, with a sample size based on power requirements for the primary study (Sutherland *et al.*, 2019).

Parents/caregivers with a child at a participating primary school (kindergarten, which is the first year of primary school, to grade six) were invited to

participate. Parents/caregivers were provided with a study information package and active parental consent was required. Children also provided assent to participate on the day of data collection.

### Data collection

Data collection was completed by researchers from the University of Newcastle and the Hunter New England Local Health District. Child characteristics, including gender and school grade, were collected using the consent forms completed by parents/caregivers. Additionally, parental postcode, employment status and highest education qualification level were collected using a computer-assisted telephone interview with the consenting parents/caregivers.

Lunchboxes were observed at the beginning of a school day by trained research assistants. Child and parent/caregiver participants were not informed which day data collection would take place, to mitigate the influence of social desirability bias. At the beginning of the school day, prior to any food consumption, children were asked to display their lunchboxes on their desks and open any opaque containers or unidentifiable item packaging. Children who were sourcing lunch from the canteen on the day of data collection were excluded from the analysis. Eligible lunchboxes were labelled with a unique identification number during data collection. Children identified unclear items for researchers, who noted the items and photographed the lunchbox contents. Photographs were analysed by two trained dietitians to identify lunchbox items and reach a consensus decision, with a third assessor resolving any conflicts.

To support the identification and characterization of lunchbox contents, dietitians used the validated School Food Checklist (Kremer *et al.*, 2006; Mitchell *et al.*, 2010). This checklist includes 20 food and beverage categories and provides the average kilojoules per category and mean cost of items in Australian dollars (Kremer *et al.*, 2006; Mitchell *et al.*, 2010). Modifications to the School Food Checklist were made to enable the classification of items as 'the five food groups' (i.e. vegetables and legumes/beans, fruit, grain (cereal) foods, meat and alternatives, dairy and alternatives) or 'unhealthy' (i.e. discretionary food and beverages) according to the Australian Guide to Healthy Eating (National Health and Medical Research Council, 2013). The mean cost of food reflected the food prices as of 2017 when data collection occurred, using an audit of food and beverage prices in local retail outlets (Sutherland *et al.*, 2020) and costs assigned to each food item in proportion to grams. FoodWorks Professional Edition V7 (Xyris Software, Highgate Hill, QLD, Australia) was used as a guide for serving size and kilojoule per



serving calculations (e.g. providing grams and kJ for one slice of bread) or via a database of nutrition profile of pre-packaged snack foods, developed by dietitians within the Hunter New England Population Health and University of Newcastle, based on an audit of Australian supermarket products.

## Secondary analysis

### Data preparation

Socio-Economic Indexes for Areas (SEIFA) quintiles were identified using postcode of residence data according to 2016 Australian Bureau of Statistics data (Australian Bureau of Statistics, 2018). Percentage of energy sourced from the five food groups and unhealthy food was calculated as the proportion of total lunchbox kilojoules. Data were also grouped by those with 0%, 0.1–50% or 50.1–100% of energy from unhealthy food. This allows comparison between lunchboxes only providing serves of the five food groups, therefore meeting healthy lunchbox recommendations (NSW Government Health Department, 2023), against typical lunchboxes that contain unhealthy food and beverages (Manson *et al.*, 2021), and those that primarily consist of unhealthy food and beverages, which is not in line with dietary recommendations (National Health and Medical Research Council, 2013). Data checking and visual histogram assessment demonstrated that such grouping was appropriate, with a high frequency of healthy-only (0% energy from unhealthy foods) lunchboxes enabling distinct analysis of this group. Furthermore, the distribution of lunchboxes containing energy from unhealthy foods meant that the groupings accurately reflected the typical lunchbox profiles (median 34% IQR 23, 42) and not recommended lunchbox profiles (median 63% IQR 56, 78) from literature (National Health and Medical Research Council, 2013; Manson *et al.*, 2021). Food costs (AUD) were adjusted for inflation between early 2017 when initial costs were determined, and 2023 when the present analysis occurred, using Australia's Consumer Price Index (CPI) for Food and Non-Alcoholic Beverage (Australian Bureau of Statistics, 2023b), with data sourced from the Australian Bureau of Statistics (Australian Bureau of Statistics, 2023a). This rise equated to an approximate 20% increase in CPI, from 106.0 in March 2017 to 127.6 in March 2023 (Australian Bureau of Statistics, 2023a). To reflect this, all lunchbox cost values were increased by 20.4%. Data were checked for normality, finding the data was normally distributed therefore mean and standard deviation are used in reporting.

### Covariates

Regression analyses explored variables that can be incorporated into public health promotion strategies,

to inform future programs. For example, demographics that could be considered in cost subsidies such as multiple children or socio-economic position, or known barriers to provision, such as time availability or knowledge to tailor interventions.

Socio-economic position was classified using the SEIFA Index of Relative Socio-Economic Disadvantage (2011). This index considers income, education and employment in specific living areas, therefore indicating the social and economic well-being in that region. Lower quintiles represent areas experiencing greater levels of disadvantage (Australian Bureau of Statistics, 2018). Parent/caregiver employment status was used as a proxy to reflect parent/caregiver time availability, as being time poor is commonly identified as being a major limitation to preparing lunchbox foods. This relates to the findings from Watson-Mackie *et al.*, who found mothers who were not in the formal workforce had more time to prepare food that they considered healthy and avoid pre-packaged foods, in contrast with mothers working full-time (Watson-Mackie *et al.*, 2023). Additionally, international literature on both mothers and fathers demonstrates households with higher level of employment are more impacted by time barriers, contributing to convenience-based food choice coping strategies (Devine *et al.*, 2009; Wills *et al.*, 2011). Parent/caregiver education level was used as a proxy for parent/caregiver knowledge, with the highest level of education status being associated with higher nutrition knowledge (Hendrie *et al.*, 2008). Percentage of energy sourced from unhealthy foods was used to reflect the dietary quality of the lunchbox.

### Potential confounders

Child characteristics including child gender and grade that have associated relationships with food intake in the literature but are not typically feasible to address in school interventions were treated as potential confounder variables.

### Data analysis

Analyses were undertaken in IBM SPSS Statistics (Version 28; SPSS Inc.). Descriptive statistics were used to provide descriptive information on the mean and standard deviation for lunchbox food costs and food costs across a series of prespecified socio-demographic subgroups. Missing data and extreme outliers were excluded from the analysis and data checks were run to identify any errors.

Multivariate linear regression analyses were used to examine the relationship between child and family socio-demographic factors and lunchbox dietary quality with lunchbox food cost. Multivariate regressions included participants with complete



socio-demographic and lunchbox data ( $n = 992$ ). The model included family socio-demographic factors of interest and dietary quality, controlling for child characteristics. This included the independent variables of SEIFA, parent/caregiver education, parent/caregiver employment, number of children within the family enrolled in primary school and dietary quality of lunchbox, controlled for child gender and grade, and outcome of lunchbox food costs. The predictor variables were assessed for collinearity with no associations found. Parent/caregiver employment status categories were dummy-coded into new variables (Tabachnick and Fidell, 2013), with engaged-in-home duties coded as the reference category, based on hypothesized trends. SEIFA and education levels, which were ordinal categories, were coded numerically and treated as continuous variables in the regression (Tabachnick and Fidell, 2013; Pallant, 2020). All other variables were considered continuous for the analysis.

## RESULTS

One thousand and twenty-six children aged between 4 and 12 years consented to participate and completed data collection. Socio-demographic and anthropometric characteristics of the sample are presented in Table 1. The mean age was 7.9 years (SD 2.0). Participants were primarily distributed across SEIFA quintiles 1–4, aligned with the profile of the region, with 49.4% of responding parents/caregivers being university educated.

### Descriptive analysis of lunchbox cost

Table 2 presents children's mean school lunchbox food cost, energy and dietary quality. The mean daily cost of a lunchbox was \$4.48 AUD (SD 1.53) per child, containing a mean of 2700kJ (SD 859). Of the total energy, a mean of 37.3% (SD 23.9) was sourced from unhealthy foods.

### Lunchbox cost across socio-demographic groups and dietary quality

Mean lunchbox food costs within socio-demographic groups are presented in Table 3. Children in Kindergarten and grade six had the highest lunchbox costs; however, there are no observable trends in the cost of lunchboxes with child grade. Male children had higher food costs for lunchboxes (\$5.54 [SD 1.55]) compared to female children (\$4.42 [SD 1.51]). Children with 100% of food sourced from the five food groups (healthy items only and aligned with recommendations) had lower cost lunchboxes (\$3.62 [SD 1.18]) in comparison to those with mostly food

**Table 1:** Characteristics of the sample of Australian primary school children and their families ( $n = 1026$ )

	N	%
Child characteristics		
Age (years) (mean, SD)	7.9	2.0
Year level (mean, SD)	2.8	2.0
Gender		
Male/boys	538	52.4
Family characteristics		
SEIFA		
Quintile 1 (highest level of disadvantage)	221	21.5
Quintile 2	345	33.6
Quintile 3	260	25.3
Quintile 4	189	18.4
Quintile 5 (lowest level of disadvantage)	11	1.1
Parent/caregiver employment <sup>a</sup>		
Unemployed, student, other	39	3.9
Engaged in home duties	110	11.1
Employed part-time	467	47.0
Employed full-time	378	38.0
Parent/caregiver education level <sup>b</sup>		
Did not complete high school	66	6.7
Completed high school	102	10.3
TAFE Certificate or Diploma	334	33.7
University degree or other related	490	49.4
No. of children in primary school		
One	524	51.1
Two	409	39.9
Three or more	93	9.1
Remoteness		
Regional/remote Australia	178	17.3
Major cities	848	82.7

<sup>a</sup>Reported by one parent/caregiver. Thirty-two not reported/missing.

<sup>b</sup>Reported by one parent/caregiver. Thirty-four not reported/missing.

SEIFA, Index of Relative Socio-economic Advantage and Disadvantage (Australian Bureau of Statistics, 2018).

from the five food groups, the typical lunchbox profile (<50% unhealthy foods) (\$4.37 [SD 1.24]), and mostly unhealthy food, not aligned with recommendations (>50% unhealthy foods) (\$5.15 [SD 1.96]). Children living in areas of most disadvantage had higher lunchbox costs (SEIFA quintile 1 mean = 4.64 [SD 1.88], quintile 2 = 4.68 [SD 1.49], quintile 3 = 4.49 [SD 1.37], quintile 4 = 3.99 [SD 1.27], quintile 5 = 3.65 [SD 0.70]). Parents/caregivers engaged in home duties

**Table 2:** Descriptive results of the cost and dietary quality of lunchboxes of Australian primary school children ( $n = 1026$ )

	Mean	SD
Cost AUD\$	4.48	1.53
Total energy kJ	2699	859
kJ from the five food groups	1607	611
kJ from unhealthy food	1092	864
Percentage of energy from unhealthy foods (%)	37.3	23.9

**Table 3:** Mean school lunchbox food costs of Australian primary school children by child and family socio-demographic groups and dietary quality ( $n = 1026$ )

	N	Mean cost \$AUD	SD
<b>Child characteristics</b>			
<b>Grade</b>			
Kindergarten	177	4.57	1.52
1	149	4.44	1.53
2	138	4.54	1.50
3	149	4.38	1.62
4	152	4.45	1.48
5	140	4.33	1.50
6	121	4.69	1.60
<b>Gender</b>			
Male/boys	538	5.54	1.55
Female/girls	488	4.42	1.51
<b>Percentage of energy sourced from unhealthy foods</b>			
Five food group items only	138	3.62	1.18
<50% energy sourced from unhealthy foods	616	4.37	1.24
>50% energy sourced from unhealthy foods	272	5.15	1.96
<b>Family characteristics</b>			
<b>SEIFA quintiles</b>			
1 (most disadvantaged)	221	4.64	1.88
2	345	4.68	1.49
3	260	4.49	1.37
4	189	3.99	1.27
5 (least disadvantaged)	11	3.65	0.70
<b>Parent/caregiver employment<sup>a</sup></b>			
Unemployed, student, other	39	4.31	1.21
Engaged in home duties	110	4.59	1.92
Employed part-time	467	4.44	1.43
Employed full-time	378	4.45	1.53

**Table 3.** Continued

	N	Mean cost \$AUD	SD
<b>Parent/caregiver education level<sup>b</sup></b>			
Did not complete high school	66	4.77	1.75
Completed high school	102	4.79	1.52
TAFE certificate or diploma	334	4.48	1.58
University degree or other related	490	4.32	1.43
<b>Number of children in primary school</b>			
1	524	4.53	1.51
2	409	4.43	1.55
3+	93	4.46	1.59

<sup>a</sup>Reported by one parent/caregiver. Thirty-two not reported/missing.

<sup>b</sup>Reported by one parent/caregiver. Thirty-four not reported/missing.

SEIFA, Index of Relative Socio-economic Advantage and Disadvantage (Australian Bureau of Statistics, 2018).

had higher mean food costs (\$4.59 [SD 1.92]) compared to other employment statuses. Mean cost differed across parent/caregiver education, with lower lunchbox cost for parents/caregivers with technical and further education (\$4.48 [SD 1.58]) or University (\$4.32 [SD 1.43]) level education compared with those who did/did not complete high school (\$4.77 [SD 1.75], \$4.79 [SD 1.52], respectively). Mean cost for families with one child in primary school was higher (\$4.53 [SD 1.51]) compared to those with two (\$4.43 [SD 1.55]) or three children in primary school (\$4.46 [SD 1.59]).

#### Associations between socio-demographic factors and dietary quality with lunchbox cost

Multivariate linear regressions showed significant associations ( $P < 0.05$ ) between proportion of energy from unhealthy foods ( $B = 0.016$  [SE 0.002],  $P < 0.001$ ), SEIFA Index ( $B = -0.178$  [SE 0.045],  $P < 0.001$ ), and cost of lunchbox contents, when adjusting for child gender and grade ( $F = 9,892 = 11.05$ ,  $P = 0.001$ ). There were no significant associations ( $P > 0.05$ ) between parent/caregiver education level ( $B = -0.105$  [SE 0.054],  $P = 0.052$ ), number of children within the family enrolled in primary school ( $B = -0.118$  [SE 0.072],  $P = 0.104$ ) and parent/caregiver employment status (Unemployed  $B = -0.145$  [SE 0.246],  $P = 0.556$ ; Employed part-time  $B = 0.017$  [SE 0.102],  $P = 0.870$ ; Employed full-time  $B = 0.026$  [SE 0.158],  $P = 0.867$ ) and cost of lunchbox contents (Table 4).



**Table 4:** Associations of individual and family socio-demographics of Australian primary school children with the food costs of school lunchboxes

Variable	<i>B</i>	<i>SE B</i>	Standardized $\beta$	<i>P</i>
Proportion of energy from unhealthy foods	0.016	0.002	0.247	<0.001
SEIFA quintiles <sup>a</sup>	-0.178	0.045	-0.123	<0.001
Parent/caregiver education level	-0.105	0.054	-0.061	0.052
Parent/caregiver employment status vs. engaged in home duties				
Unemployed, student, other	-0.145	0.246	-0.018	0.556
Employed part-time	0.017	0.102	0.005	0.870
Employed full-time	0.026	0.158	0.005	0.867
Number of children within the family enrolled in primary school	-0.118	0.072	-0.050	0.104

Model controlled for gender, school grade and the number of children within the family enrolled in primary school.

$F = (9,982) = 11.05, p = 0.001, R = 0.303, R^2 = 0.092$ .

<sup>a</sup>Socio-economic index For Areas—Index of Relative Socio-Economic Disadvantage—2016—SA1—Quintiles.

## DISCUSSION

This study explored what parents/caregivers are paying for school food in Australia and the associations between lunchbox food costs with dietary quality and socio-economic position, using a sample of Australian primary school children. Lunchbox food costs were approximately \$4.50 per child per day, with higher cost lunchboxes associated with poorer dietary quality of lunchboxes and higher level of disadvantage. The cost is comparable to alternative school food provision options, such as school-provided meals or canteens, in Australia and internationally (Caruso and Cullen, 2015; Delaney *et al.*, 2017; Smith, 2020; School Nutrition Association, 2022; New Zealand Ministry of Education, 2023). These results inform the key factors that are associated with higher lunchbox food costs to inform future public health strategies.

Lunchboxes containing higher proportions of unhealthy foods had higher food costs, indicating healthy food provision consisting of five food groups can be more affordable than the provision of unhealthy foods for the lunchbox. This finding contrasts with pricing in Australian school canteens, where healthy lunch items and snacks including salads, sandwiches and fruit, categorized as 'green' foods according to canteen guidelines are typically more expensive than the less healthy 'red' options, including pies, hot dogs and chips (Woods *et al.*, 2014; Wyse *et al.*, 2017; Billich *et al.*, 2019), likely in part due to the labour costs of preparing items (Jabs and Devine, 2006; Wyse *et al.*, 2017; Gaddis, 2019). The purchasing of lunchbox items from the supermarket is aligned with analyses of Australian habitual food budgets, with a recent analysis finding that food purchases according to Australian dietary guidelines are more affordable by \$124 to \$227 per fortnight than the current habitual diet, which contains >50% unhealthy foods,

for all socio-economic groups (Lewis *et al.*, 2021). Furthermore, a costing of healthy and sustainable food baskets (median \$188.21) compared with a typical Australian food basket (\$224.36) found the healthy and sustainable basket was significantly ( $P < 0.05$ ) less expensive and more affordable in all metropolitan areas and socio-economic quintiles (Goulding *et al.*, 2020). However, the authors noted it was important to consider the acceptability of the healthy and sustainable basket, which requires more preparation and cooking, demanding a higher skill level and time dedication (Goulding *et al.*, 2020). Qualitative interviews with Australian caregivers described the experience of packing lunchboxes, finding that parents/caregivers perceive healthy food as having higher costs and being inconvenient, therefore unhealthy and convenient foods are commonly provided in place (Bathgate and Begley, 2011). This perception may be due to the labour of healthy food provision (Jabs and Devine, 2006), including the burden of creating meals from affordable five food group ingredients; preparation, knowledge and time availability, while considering child preferences and palatability. This contrasts with commonly available ready-to-eat unhealthy lunchbox product items, which are convenient, food safe, require minimal labour and are acceptable to children (Jabs and Devine, 2006; Bathgate and Begley, 2011; Rathi *et al.*, 2018). Furthermore, many of these products feature child- or parent-directed marketing (Watson *et al.*, 2023). As a result, there is potential for the promotion of healthy lunchbox provision to reduce food costs, concurrently to increasing the availability and access to healthy, convenient and affordable food, to address the challenges faced by families.

Inequities exist in the food costs of lunchboxes, with the lower socio-economic position being associated with higher lunchbox costs, with a difference

of up to \$0.90 between the most and least disadvantaged quintiles, irrespective of unhealthy food content. These findings are consistent with limited previous evidence. Sanigorski and colleagues found lunches of children in the lowest socio-economic quartile in Victoria, Australia in 2003–04 were more expensive than those in the highest socio-economic quartile, with a \$0.26 significant difference between groups (Sanigorski *et al.*, 2005). Additionally, results of a US study found that students attending lower income schools had higher cost home lunches than middle-income schools (Caruso and Cullen, 2015). It is likely there is a multitude of complex factors, which contribute to this discrepancy. These findings could be due to a greater total quantity of food provided and an increased proportion of costly convenient foods in the lunchboxes. Food access and availability challenges may influence food provision, with less availability of healthy or affordable options in areas of a higher level of disadvantage. This was found in a Sydney, NSW food basket survey, finding greater variety and quality of fresh fruit and vegetables in suburbs of a high socio-economic position, compared to suburbs of a low socio-economic position (Crawford *et al.*, 2017). Further, while nutritional and financial literacy may play a role in the provision of higher cost items, it is important to consider the varying impact of food provision challenges across different socio-economic groups, which were unable to be controlled for in the present study. Specifically, a systematic review of 28 international studies found socio-economic position was associated with predictors of dietary intake including home-environment factors, parent modelling and child nutrition knowledge (Zarnowiecki *et al.*, 2014). Furthermore, barriers to food provision influence families differently based on their situation, for example, a qualitative study with Australian mothers found that mothers who lacked time for preparation were less concerned about financial constraints, thus spending more on food (Watson-Mackie *et al.*, 2023). While parent/caregiver employment status, used as a proxy for time availability, was not significantly associated with cost when other demographics were controlled in the present study, the example from Watson-Mackie *et al.* demonstrates that there are many complex influences that can contribute to trade-offs in prioritization of food costs. Therefore, the impact of higher cost lunchboxes for families of low socio-economic position should be considered, as a larger proportion of income being spent to provide school food, reducing lunchbox affordability. The complexities of this relationship demonstrate the need for tailored, socio-demographic conscious programs aiming to address the unique barriers faced by families, to support good dietary quality in school.

The food costs of \$4.48 per child per day lunchbox provision for parents/caregivers can be interpreted

in the context of other school food provision models. Purchasing food for recess and lunch from an Australian school canteen can provide a relatively comparable alternative, with unpublished baseline data from a canteen intervention in NSW primary schools finding canteen lunch orders cost a mean of \$4.69 (SD 1.80) (Delaney *et al.*, 2017). In Tasmania, Australia, a pilot trial in 2020 of a school-provided lunch program across three schools found that total costs for the lunches were an average of \$4.72 per child per day for a nutritious single-option menu, including \$1.91 for ingredients and \$2.81 for labour (Smith, 2020). In New Zealand, the 2023 Ka Ora, Ka Ako Healthy School Lunches Programme was costed at a maximum of NZD \$5.39 (\$4.99 AUD) per child in grades 0–3 and \$6.31 NZD (\$5.84 AUD) for a larger portion for children in grades 4–8 for lunch each day (New Zealand Ministry of Education, 2023). Major costs for this program were described as food, preparation, delivery and staffing. The costs to families of the US government-subsidized school food model were reported by the School Nutrition Association. The average cost of school meals to families was USD \$2.48, \$2.68 and \$2.74 daily (\$3.35, \$3.62, \$3.70 AUD) to elementary, middle and high school students, respectively (School Nutrition Association, 2022). Additionally, a 2011 US study compared the mean price of home-packed lunches and the National School Lunch Program (Caruso and Cullen, 2015), finding school meal costs to families were USD \$1.82 and \$2.05 (\$2.46, \$2.77 AUD) for elementary and intermediate school students respectively, while the food costs for home-packed lunches were \$1.93 and \$1.76 (\$2.61, \$2.38 AUD). School-provided meal systems alleviate labour demands on families and can address parent/caregiver-identified barriers to lunchbox provision (O'Rourke *et al.*, 2020), increasing access to food for all school children. While limited research has explored parent/caregiver willingness to pay for a school-provided meal or healthy canteen provision in Australia, pilot data indicate families may be willing to contribute between \$3 and 5 per child per day (Smith, 2020; Manson *et al.*, 2022). Therefore, the current costs of lunchboxes in the broader school food context demonstrate the potential feasibility of a cost-comparable, lower-burden alternative for Australian families.

### Strengths and limitations

This study provides comprehensive and contemporary insight into the food cost of Australian primary school children's lunchboxes. A strength was the inclusion of evidence-informed covariates in the regression to ensure results were an accurate depiction of independent relationships and the large sample of primary school



children. A key limitation was the single inflation rate applied to all products when adjusting costs to 2023, which may not consider greater inflation rates for certain food products, including differing cost changes for healthy products. Furthermore, as data were collected in 2017 it may not reflect recent changes as a result of rising costs of living in Australia and the discussed 20% inflation of food costs. These cost changes may have contributed to families adopting different purchasing patterns and led to varied lunchbox composition, which is not captured in the results. Additionally, the mean cost of food does not capture the influence of product discounts on purchasing trends or total lunchbox costs. While lunchbox contents were systematically assessed by trained dietitians, items were not weighed to determine exact quantities. Finally, despite the large sample, only including participants in one region of NSW attending catholic schools are captured, which may reflect families of an above-average household income due to increased Catholic school fees (Daniels, 2011), limiting the generalisability of the findings.

### Implications

Understanding the factors related to school food costs can inform policy and practice across the food system. Australian state and territory policies encourage the promotion of good dietary intake in the school community. To support this, future programs should aim to improve the access to healthy and affordable lunchbox foods, which have a low preparation burden for families, across all socio-economic groups. An avenue to achieve this may include increasing the availability and promotion of affordable, enjoyable, convenient and healthy foods in local supermarkets and school canteens. Internationally, school food systems should strive to consider how cost influences the choices of families to ensure there is equitable access to food in schools.

Future research should explore labour costs of school lunchbox preparation for families to understand the true cost and potential trade-offs made between labour and food costs. Further, research should explore the potential of improved lunchbox programs, school canteen offerings or a school-provided meal option in Australia to alleviate the labour burden for families, including time and convenience, at a low cost. Specifically, exploring parent/caregiver interest in a school meal system and the financial cost families are willing to contribute, including how contributions may differ across family socio-demographics or depending on what the system provides for families. Furthermore, food costs should be considered in the context of the household budget and experience of food insecurity, to determine school food affordability.

### CONCLUSION

The present study provides the most comprehensive and contemporary insight into the food costs of the lunchboxes of Australian primary school children for families. The food cost for lunchboxes of Australian primary school children is approximately \$4.50 AUD, with higher cost for lunchboxes containing a higher proportion of unhealthy foods and families living in greater areas of disadvantage. These findings reiterate that the cost of healthy food is not the key barrier to providing a nutritious school lunchbox. Therefore, there is a need for cost-considerate systematic interventions that capture the multitude of school food challenges faced by families and the associated socio-economic disparities.

### DATA AVAILABILITY

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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### AUTHOR CONTRIBUTIONS

All authors were involved project conceptualisation and research design. A.C.M. analysed the data and drafted the manuscript. R.K.G and B.J.J. provided academic supervision and support for the work. All authors interpreted the results, contributed to, read and approved the final manuscript.

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### ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The data for the cost analysis were shared with the present research team at Flinders University by the CI at the University of Newcastle. Provided data

were de-identified. The SWAP IT pilot study was conducted according to the guidelines laid down in the Declaration of Helsinki and approval to conduct this study was obtained from Hunter New England Human Research Ethics Committee (reference number 06/07/26/4.04), the University of Newcastle (reference number H-2008-0343) and the Maitland Newcastle Catholic Schools Office. Written informed consent was obtained from all subjects (Sutherland *et al.*, 2020). Dr Brittany Johnson was included in a modification of the ethics application to allow for the sharing of de-identified data.

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## 9.3 CHAPTER APPENDICES

**Table 9-1: Preferred Reporting Items for Systematic reviews and Meta-Analyses reporting guidelines (PRISMA) (Chapter 3)<sup>184</sup>**

Section and Topic	Item #	Checklist item	Thesis section
<b>TITLE</b>			
Title	1	Identify the report as a systematic review.	N/A
<b>ABSTRACT</b>			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	3.2
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	3.3
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	3.3
<b>METHODS</b>			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	3.4.4
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	3.4.3
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	3.4.3
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	3.4.5
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	3.4.6
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	3.4.1
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	3.4.7
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	3.4.8
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	3.4.7
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	3.4.7
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	3.4.7
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	3.4.7



Section and Topic	Item #	Checklist item	Thesis section
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	3.4.7
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	-
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	-
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	3.4.8
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	-
<b>RESULTS</b>			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	3.5.1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	3.4.5
Study characteristics	17	Cite each included study and present its characteristics.	3.5.2
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	3.5.2
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	3.5.2
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	3.5
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	-
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	-
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	-
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Acknowledged limitation
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	-
<b>DISCUSSION</b>			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	3.6
	23b	Discuss any limitations of the evidence included in the review.	3.6
	23c	Discuss any limitations of the review processes used.	3.6
	23d	Discuss implications of the results for practice, policy, and future research.	3.6
<b>OTHER INFORMATION</b>			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	-

Section and Topic	Item #	Checklist item	Thesis section
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	-
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	-
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Acknowledgements
Competing interests	26	Declare any competing interests of review authors.	-
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Appendix

**Table 9-2: AXIS Critical Appraisal of included studies (Chapter 3)**

		Alcaire et al., 2021	Aydin et al., 2021	Aydin et al., 2023	Bathgate & Begley, 2011	Burton et al., 2022	Cappellini et al., 2018	Casado & Rundle-Thiele, 2015	Dalma et al., 2016	Ensaifi et al., 2018	Gupta et al., 2023	Hansen et al., 2022	Harman & Cappellini, 2015	Hawthorne et al., 2018	Lindquist et al., 2021	Maher et al., 2020	McKelvie-Sebleau et al., 2023	Meier et al., 2020	Nanayakkara, Booth, et al., 2024	Nanayakkara, Marcerison, et al., 2020	Obeng-Gyasi et al., 2020	O'Donnell et al., 2022	Rathi et al., 2018	Rongen et al., 2023	Sobek et al., 2021	Teevale et al., 2012	Watson-Mackie et al., 2023	
Introduction	1	Were the aims/objectives of the study clear?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Methods	2	Was the study design appropriate for the stated aim(s)?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	UC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	3	Was the sample size justified?	N	N	N	Y	N	N	N	Y	Y	Y	N	N	N	Y	N	Y	N	N	N	N	N	Y	Y	N	Y	Y
	4	Was the target/reference population clearly defined? (Is it clear who the research was about?)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y
	5	Was the sample frame taken from an appropriate population base so that it closely represented the target/reference population under investigation?	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NC	Y	NC	NC	Y	Y	Y	Y	Y
	6	Was the selection process likely to select subjects/participants that were representative of the target/reference population under investigation?	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	NC	Y	NC	NC	Y	Y	Y	Y	Y
	7	Were measures undertaken to address and categorise non-responders?	N	N	N	N	N	Y	N	N	NA	Y	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	NA	N
	8	Were the risk factor and outcome variables measured appropriate to the aims of the study?	Y	Y	N	Y	Y	NA	Y	Y	Y	Y	Y	NA	Y	Y	NA	NA	Y	Y	Y	Y	NA	Y	NA	Y	Y	NA
	9	Were the risk factor and outcome variables measured correctly using instruments/measurements that had been trialled, piloted or published previously?	Y	Y	NC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NA	NA	Y	NC	Y	NC	NA	Y	NA	Y	Y	NA
	10	Is it clear what was used to determined statistical significance and/or precision estimates? (eg, p values, CIs)	NA	NA	Y	NA	Y	NA	Y	NA	NA	Y	Y	NA	Y	NA	NA	NA	Y	Y	Y	NA	NA	Y	NA	Y	Y	NA
	11	Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y
	Results																											
12		Were the basic data adequately described?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y
13		Does the response rate raise concerns about non-response bias?	N	Y	N	N	Y	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N	Y	NC	N	N	N	N	Y
14		If appropriate, was information about non-responders described?	N	N	Y	N	N	N	N	N	NA	Y	N	N	N	N	NA	N	N	N	N	N	N	N	N	N	NA	N
15		Were the results internally consistent?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NC	Y	Y	Y	Y	Y	Y	Y	NC	NC	Y	Y	Y	Y	Y
16	Were the results for the analyses described in the methods, presented?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NC	Y	Y	Y	Y	Y	

<i>Discussion</i>																										
17	Were the authors' discussions and conclusions justified by the results?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y
18	Were the limitations of the study discussed?	Y	Y	Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
<i>Other</i>																										
19	Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	NC	N	N	N	N	N	N	N
20	Was ethical approval or consent of participants attained?	Y	Y	Y	Y	Y	Y	NC	Y	Y	Y	Y	NC	Y	Y	NC	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Critical appraisal using AXIS tool for cross-sectional studies <sup>185</sup>  
Y – Yes; N – No; NA – Not applicable; NR – Not reported

**Table 9-3: Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist (Chapter 4)**<sup>216</sup>

No	Item	Guide questions/description	Thesis section
<b>Domain 1: Research team and reflexivity</b>			
Personal Characteristics			
1.	Interviewer/facilitator	Which author/s conducted the interview or focus group?	4.4.1
2.	Credentials	What were the researcher's credentials? <i>E.g. PhD, MD</i>	4.4.2
3.	Occupation	What was their occupation at the time of the study?	4.4.2
4.	Gender	Was the researcher male or female?	4.4.2
5.	Experience and training	What experience or training did the researcher have?	4.4.2
Relationship with participants			
6.	Relationship established	Was a relationship established prior to study commencement?	4.4.3
7.	Participant knowledge of the interviewer	What did the participants know about the researcher? <i>e.g. personal goals, reasons for doing the research</i>	4.4.4
8.	Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? <i>e.g. Bias, assumptions, reasons and interests in the research topic</i>	4.4.4
<b>Domain 2: study design</b>			
Theoretical framework			
9.	Methodological orientation and Theory	What methodological orientation was stated to underpin the study? <i>e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis</i>	4.4.1
Participant selection			
10.	Sampling	How were participants selected? <i>e.g. purposive, convenience, consecutive, snowball</i>	4.4.3
11.	Method of approach	How were participants approached? <i>e.g. face-to-face, telephone, mail, email</i>	4.4.3
12.	Sample size	How many participants were in the study?	4.4.3
13.	Non-participation	How many people refused to participate or dropped out? Reasons?	4.4.3
Setting			
14.	Setting of data collection	Where was the data collected? <i>e.g. home, clinic, workplace</i>	4.4.4
15.	Presence of non-participants	Was anyone else present besides the participants and researchers?	4.4.4
16.	Description of sample	What are the important characteristics of the sample? <i>e.g. demographic data, date</i>	4.5
Data collection			
17.	Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	4.4.4.1
18.	Repeat interviews	Were repeat interviews carried out? If yes, how many?	-
19.	Audio/visual recording	Did the research use audio or visual recording to collect the data?	4.4.4
20.	Field notes	Were field notes made during and/or after the interview or focus group?	4.4.4
21.	Duration	What was the duration of the interviews or focus group?	-
22.	Data saturation	Was data saturation discussed?	-
23.	Transcripts returned	Were transcripts returned to participants for comment and/or correction?	-
<b>Domain 3: analysis and findings</b>			
Data analysis			
24.	Number of data coders	How many data coders coded the data?	4.4.5
25.	Description of the coding tree	Did authors provide a description of the coding tree?	4.5
26.	Derivation of themes	Were themes identified in advance or derived from the data?	4.4.5
27.	Software	What software, if applicable, was used to manage the data?	4.4.5
28.	Participant checking	Did participants provide feedback on the findings?	N/A

# Reporting

29.	Quotations presented	Were participant quotations presented to illustrate the themes / findings? Was each quotation identified? e.g. <i>participant number</i>	Case study quotations 4.5
30.	Data and findings consistent	Was there consistency between the data presented and the findings?	4.5
31.	Clarity of major themes	Were major themes clearly presented in the findings?	4.5
32.	Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	4.5

**Figure 9-1: Feature identification tool (Chapter 4)**

**Country/state/town:**

**Primary/secondary:**

**Date:**

**Mealtime:**

☐ Verbal consent provided by school representative for drawing and time to be spend in the space note taking.

**General observations:** e.g. room setup, configuration, ambiance, facilities

**System inquiry template:**

Prompt feature	Observations
Cost of food	
Time, effort and convenience	
Child preferences/dietary requirements	
Nutrition of food	
Parent/caregiver involvement	
Policy and messaging	
Food Quality	
Eating time	
Food access/availability	
Child input - prep or dining	
Quantity	
Food safety	
Variety	
Eating environment	
Classroom education	
Additional	

Template developed from systematic review as part of Alexandra Manson's thesis.

**Sketch of area:**



**Table 9-4: Critique Checklist for a Case Study Report (Chapter 4)<sup>217</sup>**

<b>Checklist item</b>	<b>Rating*</b>
Is this report easy to read?	Very
Does it fit together, each sentence contributing to the whole?	Very
Does this report have a conceptual structure (i.e., themes or issues)?	Yes
Are its issues developed in a serious and scholarly way?	Yes
Is the case adequately defined?	Yes
Is there a sense of story to the presentation?	Strong
Is the reader provided some vicarious experience?	Yes
Have quotations been used effectively?	NA
Are headings, figures, artefacts, appendixes, indexes effectively used?	Very
Was it edited well, then again with a last-minute polish?	Shiny
Has the writer made sound assertions, neither over- or under-interpreting?	Yes
Has adequate attention been paid to various contexts?	Loads
Were sufficient raw data presented?	Strong
Were data sources well-chosen and in sufficient number?	Yes
Do observations and interpretations appear to have been triangulated?	Nicely
Is the role and point of view of the researcher nicely apparent?	Yes
Is the nature of the intended audience apparent?	Yes
Is empathy shown for all sides?	Yes
Are personal intentions examined?	NA
Does it appear individuals were put at risk?	No

\*Ratings as per checklist example

### 9.3.1 School food service framework: Planning a school lunch food service

**Note:** This framework was developed alongside this thesis, iteratively integrating findings from Chapter 4 and the broader literature, in addition to work with individual schools in Australia to support the design and adoption of a school-provided meal (not described in this thesis).

This guide aims to outline the key areas to consider when planning or reviewing a school-provided lunch food service. Work through this guide with your team to form an action plan.

The areas describe key areas of a school food service. The areas can be translated into different working teams with specialised knowledge or skills in that area. The area in dark blue 'context' provides key principles to inform decisions throughout this guide.

Under each area there are guiding questions, which are designed to be open ended allowing broad thinking. There is no order the areas need to be considered. These are supported by considerations, to further guide or prompt thinking. These ensure all the major areas of a school lunch food service have been considered and understood in adequate depth.

Responses can then be used to form an action plan, with a clear understanding of next steps for the school lunch food service.



Figure 1: Relationship between school lunch food service areas

Area	Guiding question Describe/consider	Notes
Context	<b>What is the location and school setting?</b> Consider the country and region the school is located within, as well as the type of school (e.g. public/independent/catholic)	
	<b>Who are the partners?</b> Consider any organisations or stakeholders which will be involved, think about each of the different areas to consider these partners	
	<b>What is the population of the school?</b> Consider student age, socio-demographics, number of students	
	<b>What is the purpose and/or guiding philosophy of the school food service?</b> Consider the goals of the food service and apply this as the underlying principles (e.g. equity – influencing pricing, universal access; student centred – providing choice etc.)	

	<b>What are the policies or guidelines which will impact on the program?</b> Consider the existing nutrition, food provision policies, ranging from the government policies to the individual school rules, which may need to be considered throughout the planning process	
Budgeting	<b>What is the business model?</b> Consider the business model and budget, and the influence of budget on the sustainability or reach of the program	
	<b>What is the funding model?</b> Consider where funds will be sourced from, including any partners. If there will be any revenue from the program which can cover ongoing program costs	
	<b>What will be the program costs?</b> Consider the startup costs to establish the program and any ongoing costs to maintain the program, aligning this with the budget	
	<b>What will be the cost of the meal/s?</b> Consider this in relation to your budget and expenses (including ingredients and workforce). Consider if the same costs, if any, will be applied for all students or if a pricing structure or co-contribution model will be applied, appropriate to the population and affordability	
Menu planning	<b>What will the menu be?</b> Consider the menu structure (e.g. what meals, length of menu cycle) and offering (a la carte menus, static menus, food availability-based menus, cycle menus, and fixed menus), what dishes, and who will be involved in the development process. Consider if student choice will be available	
	<b>What will be the recipes be?</b> Consider the team and resources to develop/source recipes and the guidance which may need to be applied (e.g. nutrition guidelines, student age, special diets)	
<b>Utilise: Trained chefs/cooks and food service dietitians to plan menu and recipes</b>		
Food service system	<b>What facilities (i.e., spaces) are required?</b> Consider what might be required to prepare, store and serve the dishes, factoring in existing and required facilities	
	<b>What model of food service will be used?</b> Based on the facilities, equipment and workforce, consider if meals need to be delivered in either a cook-fresh, cook-chill, and/or cook-freeze system	
	<b>What workforce is required?</b> Consider what personnel are required to deliver the food service, including existing and new personnel requirements, what training or experience will be required	
	<b>How will the food be sourced?</b> Consider where food will be sourced from and in what form it will be delivered	
	<b>What equipment (i.e., items and resources) is required?</b> Consider what equipment is required for storage, cooking, serving, eating and cleaning, including existing equipment and new equipment requirements	
Administration	<b>Who will receive the school meal/s?</b> Consider if the system will be universal, opt-in/out, or only target certain student populations	
	<b>How will payments be made?</b> If required, consider how payments will be made for the meal by participants (e.g. within school fees, billed, etc.)	
	<b>Will there be any communication or involvement for families?</b> Consider how the feedback loop will be connected between the school, students and parents, ensuring parent autonomy is maintained	
	<b>Are there any policies or rules which will need to be implemented to guide the program?</b> Consider if there are any policies or rules which will be needed to ensure the program principles and quality is maintained	
Eating Environment	<b>Where will meals be eaten?</b> Consider the space available that can be used as an eating area, including gyms, classrooms etc.	
	<b>What will be the layout?</b> Consider the seating options, seating choice, how this is organised or assigned and any setup for the room prior to the meal	

	<b>Will there be any meal/menu promotion or discussion?</b> Consider any posters or signage in the space, encouraged discussion, or use of rituals to signify the mealtime or environment	
	<b>What will be part of the surroundings or ambience?</b> Consider how the eating environment, including sound, art, lighting etc can support positive mealtime experiences	
Mealtime	<b>How will the food be served?</b> Consider how the food makes it from the kitchen or food preparation area to the plate, as well as how the plate gets to the participant. This may be separate or combined stages, depending on how the participant will be involved. Consider who will be responsible, where plating occurs and if choice is part of this stage. Consider how student choice can be integrated into the service of food (e.g. portion size, items served)	
	<b>What adult supervision is required?</b> Consider what supervision, support or monitoring is required during the mealtime and who will be responsible for this, and whether adults will also eat meal/s	
	<b>What will be the mealtime duration?</b> Consider how long will be dedicated for eating time, how this fits with lesson time and playtime	
	<b>Will there be multiple mealtime sittings?</b> Consider if all participants will eat at the same time or repeated one group after another, influencing what might need to be re-setup	
Post-meal	<b>How will the meal be cleaned up?</b> Consider responsibilities for students and staff, including scraping plates, washing up and tidying	
	<b>What is the waste management plan?</b> Consider ways to reduce environmental impact, including food waste, and leftovers	
	<b>Are there any evaluation strategies or reports required?</b> Consider use of measures to review or evaluate the food service, and if there are any reports needed for stakeholders or partners, including when/how often to evaluate	
	<b>Will the school meal be integrated with any learning?</b> Consider if the meal will be integrated with the classroom education, including learning about the foods, nutrition, growing a kitchen garden etc.	

Note: Alterations can be made to tense and framing to describe existing systems.

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### **9.3.2 International case studies of school food service (Chapter 4)**

A version of this appendix has been peer-reviewed and published in Health Promotion International as a supplementary file<sup>205</sup>.

#### **9.3.2.1 United Kingdom**

School meals have been available in select areas of England from the mid-19<sup>th</sup> century to address undernourishment and malnutrition. However, it wasn't until the 1940s that a National School Meals policy was introduced. Shortly after, free school meals were provided to all students across England as a result of the Education Act of 1944, aiming to guard against nutrient deficiency in socially deprived children<sup>330</sup>, particularly resulting from World War II. School meals in England have varied greatly over the years, with changes in responsibility of financing meals between government and parents, nutrition guidelines being revoked, and reduced entitlement of free school meals. As a result, by the 2000s the quality of school meals had declined, despite numerous interventions attempting to address this, including reintroduction and reiterations of nutrition standards. Local governments tendered catering to lowest bidders, with these catering companies leading to cost-reductions which reduced meal quality<sup>128</sup>. The poor quality of school meals and declining public health contributed to Jamie Oliver's 'Jamie's School Dinners' campaign<sup>330</sup>, shedding light on the concerns with the school meal system. This campaign coincided with the publication of nutrient-based school food guidelines and establishment of the School Food Trust<sup>128</sup>. This combination, along with the political context of the time, meant the campaign was successful in inciting action. Implementation of the standards which provided specific macro- and micro-nutrient targets and restrictions on unhealthy choices with support of the School Food Trust, were found to be generally successful in improving school meals<sup>330</sup>. Regardless, challenges have persisted, including limited free meal eligibility, cost cutting measures and increasing costs reducing meal quality, limited guideline monitoring and differing responsibilities across the industry. Presently, the food provided in school is guided by the School Food Standards, which have mixed compliance.

#### **Primary School, West London, England**

The dining room is a large, dedicated dining space, with large tables and bench seats. As you enter the dining room, a large painted mural of a garden on the right wall adds colour to the room. Hung on the wall are posters for Allergy Awareness Week, and a graphic poster of a tomato, encouraging students to "#EatThemToDefeatThem". In front of this wall a "Snack Station" is presented on a table, informing students "don't go hungry" and "help yourself". The snack station has a picnic aesthetic display, complete with checkered mat, includes five flowerpots, lined and filled with carrot and green capsicum/bell pepper sticks. The left side of the room has a large window, that looks out to a grassed area and provides natural light. The dining room is conjoined

with the large kitchen facility, where food is prepared. A window connects the room, from which food can be served. The four-week menu cycle is displayed next to the kitchen window, indicating the main meal options available to choose from each day, in addition to outlining the daily food offerings, such as bread, vegetable sticks and the salad bar. Below a map depicts the local sourcing supply chain used by the caterers, visually informing students of food sources, for example, that Beef is sourced from Sheffield, while apples are from Kent.

Next to the main door, sits a trolley filled with lunchboxes. At mealtime, those who are not participating in the school meal can collect their lunchbox and choose a seat at the tables. Students participating in the school meal line up along the right side of the room. A teaching assistant staff member uses an iPad to tick off student names. No payments are made by students, and it is unknown who receives free school meals. The line is parallel with the snack station, with a large bench to sit and wait the short duration. Students in the line pass by the menu displayed on the wall before arriving at the kitchen window. Food service staff stand in the kitchen and ask students their choice between the options of the day and requests can be made about the portion size, serving it onto their plastic plates. The food is prepared in the attached kitchen; prepared, cooked and served on the same day. The main meal options are offered first. On today's menus, fish fingers, Quorn nuggets and/or chunky hot chips (fries). Trays of baked beans, steamed green peas, and coleslaw are offered next. Dessert is served at the same time, in a separate dish. Today's options include fresh fruit, cut and served from a colourful platter, or a vanilla sponge cake with apple compote. Once one of the dessert options is chosen and served by staff, students move along to a salad bar. The salad bar has individual bowls of vegetables and a student volunteer offer their preference of shaved carrot, green capsicum, tomato, cucumber, beetroot and/or lettuce to students. On the tables plastic cups are stacked, and large containers full of metal cutlery are prepared. Jugs full of water are available on the side of the room, the only drink option available. Students then join their peers with lunchboxes at the tables, choosing where to sit. Meals are consumed, with teaching assistants monitoring the mealtime. Second serves are not offered to or received by students.

Once meals are completed, plates, cups and cutlery are cleared to a bin station. Food waste is scraped into the bin by students, and then cutlery, plates and cups are placed in their designated tray. This entire process repeats over the hour of breaktime, with students finishing and leaving their meal as others arrive and begin in a staggered fashion.

### **9.3.2.2 Sweden**

School meals were first introduced in Sweden in the 19<sup>th</sup> century, growing in the 1940s to become almost commonplace in all schools by the 1960s. The driving forces for popularisation of school meals included malnutrition and need for social equality through universal meal provision.

Therefore, funding was received through state grants, as part of the social democratic welfare state regime<sup>223</sup>, in which welfare is universal and publicly provided, typically associated as a Nordic welfare model. The education act of 1997 entitled children to free school meals, with a 2011 update to the Act stating the meals must be nutritious<sup>41, 331</sup>. Further actions in the 2010s onwards have aimed to increase school meal quality and sustainability<sup>331</sup>. The Swedish Food Agency published the national guidelines for school meals in 2015, with revisions in 2019 and 2023<sup>332</sup>. These guidelines are based on the Nordic Nutrition Recommendations, which provide benchmark nutrient intake values grounded in current scientific knowledge<sup>333</sup>. The 2019 guidelines introduced "the meal model," which focuses on six areas: tasty, safe, nutritious, eco-smart, pleasant, and educational. The recommendations cover various aspects such as ingredients, serving times, meal environments, and student involvement. Additionally, the guidelines support integrating school lunches into education, referred to as pedagogic meals, where teachers eating with students model positive behaviours<sup>223, 332</sup>. The guidelines also promote sustainability by encouraging conscious choices and reducing food waste to lessen environmental impact. Studies indicate that up to 20% of school meals are wasted, resulting in significant environmental impacts but also losses of valuable nutrients such as protein, or dietary fibre, which is often lacking in school children's diets<sup>334, 335, 336</sup>. School meal provision is under the responsibility of the local municipality, including funding, resource allocation and daily operations<sup>331</sup>; however, meal production can be managed by municipalities or contracted out. Sweden remains one of the few countries which provides universal free hot school meals to all primary school students, and most secondary school students, five days a week<sup>337</sup>.

### **Primary School, Uppsala, Sweden**

Several entrances lead into a large dining room featuring shared wooden tables and individual wooden chairs. The entire left wall is stretched with windows, which provide natural light and look out onto the asphalt school playing area. On the far wall from the entry, steps lead up to a small stage. Posters displayed on one wall shows images of the foods which are best grown in each month. Tables are separated by room dividers, decorated with fake leafy green plants. On the opposite side is the food service area and conjoined kitchen facility. The food service space begins with a chalkboard A-frame sign, describing the menu of the day in Swedish. Next to this, the top shelf of a glass cabinet displays small glasses full of spices, each labelled. On the second cabinet shelf, a plate displays an example of the daily menu, plated with white fish and creamy sauce, peas, shaved carrot, potatoes and a slice of lemon. A small whiteboard states the allergens present in the meals. The food is prepared in the attached kitchen, with majority of food being prepared, cooked and served primarily on the same day, or leftovers from the previous day served as an additional option.

Students enter through the main entrance and pass by a hand-hygiene station, to approach the buffet area, with in built bain-maries. The options are indicated with small signs, which include an illustration of the animal or plant the food is sourced from, with the white fish with creamy sauce indicated with a sign stating “Fisk” and a graphic of a fish. Other bain-marie trays contain rice, beans, pulled pork, and potatoes. A kitchen staff member stands by the food if assistance is required, or food refills are needed. Students collect a ceramic plate from the beginning of the buffet area, then proceed along the line, self-serving the food they are interested in. Following the hot food, a salad bar is available, with ambient and cold food options. This includes croutons, pasta salad, peas, summer salad, shaved carrot, pickled vegetables, and sauces/dressings. Metal cutlery and glass cups are available for students to collect at the end. A water tap, bottle of lactose free milk and oat milk are all available at the end of the stations, to collect a beverage. No payments are required or made, with a universal school-provided meal program.

Students then move to the tables, choosing where to sit. They can return to the food stations as much as desired for additional serves. There is no set time for the meal to end but students sit for around 20 minutes. Once they are finished eating, food and other waste is scraped into a bin station, with separate bins signed for food waste or other, such as serviettes. The bin is automatically weighed, indicating the amount of food waste which has been collected that day. Students stack their cutlery and crockery into a dishwasher tray which sits in the window between the kitchen and dining room, where a staff member is washing the dishes as they are collected. This process repeats, with students leaving once they are finished and different year levels beginning their mealtime in a staggered fashion throughout breaktime.

#### **9.3.2.3 France**

School canteens, or ‘cantines’ were first introduced in France in the late 19<sup>th</sup> century to provide meals for undernourished children<sup>338</sup>. Following World War II, school meals were expanded to most French schools, to ensure every child had access to one balanced, hot meal per day as a response to undernutrition and food access challenges<sup>338</sup>. Concurrently, canteens were introduced in workplaces. Meals were typically received by lower income families, while high income families picked up their children from school and brought them home for lunch. However, this model has since changed, likely due to changes of the roles of women in the workforce<sup>338</sup>. Food quality guidelines were first introduced in the 1970s to guide food provided in French schools<sup>338</sup>. Since, there have been numerous updates to nutritional policies<sup>4</sup>, with French school meal standards becoming compulsory in 2011 under a legislative framework<sup>339</sup>. Recent regulatory frameworks completed the long list of directives to address social and environmental aspects of meal sustainability<sup>340</sup>. These standards guide numerous components of the meal and frequency of certain dishes, in addition to environmental and social sustainability. The current primary aim of



school meals is to meet the physiological and nutritional needs of children and they sit under the responsibility of the municipality.

### **Primary School, Dijon, France**

The 'canteen' includes numerous small dining rooms dedicated for school meals, each suitable to fit one class full of students at a time. Large windows and glass doors overlook play areas on one end of each room and let in natural light. The other end of the room has a door leading to the corridor and nearby satellite kitchen. Art is displayed on the walls, showing a garden scene. The room has small wooden tables, which fit four individual seats.

Students enter the room and find their seat of choice. Ceramic plates, glass cups and metal cutlery are brought to table and given to the students by food service staff. Jugs of water are placed on the table for students to self-serve. Other adults, whose role is not clear, support with the meal, sitting with the students, monitoring behaviour and assisting with food service where required. No payments are seen being made by students and it is unknown who receives subsidised school meals. Only students who are participating in the meal come into the dining room, while the families not participating typically bring their child home for lunch.

Food service staff in hairnets bring in trolleys with the first course of the meal. The food has been delivered from an offsite centralised kitchen and heated in the school satellite kitchen. Students each receive an individual serve of pizza napolitaine, eaten from the containers they were reheated in. These containers are cleared by food service staff before the next course, the main meal, is brought in. Main meal options include bouchées de poulet rôties (chicken) and au œufs pochés sauce milanaise (egg in cream sauce), which is vegetarian. This is served alongside légumes méditerranéens (cooked vegetables) and baguette is also offered. Students are asked to indicate their preference for the vegetarian option by quietly placing their cutlery on top of their cup. Food service staff place the trays of chicken and vegetables onto the tables, allowing students to self-serve, while the vegetarian dish is individually served to those who requested. Students raise their hand if they want a slice of baguette alongside their main meal. Additional serves of baguette and vegetables are readily available upon request. Once students are finished eating, they stack their own dirty dishes in a pile on the table, helping the staff to clear these onto the trolley to be cleaned in the kitchen and reset the table with small side plates. Students are each given a small container of fromage ail et fines herbes (cheese with herbs) and place their hand up if they would like this accompanied by bread. Following cheese, the fourth course begins, with a tray of fresh cherries brought around to the tables by staff and served onto the students plates as per their portion size requests. Again, additional serves are available upon request during the cheese and fruit courses. Students again assist to stack plates before lining up and leaving the dining room. There is an opportunity for students to provide feedback on the main meal which was served, using a smile scale button outside the door.

There is minimal wait time between courses, with quick staff clean up as required. The mealtime is approximately 40 minutes, with no students leaving until the meal is complete. Two meal services occur in the dining room across the break, with alternating playtime for students either before or after their meal.

#### **9.3.2.4 Australia**

Australia has historically relied on home-packed food service models in schools. This model relies on food being prepared for the student within the home, typically by the caregiver or child, and brought to school. School lunches have traditionally been framed as a maternal obligation<sup>341</sup>. Historically, Australian students were able to go home for mealtimes, seemingly acting as a contributing factor as to why meals were not provided in schools. As this changed and students remained on the school grounds for the whole day, food provisioning for the lunch meal remained the responsibility of the household, and students brought their lunchbox with them for consumption at school. Between the 50s and 70s, a national school milk scheme provided free cow's milk to school students, part of a health scheme to provide children with adequate nutrition and address low calcium intake<sup>341</sup>. Presently, majority of school food is home-packed, with no state or national guidance on the food to be provided in lunchboxes. Within individual schools, many implement nutrition policies, mainly surrounding allergens.

In the 60s school canteens, colloquially known as tuckshops, were introduced, allowing for lunch orders to be placed and takeaway a la carte food purchased within the school from a small shop. Canteens are still utilised in most Australian schools, with the food now commonly provided from an external catering company<sup>341</sup>. Food provided in these canteens are guided by national and state based guidelines<sup>41</sup>; however, compliance with these is limited<sup>42, 59, 264</sup>. In response to students coming to school without food, some schools or teachers provide food to students in need, and food relief programs have also been introduced. Food relief programs are often charity-run and aim to ensure students have something to eat during the school day. However, these programs do not have reach to all children, are often run on an ad-hoc basis which can further exacerbate stigma. Further, such programs do not pose a sustainable solution for food insecurity, often limited by resources and funding. Recent interest has emerged in adoption of a school-provided meal model in Australia, with numerous schools piloting such a model.

#### **Primary School, South Australia, Australia**

The meal occurs in a large dining room, previously a boarding house dining room and kitchen, as evidenced by wooden plaques naming prior boarding house prefects. The room contains large tables and individual chairs sitting small groups, allowing for groups of children to sit together. Large windows on one side look out towards a main road followed by parklands in the distance.

The other wall of windows looks out into the school café and play area. The dining room is conjoined with the kitchen, with a serving window connecting the rooms. Paper plates, bamboo cutlery and serviettes are counted out and placed on the tables by staff members. There is a TV screen which has been wheeled into the room, which faces the tables and displays the menu for the day on a colourful background.

Students enter the dining room and find a seat, guided by teachers into groups or empty spots, some bringing their drink bottles of water along with them. No payments are seen being made by students for meals. Only students who are participating in the meal enter the dining room, while those enjoying a lunchbox from home eat as per their normal routine, outside or in classrooms. The food has been delivered from an offsite centralised kitchen and is plated and served in the onsite kitchen, cold or at room temperature. The meal is Mexican themed on this day, with white tortillas, a bean and vegetable dish, guacamole, chicken, lettuce, and salsa. The chefs plate the dishes on large share plates, with enough for one plate per table, and place them ready for collection at the kitchen window.

There are laminated numbers placed on each table, corresponding to each of the dishes to be served. When the numbers are displayed on the TV screen, the student sitting at a space with the corresponding number approaches the kitchen window to collect the large share plate and returns this to the table. This process is monitored and supported by teaching staff. This continues with all the different components of the dish, with one student collecting chicken after being allocated '1' with the student allocated '2' collects the salsa. Once all students are returned to their seats, they are given the approval by teaching staff to begin, self-serving using tongs, spoons and salad servers, and sharing the food amongst themselves. Special meals are provided for students with specific dietary requirements on separate plates, being a modified version of the menu of the day. Staff monitor the meal for behaviour and ensure food is being appropriately shared, providing assistance where required. More food from the kitchen is offered to tables who have finished the food from their share plate. Once the main meal has been completed, new numbers appear on the TV screen corresponding to the remaining laminated numbers on the table. As these numbers appear, the students sitting at a space with the corresponding laminated number go up and retrieve the dessert component of the meal, which is fruit today, and bring it back to their table. Following fruit, teachers provide prompts and students bring their own dirty paper plates to the bin near the exit. Students then leave the room, finishing their mealtime.

The first food service consists of younger students, who spend 20 minutes in the dining room. After the students leave, staff quickly collect the share plates, returning them to the kitchen space, and pick up any large pieces of food from the floor, before placing out more paper plates, bamboo cutlery and serviettes. The second group of students, who are older, enter the room and the mealtime process repeats.

## **Primary School, Tasmania, Australia 1**

The dining room utilises the school hall, which features a large stage at one end, along with the Australian and Aboriginal flags. The walls of the room are painted yellow, with blue doors. The area is filled with natural light and all external windows look into colourful murals on walls outside or garden areas. Large trestle tables are arranged across the room, each with a floor mat underneath, on top of the carpeted floor. Each table is covered in a black tablecloth and surrounded by eight blue plastic chairs. The tables are set, with a folded serviette in each spot and a metal fork on top. A bunch of pink and white flowers in a glass jar sits in the middle of each table. Across one wall, large glass doors open into a hallway space, which connects to the canteen kitchen window. The school meal is prepared within this canteen kitchen, being cooked and served primarily on the same day. Next to the canteen window, a large pin-up board includes text reading "School Lunch Project" surrounded by images of students eating meals and staff preparing the food. The menu is displayed for the food served in that week. Text and images show meals previously served, exclaiming 'MEXICAN BOWL!!' and 'BUTTER CHICKEN!!' next to photos of meals, and students with butter chicken sauce on their faces.

Students enter the dining room and find a seat, guided by teachers into groups or empty spots, some bringing their drink bottles of water along with them. No payments are seen being made by students for meals. Students who are not eating the meal bring their lunchbox and sit at one table together at the side of the room. One kitchen staff member and a senior teaching staff member stand in the kitchen and serve the meal into bowls. The lunch dish is pasta bolognese, which is served alongside a salad, consisting of iceberg lettuce, tomato and cucumber, in small ceramic bowls. There are no alternative meals provided or special diet meals provided. Individual bowls are filled with pasta and salad and are placed at the kitchen window. From here the bowls are collected by volunteer older students or classroom teachers, who deliver this to each waiting student. Other student volunteers carry around a bowl of cheese which they spoon onto the meals of the students who request it, and slices of bread which are handed out on request. Students eat their meal and are asked if they are interested in additional serves, from a roaming volunteer/staff member, or can bring their bowl to the kitchen window for a refill. Once they are finished eating, they bring their bowl and fork to a clean-up area, where they scrape the waste from their meal into a bucket, stack their bowl on a table and place their fork into a tub. A box of apples is available beside the kitchen window for students to grab as they walk past and return to their seats to eat. After about 15 minutes most students are finished eating and head outside to enjoy their playtime. Staff clean any remaining bowls, cutlery or food waste from the room. Older students then arrive for their lunch. These students line up at the kitchen window and inform the kitchen staff of their preferences. These portions are larger and served onto a ceramic plate. Students receive their plate from the serving staff and collect their own cheese, bread and then cutlery and bring it to the

tables to enjoy. The same dining process repeats, with extra serves available for collection at the kitchen window, served by staff. After finishing students again scrape their plates, followed by time for apples. After about 15 minutes students are again finished their meals, with staff beginning to clean up the area, including collecting dirty dishes and returning them to the kitchen.

## **High School, Tasmania, Australia 2**

The dining space utilises the repurposed old schoolhouse, a carpeted room in a small red brick building. Along the wall are windows providing light and looking into a grass area outside. A large pinboard on the back wall features the colourful writing “THE OLD SCHOOL HOUSE DINER”. Below, a series of posters describe different menu items and provide guidance to support successful mealtimes, such as “lunchtime routine” describing the rituals and time that should be implemented to help students at mealtime. Above the entry, a framed drawn artwork of the old schoolhouse diner is hung, reading that the ‘diner’ is open Monday and Wednesday. There are two long tables, each, which are covered in beige tablecloths. Metal forks are set out on the table in front of each individual grey plastic seat, next to filled napkin holders and small plants along the tables. To the side of the tables, a door leads into a kitchen area. The kitchen is set up for classes, with numerous bench spaces, each complete with an oven, sink and set of equipment.

At lunchtime, students enter the dining room and find a seat, guided by a hospitality student wearing an apron, acting as a waitress. Some students bring their drink bottles of water along with them. No payments are seen being made by students for meals. Students from the primary school and high school come for lunch together. Students in the high school hospitality class prepare the food for this school meal during the pre-lunch lessons. Today’s meal is large trays of lentil lasagne, accompanied by a salad, of iceberg lettuce, tomato, cucumber, capsicum and carrot, and halved bread rolls. There are no alternative meals or special diet meals provided. In the kitchen, the hospitality students are supported by their teacher to serve up all the plates. Different sized scoops are used to indicate portion sizes for the younger and older age groups of students. Salad and lasagne is plated onto ceramic plates and brought out by hospitality students into the attached dining space, where they are delivered to the students at their seats. The bowl of bread rolls is in the side of the kitchen, unserved. Students eat their meal and are asked if they are interested in additional serves by the student acting as waitress, with their bowl taken and refilled in the kitchen before being returned.

Once students are finished eating after about 15-20 minutes, they bring their plates and fork to a clean-up area, where they scrape the waste from their meal into a bin, stack their bowl and fork in piles on the sink. The hospitality students have an opportunity to eat the meal, sitting in the kitchen. After they are done, they pack up the leftover food and leave for their next class. A new class of hospitality students enters for the after-lunch lessons and begins their class with the remainder of the pack up and cleaning of the dishes.

### **Primary School, Tasmania, Australia 3**

Outside the kitchen door a sign asks “what’s on the menu?”, showing the menu for the school meal across each day of the week, having a five day school lunch offering. In another hallway, a sign shows how one classroom brainstormed the benefits of hot lunch in their school, with benefits including attendance, cost, nutrition, social and exposure to new foods. This is surrounded by images of students eating the lunch. At breaktime, students from one classroom file out into the courtyard space, bringing their water bottles and collecting a plastic stool from a stack by the door as they enter. Chairs are placed around bench tables, situated under umbrellas. The courtyard has walls covered in colourful murals and garden boxes around the edge. Students from another classroom remain in their room, collecting their handmade placemat from the teacher and placing this on their group desks. A black trolley is brought into each dining space, labelled with the classroom name. The trolley contains a slow cooker filled with butter chicken curry, rice cooker of white rice, stacks of ceramic bowls and cups of metal forks. The curry served has been delivered frozen to the school, after being prepared in a centralised kitchen. The food is defrosted then reheated in the slow cooker, while rice is cooked fresh on the day all in the school kitchen.

The trolleys are delivered to the different areas by kitchen and classroom staff members, where they will be served and eaten by students. In the courtyard and classrooms, students line up at the trolley to receive their meal. No payments are made by students for meals. Portions are served by the staff, with students able to request the quantities they are interested in. There is a small amount of butter tofu curry available for vegetarian students, served specifically for those who need it. Students collect their portion and a fork, bringing this to their seat to eat. Students can approach the trolley for additional serves from the staff. Once students are finished, they scrape their food waste into empty ice cream tubs which sit on a bench to the side of the room, then rinsing their bowls in a sink of water before stacking them back on the trolley. The trolleys are returned by staff or student volunteers to the kitchen. In the kitchen the staff member uses the industrial dishwasher to clean the dishes. The mealtime spans across approximately 20 minutes, with the courtyard space being used for playtime after the meal is finished.

**Table 9-5: STROBE Reporting checklist (Chapter 5)**STROBE Statement—Checklist of items that should be included in reports of **cross-sectional studies**

	Item No	Recommendation	Item reported
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	Chapter 5
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	Chapter 5
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	5.3
Objectives	3	State specific objectives, including any prespecified hypotheses	5.3
Methods			
Study design	4	Present key elements of study design early in the paper	5.4.1
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5.4.1 5.4.4
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5.4.2
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5.4.4
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5.4.4
Bias	9	Describe any efforts to address potential sources of bias	5.4.6
Study size	10	Explain how the study size was arrived at	5.4.6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5.4.6
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	5.4.6
		(b) Describe any methods used to examine subgroups and interactions	5.4.6
		(c) Explain how missing data were addressed	5.4.6
		(d) If applicable, describe analytical methods taking account of sampling strategy	5.4.6
		(e) Describe any sensitivity analyses	5.4.6
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5.5.1
		(b) Give reasons for non-participation at each stage	5.5.1
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	5.5.1
		(b) Indicate number of participants with missing data for each variable of interest	5.5
Outcome data	15*	Report numbers of outcome events or summary measures	5.5
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	-
		(b) Report category boundaries when continuous variables were categorized	-

		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	-
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	5.5
<b>Discussion</b>			
Key results	18	Summarise key results with reference to study objectives	5.6
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	5.6
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	5.6
Generalisability	21	Discuss the generalisability (external validity) of the study results	5.6
<b>Other information</b>			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Acknowledgements

Strengthening the Reporting of Observational Studies in Epidemiology Statement for cross-sectional studies<sup>238</sup>



### 9.3.3 Nominal Group Technique workshops recruitment survey (Chapter 5)

Researchers in the Caring Futures Institute at **Flinders University** are pleased to invite you to take part in the online workshop:

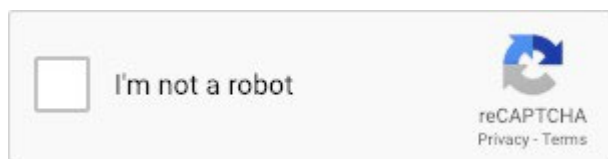


The workshops will ask you to discuss the features which would be most acceptable to you as a parents/caregiver in a hypothetical Australian school-provided meal system. Workshops will be held **virtually** in **September/October 2023** and will engage with **Australian parents and caregivers of primary school aged children** to consider a potential transformation of school food provision.

You will be asked to attend **one online group workshop with other parents/caregivers, 1.5-hours in duration** and arranged at a mutually convenient time. The sharing of your experiences will help to understand what would make a potential school-provided meal system acceptable to you.

The purpose of this survey is to provide you with more information about what the workshops involve, confirm that you are an eligible participant, determine your availability and help us learn more about you. You will need about 5 minutes to complete this form. In recognition of your internet expenses for workshop participation, you will be provided with a **\$10 voucher**. This voucher will be provided to you on completion of the workshop. If you prefer not to participate please exit the survey.

If you have any questions please contact Alexandra Manson Tel:  
08 8201 2048  
Email: [alexandra.manson@flinders.edu.au](mailto:alexandra.manson@flinders.edu.au)



Please read the [information sheet](#) before deciding to participate in this research. The project has been approved by Flinders University's Human Research Ethics Committee 5812. Once you have read this information, please respond to the series of statements to confirm that you wish to be involved and provide consent.

If you consent to being involved in these workshops, please indicate by responding to the questions below.

- I have read and understood the information about the research, and I understand I am being asked to provide informed consent to participate in this research study. I understand that I can contact the research team if I have further questions about this research study.
- I am not aware of any condition that would prevent my participation, and I agree to participate in this project. I understand that I am free to withdraw at any time during the study.
- I understand that I can contact Flinders University's Research Ethics & Compliance Office if I have any complaints or reservations about the ethical conduct of this study.
- I understand that my involvement is confidential, and that the information collected may be published. I understand that I will not be identified in any research products.
- I understand that I will be unable to withdraw my data and information from this project. I also understand that this data will be used for this research study.

I further consent to:

- completing a questionnaire
- participating in a Focus Group discussion
- having my information audio recorded
- my data and information being used in this project and other related projects for an extended period of time (no more than 5 years after publication of the data)
- being contacted about other research projects

Do you consent to take part in this study?

- ☐ I consent to take part in this study
- ☐ I do not consent to take part in this study

The following questions help us to understand more about you

Please enter your full name:

Are you a parent/caregiver of a child who is enrolled in primary school (i.e., Kinder/reception - grade 6) in Australia?

- ☐ Yes
- ☐ No

Preferred phone number:

Preferred email contact:

How old are you?

What gender do you identify as?

- ☐ Man
- ☐ Woman
- ☐ Non-binary / third gender
- ☐ Prefer not to answer

What is your cultural identity and country of birth?

What is your postcode?

What is your highest level of education?

- ☐ Did not complete high school
- ☐ Completed high school
- ☐ Some tertiary education
- ☐ Completed tertiary education (degree, diploma, certification)
- ☐ Higher degree (Masters, PhD)
- ☐ Prefer not to answer

What is your employment status?

- ☐ Employed full-time
- ☐ Employed part-time
- ☐ Employed casually
- ☐ Not currently employed outside of the home
- ☐ Student
- ☐ Other
- ☐ Prefer not to answer

What is your total household income per week (or annually)

- ☐ \$0-\$149 (\$0-\$7,799)
- ☐ \$150-\$299 (\$7,800-\$15,599)
- ☐ \$300-\$399 (\$15,600-\$20,799)
- ☐ \$400-\$499 (\$20,800-\$25,999)
- ☐ \$500-\$649 (\$26,000-\$33,799)
- ☐ \$650-\$799 (\$33,800-\$41,599)
- ☐ \$800-\$999 (\$41,600-\$51,999)
- ☐ \$1,000-\$1,249 (\$52,000-\$64,999)
- ☐ \$1,250-\$1,499 (\$65,000-\$77,999)
- ☐ \$1,500-\$1,749 (\$78,000-\$90,999)
- ☐ \$1,750-\$1,999 (\$91,000-\$103,999)
- ☐ \$2,000-\$2,499 (\$104,000-\$155,999)
- ☐ \$3,000+ (\$156,000+)
- ☐ Prefer not to answer

What is your relationship status?

- ☐ Single
- ☐ Married / de facto / partnered
- ☐ Divorced
- ☐ Widowed
- ☐ Other
- ☐ Prefer not to answer

Workshops will be hosted online via Microsoft Teams for 1.5 hours and you will only be asked to attend one workshop. Let us know what your usual availability and time zone.

You will be sent a message or email to arrange a workshop.

Please provide your usual availability

e.g. After 5pm ACDT on a weekday

Are you interested in receiving information via email about future research you may be eligible to take part in? *(note this information will be stored securely and only be accessible to the research team)*

- ☐ Yes
- ☐ No

Thank you for registering your interest in this project. We will contact you via your preferred email/phone number to confirm your participation, workshop details and the Microsoft Teams link.

If you have any questions please don't hesitate to contact Alex at [alexandra.manson@flinders.edu.au](mailto:alexandra.manson@flinders.edu.au)

**Table 9-6: Sampling considerations for the Australian parent population**

Socio-demographic of interest	Relevant national data and comments.	Potential survey question																												
Cultural diversity	<p>Inclusion of participants across different cultures ensures different food experiences are better explored, considering different cultural relationships with food and mealtimes, dietary requirements and ensuring that food provided to children is reflective of their culture, while allowing others to experience cultural food.</p> <p>Child ethnicity is associated with their dietary habits<sup>342</sup>.</p> <p>In 2021, just over 7 million people in Australia were born overseas, representing 27.6% of the population. With majority from England, India, China then New Zealand<sup>254</sup>.</p>	What is your cultural identity and country of birth?																												
Participant gender	<p>Capturing parents of all genders will represent experiences and priorities regardless of gender, while previous research has primarily centred only on the mothers perspective of many aspects of parenting.</p> <p>79.9% of single parents are mothers<sup>343</sup>.</p>	<p>What gender do you identify as?</p> <ul style="list-style-type: none"><li>- Male</li><li>- Female</li><li>- Non-binary / third gender</li><li>- Prefer not to answer</li></ul>																												
Socio-economic position	<p>Findings of the cost analysis study revealed that SEIFA is related to the cost of lunchbox foods, meaning SEIFA is an important aspect to consider in the different impact of factors on school food perspectives.</p> <p>Approximately 20% of areas are allocated to each quintile<sup>273</sup></p> <p>For all families, % in each income category is...</p> <table><tr><td>Negative/Nil income</td><td>1%</td></tr><tr><td>\$1-\$149</td><td>0%</td></tr><tr><td>\$150-\$299</td><td>1%</td></tr><tr><td>\$300-\$399</td><td>1%</td></tr><tr><td>\$400-\$499</td><td>2%</td></tr><tr><td>\$500-\$649</td><td>2%</td></tr><tr><td>\$650-\$799</td><td>6%</td></tr><tr><td>\$800-\$999</td><td>5%</td></tr><tr><td>\$1,000-\$1,249</td><td>6%</td></tr><tr><td>\$1,250-\$1,499</td><td>7%</td></tr><tr><td>\$1,500-\$1,749</td><td>5%</td></tr><tr><td>\$1,750-\$1,999</td><td>6%</td></tr><tr><td>\$2,000-\$2,499</td><td>13%</td></tr><tr><td>\$2,500-\$2,999</td><td>9%</td></tr></table>	Negative/Nil income	1%	\$1-\$149	0%	\$150-\$299	1%	\$300-\$399	1%	\$400-\$499	2%	\$500-\$649	2%	\$650-\$799	6%	\$800-\$999	5%	\$1,000-\$1,249	6%	\$1,250-\$1,499	7%	\$1,500-\$1,749	5%	\$1,750-\$1,999	6%	\$2,000-\$2,499	13%	\$2,500-\$2,999	9%	<p>What is your postcode?</p> <ul style="list-style-type: none"><li>- Text box response</li></ul> <p>→ Can be used to determine SEIFA and living location</p> <p>What is your total household income before tax per week (or annually)</p> <ul style="list-style-type: none"><li>- \$0-\$149 (\$0-\$7,799)</li><li>- \$150-\$299 (\$7,800-\$15,599)</li><li>- \$300-\$399 (\$15,600-\$20,799)</li><li>- \$400-\$499 (\$20,800-\$25,999)</li><li>- \$500-\$649 (\$26,000-\$33,799)</li><li>- \$650-\$799 (\$33,800-\$41,599)</li><li>- \$800-\$999 (\$41,600-\$51,999)</li><li>- \$1,000-\$1,249 (\$52,000-\$64,999)</li><li>- \$1,250-\$1,499 (\$65,000-\$77,999)</li><li>- \$1,500-\$1,749 (\$78,000-\$90,999)</li><li>- \$1,750-\$1,999 (\$91,000-\$103,999)</li><li>- \$2,000-\$2,999 (\$104,000-\$155,999)</li><li>- \$3,000+ (\$156,000+)</li></ul>
Negative/Nil income	1%																													
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	<table><tr><td>\$3,000-\$3,499</td><td>8%</td></tr><tr><td>\$3,500-\$3,999</td><td>5%</td></tr><tr><td>\$4,000 or more</td><td>15%</td></tr></table> 305.	\$3,000-\$3,499	8%	\$3,500-\$3,999	5%	\$4,000 or more	15%							
\$3,000-\$3,499	8%													
\$3,500-\$3,999	5%													
\$4,000 or more	15%													
Family structure	<p>This allows representation of single parents and coupled parents, who may face different challenges in food provision<sup>254</sup>.</p> <p>Of families with children under 15 years, approximately 2 million are couple families, while 520 are one parent families<sup>305</sup>. Equivalent to 1/5 of families having a single parent.</p>	<p>What is your relationship status?</p> <ul style="list-style-type: none"><li>- Single</li><li>- Married / de facto / partnered</li><li>- Divorced</li><li>- Widowed</li><li>- Other</li><li>- Prefer not to answer</li></ul>												
Living location	<p>Allows capturing of people across different living areas, who may face different challenges with food procurement, cost, access etc. as per advice received from the advisory group<sup>254</sup>.</p> <p><b>Family living location %</b></p> <table><tr><td>Adelaide metro area</td><td>77.4</td></tr><tr><td>Regional/rural</td><td>22.5</td></tr></table>	Adelaide metro area	77.4	Regional/rural	22.5	<p>What is your postcode?</p> <ul style="list-style-type: none"><li>- Text box response</li></ul> <p>→ Can be used to understand living location e.g. state and rural/ remote/ metro areas, without furthering participant burden</p>								
Adelaide metro area	77.4													
Regional/rural	22.5													
Education and employment	<p>Education is used as a proxy for knowledge on food preparation, nutrition etc. therefore is important to consider. 68% of adults had or were studying for a non-school qualification, including a certificate, diploma or degree 32% overall of people aged 15-74 years had a bachelor degree, with notable variations across age groups.</p> <p>Employment status is a proxy for time availability, with parents who may be employed full time having less time available for food preparation and perceive this as a greater challenge. For couples with children 0-14 years, many families have just one partner employed<sup>343</sup>.</p> <p><b>Couple families with children 0-14 years</b></p> <table><tr><td></td><td><b>2186.0</b></td><td></td></tr><tr><td>Both partners employed</td><td>1548.8</td><td>71%</td></tr><tr><td>One partner employed</td><td>523.9</td><td>24%</td></tr><tr><td>Neither partner employed</td><td>73.8</td><td>3%</td></tr></table> <p>Occupation understands the role and experience of the parent, if they work in a relevant field</p>		<b>2186.0</b>		Both partners employed	1548.8	71%	One partner employed	523.9	24%	Neither partner employed	73.8	3%	<p>What is your highest level of education?</p> <ul style="list-style-type: none"><li>- Did not complete high school</li><li>- Completed high school</li><li>- Some tertiary education</li><li>- Completed tertiary education (degree, diploma, certification)</li><li>- Higher degree (Masters, PhD)</li><li>- Prefer not to answer</li></ul> <p>What is your employment status?</p> <ul style="list-style-type: none"><li>- Not currently employed outside of the home</li><li>- Employed full-time</li><li>- Employed part-time</li><li>- Employed casually</li><li>- Student</li><li>- Other</li><li>- Prefer not to answer</li></ul>
	<b>2186.0</b>													
Both partners employed	1548.8	71%												
One partner employed	523.9	24%												
Neither partner employed	73.8	3%												

Family size	<p>This reflects how many family members participants may have to provide food for, including packing lunchboxes, which may impact on the burden felt<sup>254</sup>.</p> <p><b>Number of children at home (couple family) %</b></p> <table><tr><td>One</td><td>36</td></tr><tr><td>Two</td><td>44</td></tr><tr><td>Three</td><td>15</td></tr><tr><td>Four</td><td>3</td></tr><tr><td>Five</td><td>1</td></tr></table>	One	36	Two	44	Three	15	Four	3	Five	1	<p>Are you a parent/caregiver of a child who is enrolled in primary school (i.e., Kinder/reception - grade 6) in Australia?</p> <ul style="list-style-type: none"><li>- Yes - one child in primary school</li><li>- Yes - two children in primary school</li><li>- Yes - three children in primary school</li><li>- Yes - 4+ children in primary school</li><li>- No</li></ul>
One	36											
Two	44											
Three	15											
Four	3											
Five	1											

National data used to inform relevant target proportions for recruitment.  
Data sourced from Australian Bureau of Statistics where possible.



**Table 9-7: STROBE Reporting checklist (Chapter 6)**STROBE Statement—Checklist of items that should be included in reports of **cross-sectional studies**

	Item No	Recommendation	Item reported
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	Chapter 6
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	Chapter 6
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	6.3
Objectives	3	State specific objectives, including any prespecified hypotheses	6.3
Methods			
Study design	4	Present key elements of study design early in the paper	6.4.3
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6.4.4.1 6.4.4.3
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	6.4.4.2
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6.4.5.3 6.4.5.4
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6.4.5.5
Bias	9	Describe any efforts to address potential sources of bias	6.4.5.5
Study size	10	Explain how the study size was arrived at	6.4.4
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6.4.5.5
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	6.4.5.5
		(b) Describe any methods used to examine subgroups and interactions	6.4.5.5
		(c) Explain how missing data were addressed	6.4.5.5
		(d) If applicable, describe analytical methods taking account of sampling strategy	6.4.5.5
		(e) Describe any sensitivity analyses	6.4.5.5
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6.5
		(b) Give reasons for non-participation at each stage	6.5
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6.5
		(b) Indicate number of participants with missing data for each variable of interest	6.5
Outcome data	15*	Report numbers of outcome events or summary measures	6.5
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision	6.5

		(eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	
		(b) Report category boundaries when continuous variables were categorized	6.5
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	6.5
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	6.5
<b>Discussion</b>			
Key results	18	Summarise key results with reference to study objectives	6.6
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	6.6
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	6.6
Generalisability	21	Discuss the generalisability (external validity) of the study results	6.6
<b>Other information</b>			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Acknowledgements

Strengthening the Reporting of Observational Studies in Epidemiology Statement for cross-sectional studies<sup>238</sup>

**Table 9-8: STROBE Reporting checklist (Chapter 7)**STROBE Statement—Checklist of items that should be included in reports of **cross-sectional studies**

	Item No	Recommendation	Thesis section
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	7.2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	7.2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	7.3
Objectives	3	State specific objectives, including any prespecified hypotheses	7.3
Methods			
Study design	4	Present key elements of study design early in the paper	7.4.1
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7.4.1 7.4.5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	7.4.5 7.4.6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7.4.8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	7.4
Bias	9	Describe any efforts to address potential sources of bias	7.4.6
Study size	10	Explain how the study size was arrived at	7.4.6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7.4.7
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	7.4.8
		(b) Describe any methods used to examine subgroups and interactions	7.4.8
		(c) Explain how missing data were addressed	7.4.7
		(d) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(e) Describe any sensitivity analyses	7.4.8
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7.5
		(b) Give reasons for non-participation at each stage	7.5
		(c) Consider use of a flow diagram	-
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7.5
		(b) Indicate number of participants with missing data for each variable of interest	7.5
Outcome data	15*	Report numbers of outcome events or summary measures	7.5
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg. 95% confidence interval). Make clear which	7.5

		confounders were adjusted for and why they were included	
		(b) Report category boundaries when continuous variables were categorized	7.5
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	7.5
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	7.5
<b>Discussion</b>			
Key results	18	Summarise key results with reference to study objectives	7.6
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	7.6
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	7.6
Generalisability	21	Discuss the generalisability (external validity) of the study results	7.6
<b>Other information</b>			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Acknowledgements

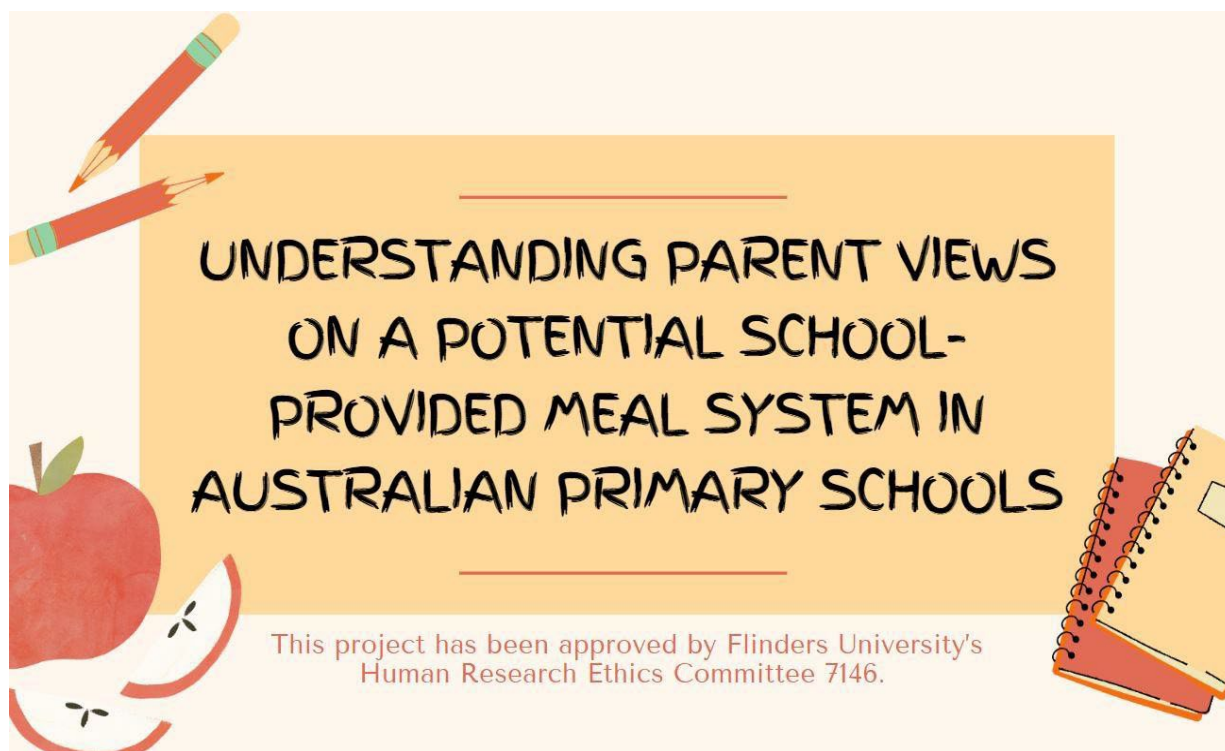
Strengthening the Reporting of Observational Studies in Epidemiology Statement for cross-sectional studies<sup>238</sup>

**Table 9-9: Discrete choice experiment REporting ChecklisT (DIRECT) (Chapter 7)**<sup>301</sup>

Section Item		Thesis section
<b>Purpose and rationale</b>		
1	Describe the real-world context and decision-maker that the hypothetical choice context seeks to replicate or inform	7.4.1
2	Provide a rationale for using a DCE to answer the research question	7.4.1
<b>Attributes and levels</b>		
3	Describe how attributes and levels were derived (e.g. literature review, interviews, focus groups, expert input)	7.4.2
4	Provide the final list of attributes and levels	7.4.2
<b>Experimental design</b>		
5	Report the number of alternatives per choice set and whether they were labelled or unlabelled	7.4.3
6	Describe response options (e.g. forced choice, opt-out, status quo)	7.4.3
7	Describe the type of experimental design (e.g. orthogonal, D-efficient, Bayesian efficient, partial profile)	7.4.4
8	Describe which effects are identified in the design (e.g. main effects, higher order interactions, functional form)	7.4.4
9	Describe the number of choice sets, blocks and choice sets per block	7.4.4
10	Indicate how the experimental design was obtained (software, catalogue, other)	7.4.4
<b>Survey design</b>		
11	Provide a sample choice set and the instructions and background information given to respondents (e.g. providing the survey as an appendix)	7.4.3
12	Report any randomisation (e.g. choice set order, attribute order, alternative order, framing effects)	7.4.3
13	Describe what was checked in piloting (e.g. understanding, respondent burden, timing, wording)	7.4.5
14	Report whether information from the pilot was used to update the experimental design (e.g. priors, functional form of attributes) or survey design	7.4.5
<b>Sample and data collection</b>		
15	Report respondent inclusion/exclusion criteria	7.4.6
16	Describe how data were collected (e.g. mail, personal interview, web survey)	7.4.5
17	Report the response rate or cooperation rate, if possible	7.5
18	Report the final sample size and how the sample size was determined	7.5
19	Describe respondent characteristics and representativeness of target population, if known	7.5
<b>Econometric analysis</b>		
20	Indicate coding of data (e.g. effects, dummy, continuous) including definitions	7.4.8
21	Report whether any respondents were removed and why (e.g. suspected fraudulent responses, rationality tests)	7.4.8
22	Provide the rationale for model choice (e.g. conditional logit, mixed logit, latent class) and assumptions (e.g. error variance)	7.4.8
23	Report model specification	7.4.8
<b>Reporting of results</b>		
24	Report the model performance, goodness of fit (if comparing models)	7.4.8
25	Describe methods used for analysis of model results (e.g. calculation of marginal rate of substitution, attribute relative importance, welfare gain)	7.4.8
26	Report measures of precision for the output(s) of interest (e.g. confidence intervals) and how these were derived	7.5.1

### 9.3.4 Online survey, including Discrete Choice Experiment (Chapter 7)

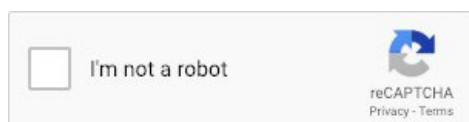
Researchers in the Caring Futures Institute at Flinders University are pleased to invite you to take part in the online survey:



What would Australian parents/caregivers want if Australian primary schools fed children or provided meals at school?  
By completing this survey, your views may inform what schools offer in the future.

The survey will gain your consent, confirm that you are an eligible participant, questions about options if schools provided meals, as well as a few questions about you, taking approximately 20-30 minutes to complete

If you have any questions please contact  
Alexandra Manson Tel: 08 8201 2048  
Email: [alexandra.manson@flinders.edu.au](mailto:alexandra.manson@flinders.edu.au)



Please read the [information sheet](#) before deciding to participate in this research. The project has been approved by Flinders University's Human Research Ethics Committee 7146. All responses will be anonymous and no identifiable information will be collected. Participating is entirely voluntary and there will be no consequences for choosing not to participate.

Once you have read this information, please read the series of statements to confirm that you wish to be involved and provide consent. You can download the information sheet to keep a copy.

### Consent Statement

- I have read and understood the information about the research, and I understand I am being asked to provide informed consent to participate in this research study. I understand that I can contact the research team if I have further questions about this research study.
- I am not aware of any condition that would prevent my participation, and I agree to participate in this project.
- I understand that I am free to withdraw at any time during the study.
- I understand that I can contact Flinders University's Research Ethics and Compliance Office if I have any complaints or reservations about the ethical conduct of this study.
- I understand that my involvement is confidential, and that the information collected may be published. I understand that I will not be identified in any research products.

I further consent to:

- completing a survey
- sharing my de-identified data with other researchers
- my data and information being used in this project and other related projects for an extended period of time (no more than 5 years after publication of the data)

Do you consent to take part in this survey?

- ☐ I consent to take part in this study
- ☐ I do not consent to take part in this study

Are you a parent/caregiver of a child who is enrolled in primary school (i.e., Kinder/reception - grade 6) in Australia?

- ☐ Yes - one child in primary school
- ☐ Yes - two children in primary school
- ☐ Yes - three children in primary school
- ☐ Yes - 4+ children in primary school
- ☐ No

This survey contains four short sections.

1. Questions which ask you to choose between different school meal scenarios  
There are 12 questions, each are slightly different. Please make sure you read closely
2. Questions to understand why you chose particular scenarios
3. Some questions about you
4. Final questions on school food, understanding your views and experiences

The first set of questions will show you a scenario, where you will need to select between Option A and Option B. Choose the option that most closely matches what you would prefer if your child's school provided for your child to eat/drink during the school day.

We have listed some items which will vary in the scenario options. When making your choice please consider only these things:

### **Cost**

How much money it will cost you in Australian dollars (AUD) for a school-provided meal per child, per day (this is the out of pocket value, not considering tax or government contributions)

Alternatives include \$0, \$4, \$10, \$15.

### **Nutrition and Quality**

Nutrition and quality is the nutritional value and overall quality of the food provided at school. Alternatives include having a school meal menu that provides food, with a range of food groups, using quality ingredients, supported by policy. Or alternatively, a menu providing food based on availability and preferences, aiming to fuel children's energy levels or get food into bellies.

### Menu options

Menu options refers to two main meal choices which children can select between at mealtime, or being offered one main meal option at each mealtime. Children who have dietary requirements will always be catered for.

### Access

Access is about how children can access meals provided by schools. Alternatives include a universal system (everyone receives the school-provided meal) or an optional school meal system (where you could choose not to participate and continue to provide a lunchbox, or only participate some of the time).

### Environmental sustainability

Environmental sustainability refers to using locally-sourced produce, using imperfect fruit and vegetables, reducing food waste, donating leftover foods, and providing foods which have lower carbon footprint, supported by policy. The alternative would be a menu and system which does not specifically consider environmental sustainability.

### School approach to food

This is how the mealtime is integrated as part of the broader school day. A focus on the school approach to food includes the school meal program being connected with the classroom education, which could include kitchen gardens or cooking lessons, with the mealtime focused on students learning about food and being exposed to food in a way that helps develop positive attitudes towards food and eating, supported by policy. Or alternatively, no focus on the school approach to food with the meal being only focused on providing children with food.

The question will look a bit like this...

	Option A	Option B
<b>Cost</b>	\$4	\$10
<b>Nutrition and Quality</b>	Menu focus on nutritious food from quality ingredients	Basic menu to get food in bellies
<b>Menu options</b>	One meal offering	Two meal choices
<b>Access</b>	All students receive meal	Optional to participate
<b>Environmental sustainability</b>	System focus on environmental sustainability	No focus on environmental sustainability
<b>School approach to food</b>	System focus on learning, positive messaging and an integrated approach to food	School lunch stands alone from learning, with no integration or messaging efforts



You will be asked to select from:

- ☐ Option A
- ☐ Option B

It may ask if you would prefer to opt-out instead of your choice, meaning that the school food system would remain lunch-box predominant, with no school lunch offering for any students.

Ready to get started? Remember that your answers are anonymous so please answer honestly. There are no right or wrong answers, just choose which option you would choose in the scenario.

For each question, the options will vary in what different alternatives are shown.

The survey will present 12 different scenarios so make sure you read closely. (question variations repeated 12 times here)

Imagine your child's school were to start providing the foods your child was going to eat at lunchtime. Food would be provided by trained staff, in a safe manner, with meals appropriate for dietary requirements. Please indicate which option you most prefer to be provided at your child's school. Assume they are all available options.

	Option A	Option B
<b>Cost</b>	\$4	\$10
<b>Nutrition and Quality</b>	Basic menu to get food in bellies	Menu focus on nutritious food from quality ingredients
<b>Menu options</b>	Two meal choices	One meal offering
<b>Access</b>	All students receive meal	Optional to participate
<b>Environmental sustainability</b>	System focus on environmental sustainability	No focus on environmental sustainability
<b>School approach to food</b>	System focus on learning, positive messaging and an integrated approach to food	School lunch stands alone from learning, with no integration or messaging efforts

- ☐ Option A
- ☐ Option B

If given the option, would you maintain your choice, or opt-out?  
(opt-out meaning that the school food system would remain lunch-box predominant, with no school lunch offering for any students)

- ☐ I would maintain my choice
- ☐ I would opt-out and have no school lunch program

## 12 Choice tasks using this question format, designed through Ngene

The next questions will help us understand your choices a bit more.

How much would you be willing to pay for a school-provided lunch? \$ Per child, per day (AUD)

Consider the situation and if this would change the amount you would pay

	0	2	4	6	8	10	12	14	16	18	20
Average price you would be willing to pay for a school-provided meal	<input type="radio"/>										
If the system was socially priced (e.g. how much would you pay to make sure other children are fed)	<input type="radio"/>										
If for a younger child (5-9 years old), to receive a smaller serve	<input type="radio"/>										
If for an older child (9-12 years old), to receive a larger serve	<input type="radio"/>										

Do you think there should be different pricing based on family income?

- ☐ Yes - low income families should pay less
- ☐ No - everyone should pay the same

Please select what is more important to you in a hypothetical school-provided meal system

Nutrition and quality

- ☐ Menu focus on nutritious food from quality ingredients
- ☐ Basic menu to get food in bellies

Menu options

- ☐ One meal offering
- ☐ Two meal choices

Reach

- ☐ All students receive meal
- ☐ Optional to participate

Environmental sustainability

- ☐ System focus on environmental sustainability
- ☐ No focus on environmental sustainability

School approach to food

- ☐ System focus on learning, positive messaging and an integrated approach to food

- ☐ School lunch stands alone from learning, with no integration or messaging efforts

## Socio-demographics

The following questions help us to understand more about you.

How old are you?

What gender do you identify as?

- ☐ Man
- ☐ Woman
- ☐ Non-binary / third gender
- ☐ Prefer not to answer

Which of the following best describes your ancestry?

- ☐ Australian
- ☐ Australian Aboriginal
- ☐ Torres Straits Islander
- ☐ English
- ☐ Irish
- ☐ Scottish
- ☐ Chinese
- ☐ Italian
- ☐ German
- ☐ Other (please specify)
- ☐ Prefer not to say

Does your cultural background influence the foods your child eats at home and you pack for school?

- ☐ Yes - please describe
- ☐ No

What is your postcode?

What is your relationship status?

- ☐ Single

- ☐ Married / de facto / partnered
- ☐ Divorced
- ☐ Widowed
- ☐ Other
- ☐ Prefer not to answer

Which statement best describes your caregiving situation for your child?

- ☐ I am a single parent and the sole caregiver.
- ☐ I share caregiving responsibilities with another parent/caregiver.
- ☐ I am the primary caregiver, but there is another parent/caregiver involved.
- ☐ Other (please specify)

What is your highest level of education?

- ☐ Did not complete high school
- ☐ Completed high school
- ☐ Some tertiary education
- ☐ Completed tertiary education (degree, diploma, certification)
- ☐ Higher degree (Masters, PhD)
- ☐ Prefer not to answer

What is your employment status?

- ☐ Employed full-time
- ☐ Employed part-time
- ☐ Employed casually
- ☐ Not currently employed outside of the home
- ☐ Student
- ☐ Other
- ☐ Prefer not to answer

For your co-parent - What is their highest level of education?

- ☐ Did not complete high school
- ☐ Completed high school
- ☐ Some tertiary education
- ☐ Completed tertiary education (degree, diploma, certification)
- ☐ Higher degree (Masters, PhD)
- ☐ Prefer not to answer

For your co-parent - What is their employment status?

- ☐ Employed full-time
- ☐ Employed part-time
- ☐ Employed casually
- ☐ Not currently employed outside of the home   Student
- ☐ Other
- ☐ Prefer not to answer

What is your total household (combined) income per week (or annually)

- ☐ \$0-\$149 (\$0-\$7,799)
- ☐ \$150-\$299 (\$7,800-\$15,599)
- ☐ \$300-\$399 (\$15,600-\$20,799)
- ☐ \$400-\$499 (\$20,800-\$25,999)
- ☐ \$500-\$649 (\$26,000-\$33,799)
- ☐ \$650-\$799 (\$33,800-\$41,599)
- ☐ \$800-\$999 (\$41,600-\$51,999)
- ☐ \$1,000-\$1,249 (\$52,000-\$64,999)
- ☐ \$1,250-\$1,499 (\$65,000-\$77,999)
- ☐ \$1,500-\$1,749 (\$78,000-\$90,999)
- ☐ \$1,750-\$1,999 (\$91,000-\$103,999)
- ☐ \$2,000-\$2,499 (\$104,000-\$155,999)
- ☐ \$2,500-\$2,999 (\$130,000-\$155,999)
- ☐ \$3,000-\$3,499 (\$156,000-\$181,999)
- ☐ \$3,500-\$3,999 (\$182,000-\$207,999)
- ☐ \$4,000-\$4,499 (\$208,000-\$233,999)
- ☐ \$4,500-\$4,999 (\$234,000-\$259,999)
- ☐ \$5,000-\$5,999 (\$260,000-\$311,999)
- ☐ \$6,000-\$7,999 (\$312,000-\$415,999)
- ☐ \$8,000 or more (\$416,000 or more)
- ☐ Prefer not to answer

How many children under the age of 15 live in your household?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ More than 5 (please specify)

How many people over the age of 15, including yourself, older children and adults, live in your household?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4
- ☐ 5
- ☐ More than 5 (please specify)

Are you interested in a school-provided meal program in Australian primary schools and why?

- ☐ Yes
- ☐ No

When thinking about school-provided meals, what meal occasions you be interested in being available?

- ☐ Before school breakfast
- ☐ Recess/morning snack time
- ☐ Lunch
- ☐ Other snack times/crunch and sip
- ☐ After school
- ☐ None - I would like to provide food myself

Are school-provided meals currently offered at your child's school?

Please provide some details of the program e.g. how is food prepared, how often, what is provided, is it the out of school care program?

- ☐ No
- ☐ Yes - Before school breakfast
- ☐ Yes - Recess/morning snack time
- ☐ Yes -Lunch
- ☐ Yes - Other snack times/crunch and sip
- ☐ Yes - After school

Does your child/children have any dietary requirements? Please specify

- ☐ Yes - allergy/intolerance e.g. Nut allergy
- ☐ Yes - cultural requirement e.g. Halal
- ☐ Yes - other (sensory or family preferences) e.g. Vegan or white foods only
- ☐ No

When you think about the school hypothetically making your child's lunch, what are you looking forward to? (tick all that apply)

- ☐ Not having to make my child's lunch
- ☐ My child will have a nutritious/quality lunch
- ☐ My child will try new foods
- ☐ My child will have food choice
- ☐ My child will have a learning experience
- ☐ Lunches will be affordable
- ☐ My child will have a filling lunch
- ☐ My child will have more time to eat lunch
- ☐ Lunches will be more environmentally sustainable
- ☐ Lunches will be equal and stigma free across all students

- ☐ I am not looking forward to the school making my child's lunch
- ☐ Other (please explain)

When you think about the school hypothetically making your child's lunch, what are you worried about? (tick all that apply)

- ☐ Not getting to make my child's lunch
- ☐ My child will not like the food
- ☐ My child will not be given enough food
- ☐ My child will be given too much food
- ☐ My child has dietary requirements and there will not be food that they can eat
- ☐ My child will not try new foods
- ☐ My child will not get food choice
- ☐ There will not be learning experiences with the food
- ☐ Lunches will be too expensive
- ☐ My child will not have a nutritious/quality lunch
- ☐ My child will have less time to play
- ☐ Lunches will not be environmentally sustainable
- ☐ Lunches may result in bullying, stigma or shame
- ☐ I am not worried about the school making my child's lunch
- ☐ Other (please explain)

Who usually makes your child's lunch? (select all that apply)

- ☐ Parent/caregiver
- ☐ They make their own
- ☐ Their brother or sister
- ☐ They usually buy their lunch/parent places a lunch order
- ☐ They do not usually have lunch
- ☐ They have school-provided lunch at their school

How much time does this person usually spend making packed lunches (lunch boxes) each day?

- ☐ 1-5 minutes
- ☐ 6-10 minutes
- ☐ 11-15 minutes
- ☐ 16-20 minutes
- ☐ 21-25 minutes
- ☐ 26-30 minutes
- ☐ 30+ minutes

How much do you currently spend on school lunches (recess/snack and lunch), per child?  
(You can provide an estimate per day or week)

If you prepare lunches for multiple children divide this by the number of children to give a per child estimate

Per day \$

Per week \$

Do you have any final thoughts?



**Table 9-10: Participant demographics used to establish equivalised household income (Chapter 7)**

	n	%
Number of children in household (under 15)		
1	66	17.2
2	202	52.7
3	77	20.1
4	27	7.0
5+	11	2.9
Number of adults in household (over 15)		
1	55	14.4
2	277	72.3
3	31	8.1
4	16	4.2
5+	4	1.0
\$0-\$149 (\$0-\$7,799)	2	0.6
\$150-\$299 (\$7,800-\$15,599)	3	0.9
\$300-\$399 (\$15,600-\$20,799)	3	0.9
\$400-\$499 (\$20,800-\$25,999)	7	2.0
\$500-\$649 (\$26,000-\$33,799)	9	2.6
\$650-\$799 (\$33,800-\$41,599)	16	4.7
\$800-\$999 (\$41,600-\$51,999)	14	4.1
\$1,000-\$1,249 (\$52,000-\$64,999)	26	7.6
\$1,250-\$1,499 (\$65,000-\$77,999)	22	6.4
\$1,500-\$1,749 (\$78,000-\$90,999)	22	6.4
\$1,750-\$1,999 (\$91,000-\$103,999)	28	8.2
\$2,000-\$2,499 (\$104,000-\$155,999)	62	18.1
\$2,500-\$2,999 (\$130,000-\$155,999)	27	7.9
\$3,000-\$3,499 (\$156,000-\$181,999)	32	9.3
\$3,500-\$3,999 (\$182,000-\$207,999)	26	7.6
\$4,000-\$4,499 (\$208,000-\$233,999)	21	6.1
\$4,500-\$4,999 (\$234,000-\$259,999)	6	1.7
\$5,000-\$5,999 (\$260,000-\$311,999)	9	2.6
\$6,000-\$7,999 (\$312,000-\$415,999)	5	1.5
\$8,000 or more (\$416,000 or more)	3	0.9
Prefer not to answer	40	

**Table 9-11: Importance of school-provided meal program attributes using multinomial logit model analysis to parents identified as high equivalised household income category (n=172) (Chapter 7)**

Attributes	Coefficient (SE)	95%CI	Relative importance score
<b>Nutrition and Quality</b>			
Basic menu to get food in bellies (ref)	.94319*** (.06668)	.81249 to 1.07389	1
Menu focus on nutritious food from quality ingredients			
<b>Cost</b>	-.10008*** (.00575)	-.11135 to -.08881	5
<b>Menu options</b>			
One (ref)	.40794*** (.06479)	.28096 to .53493	2
Two			
<b>Access</b>			
Optional (ref)	.05612 (.06122)	-.06388 to .17612	6
Universal			
<b>Environmental sustainability</b>			
Not integrated (ref)	.39384*** (.06381)	.26878 to .51889	3
Integrated			
<b>School approach to food</b>			
Not integrated (ref)	.33430*** (.06183)	.21312 to .45547	4
Integrated			

\*\*\*P value <0.01, \*\*P value <0.05, \*p value <0.1

Table notes: ref= reference value

**Table 9-12: Willingness to pay for a change in the level of attributes of a school-provided meal for parents identified as high equivalised household income category (n=172) (Chapter 7)**

<b>Outcome attributes</b>	<b>Willingness to pay (\$AUD)</b>	<b>95% CI</b>
Nutrition and Quality	\$9.42***	8.04 to 10.81
Menu options	\$4.08***	2.78 to 5.38
Environmental sustainability	\$3.94***	2.66 to 5.21
School approach to food	\$3.34***	2.10 to 4.58
Access	\$0.56	-0.66 to 1.78

\*\*\*P value <0.01, \*\*P value <0.05, \*p value <0.1

**Table 9-13: Importance of school-provided meal program attributes using multinomial logit model analysis to parents identified as low equivalised household income category (n=171) (Chapter 7)**

Attributes	Coefficient (SE)	95%CI	Relative importance score
<b>Nutrition and Quality</b>			
Basic menu to get food in bellies (ref)	.55151*** (.05264)	.44833 to .65470	2
Menu focus on nutritious food from quality ingredients			
<b>Cost</b>	-.11849*** (.00486)	-.12803 to -.10896	5
<b>Menu options</b>			
One (ref)	.55292*** (.05354)	.44797 to .65786	1
Two			
<b>Access</b>			
Optional (ref)	.11352** (.05108)	.01340 to .21364	6
Universal			
<b>Environmental sustainability</b>			
Not integrated (ref)	.31708*** (.05300)	.21320 to .42096	3
Integrated			
<b>School approach to food</b>			
Not integrated (ref)	.26070*** (.05150)	.15975 to .36164	4
Integrated			

\*\*\*P value <0.01, \*\*P value <0.05, \*p value <0.1

**Table 9-14: Willingness to pay for a change in the level of attributes of a school-provided meal for parents identified as low equivalised household income category (n=171) (Chapter 7)**

<b>Outcome attributes</b>	<b>Willingness to pay (\$AUD)</b>	<b>95% CI</b>
Nutrition and Quality	\$4.65***	3.78 to 5.53
Menu options	\$4.67***	3.77 to 5.56
Environmental sustainability	\$2.68***	1.80 to 3.55
School approach to food	\$2.20***	1.33 to 3.07
Access	\$0.96**	0.11 to 1.81

\*\*\*P value <0.01, \*\*P value <0.05, \*p value <0.1