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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.

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, mealtime 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[b]	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[a], 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[a]
France	Established school-provided meal system	Public primary school Dijon	Meal available daily for all students	Social pricing based on household income[a]
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[a]
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[a]
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[a]

[a]Government (national and/or local) subsidies.
[b]Further country context is provided in Supplementary File 3.

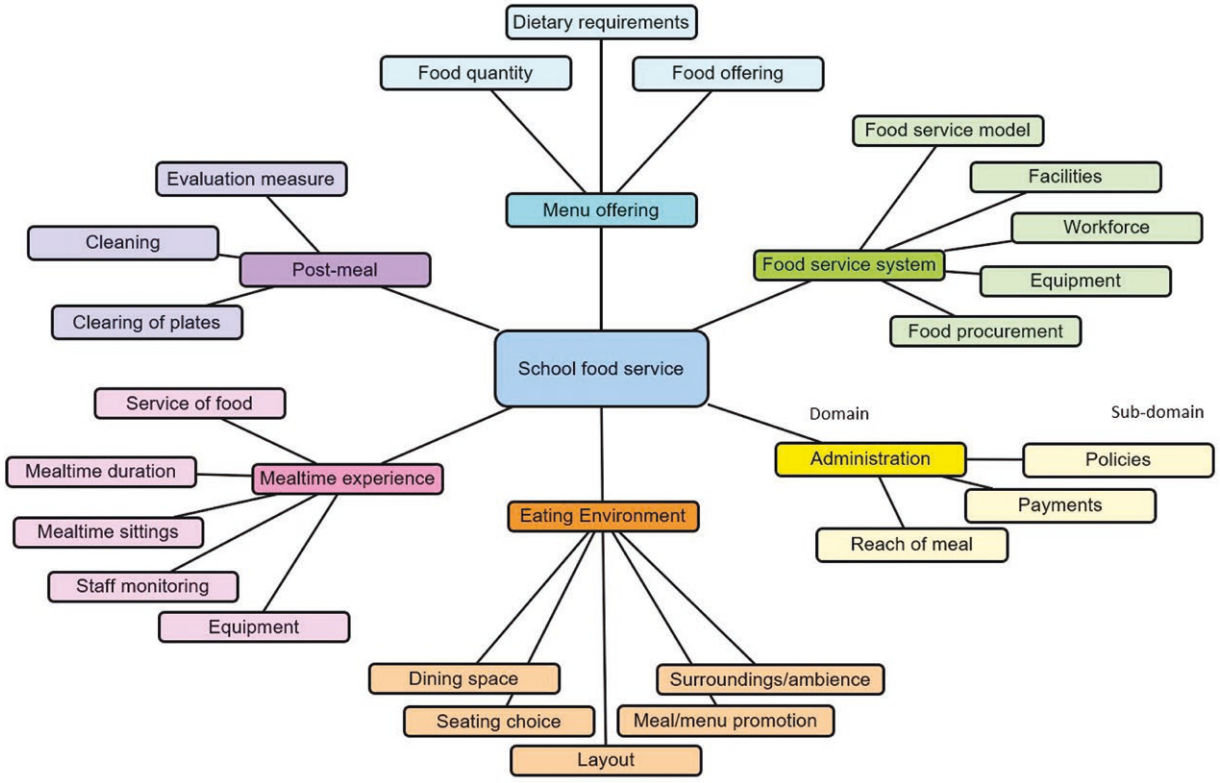

Fig. 1: Map of school food service coding.

> *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 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 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 Maclntyre, 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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