









Foods provided to children in family day care: an observational study

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Abstract

Objective: To assess the quality and quantity of foods and beverages provided to children aged 0–5 years in family day care and identify structural and socio-demographic factors associated with the nutritional quality of food provided.

Design: A cross-sectional study measured the food and beverages provided to children using weighed food records. The number of serves from different food groups was calculated according to the Australian Guide to Healthy Eating, and a healthy food provision index score was created. Associations between structural and socio-demographic factors and healthy food provision index scores were analysed using linear mixed models.

Setting: Family day care services in two large geographic areas in New South Wales, Australia.

Participants: One hundred and four children in thirty-three family day care services.

Results: During attendance at childcare, most children met recommended servings of fruit but not dairy, vegetables, lean meat and meat alternatives and wholegrains. Discretionary foods exceeded recommendations. Children's age, socio-economic status and the type of main meal provided were significantly associated with the healthy food provision index score.

Conclusions: Foods provided to children in family day care are aligned with dietary recommendations for fruit but not vegetables, dairy, lean meat and meat alternatives, wholegrains or discretionary foods. Interventions to promote healthy eating are needed to support families and educators to improve the nutritional quality of food provided to children.

Keywords
Family day care
Nutrition
Food provision
Children

In the early years, nutrition is vital for optimal health and cognitive, emotional and physical development and can reduce the risk of developing chronic diseases in later life⁽¹⁾. Australian children's diets are far from ideal with only 20% of children aged 2–3 years and 3% of children aged 4–8 years meeting the recommended intake of vegetables⁽²⁾. Further, discretionary food and beverages contribute to 30% and 38% of energy intake in children aged 2–3 and 4–8 years, respectively, contributing to excess intakes of total and saturated fat, added sugars and Na⁽³⁾.

Systematic reviews have found that Early Childhood Education and Care (ECEC) services can improve children's dietary intake^(4,5). They can also communicate health messages to support families to make positive changes at home⁽⁶⁾. Nutrition guidelines in New South Wales recommend that children in ECEC services be provided with at least 50% of the Australian Dietary Guidelines' recommended daily intake of all nutrients when attending an ECEC services for more than 8 h or when they receive morning tea, lunch and afternoon tea while in attendance⁽⁷⁾.

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In Australia, family day care (FDC) is a form of ECEC service where educators provide education and care for up to four children below school age (0–5 years) and an additional three school-aged children (5–12 years) in a home environment⁽⁸⁾. FDC educators must be registered through an approved service provider to work as a FDC educator in Australia and receive government subsidies⁽⁸⁾. The service provider monitors and supports educators to ensure they comply with the service providers' policies and the National Quality Framework (Australia's ECEC regulatory system composed of the National Quality Standard, the Education and Care Services National Regulations and the Early Years Learning Framework)⁽⁸⁾. Over 125 000 Australian children aged between 0 and 12 years attended FDC in 2019⁽⁹⁾.

Most research exploring the nutrition environment in ECEC services has been conducted with centre-based services, with little on FDC^(10,11). Studies involving direct observation in Family Child Care Homes (equivalent to FDC) in the USA have found children's diet quality has been associated with the food provided^(12,13), nutrition education⁽¹²⁾, nutrition policy⁽¹²⁾, educator income⁽¹⁴⁾, ethnicity⁽¹⁴⁾ and main language spoken at home⁽¹⁴⁾. Additionally, children were not being provided with, or consuming, adequate amounts of vegetables, total protein foods, seafood and plant-based proteins and whole-grains⁽¹³⁾. Unlike the USA where all food is provided by educators, in Australia, food can be provided by parents/caregivers, educators or a combination of both, depending on the preference of the individual educator⁽¹⁵⁾. To our knowledge, only four studies have been published in Australia that explore healthy eating in FDC; however, all have involved self-reported data and no studies captured information on the quantity of food provided^(15–18). Therefore, the present study aimed to: (1) assess the quality and quantity of food and beverages provided to children aged 0–5 years in FDC services in two large geographic areas in New South Wales, Australia, and (2) identify structural and sociodemographic factors associated with the nutritional quality of foods provided to children.

Methods

Setting and design

A cross-sectional study involving direct observation within thirty-three FDC services was conducted between April 2019 and February 2020 in the south west Sydney and Illawarra Shoalhaven regions of New South Wales.

Study sample and recruitment

Educators were recruited through their FDC service provider who had previously participated in a survey and policy review (unpublished results)⁽¹⁹⁾. Based on the sample of twenty-eight service providers from the previous study, 700

educators were eligible to participate with approximately 2200 children. A sample size of approximately 220 children was calculated to be sufficient to estimate children's physical activity levels, which was an outcome of interest in the larger study. The calculation used baseline data of children's physical activity levels in Family Child Care Homes, with an intraclass correlation of 0.33, a mean of 8.1 (SD 3.1) min/h in physical activity and a design effect of 1.99 (using a cluster size of three children per service). Once the service provider agreed to participate, they were asked to provide a list of all their eligible educators' contact details (email and/or telephone number) to be invited to participate in the study as this information is not publicly available. Where service providers did not want to provide their educators' contact details without their permission, the service providers emailed their educators an invitation to participate, including the participant information sheet and consent forms. Educators were eligible if they cared for at least three children aged 0–5 years, and their service provider was situated in the sampling areas. If an educator consented to participate, a data collector contacted them to confirm their eligibility, introduce themselves and explain what the observation would entail.

Multiple recruitment strategies were utilised, including face-to-face recruitment at FDC meetings and the development of a brief video to explain the study (which was sent to service providers and educators via email). Educators were informed of the date of the observation 24 h in advance and asked not to inform parents about the scheduled observation so parents would not alter the types of food provided to their child (if applicable). Children were included in the current study if food data were collected for lunch and at least one snack (morning or afternoon tea). As a thank you for participating in the study, an AUD\$100 educational resource voucher was provided to educators who completed the observation.

Measurements

Parent/caregivers completed a short survey that was attached to the consent form to capture information on their child's sex, date of birth, postcode of residence and the main language spoken at home. Educators also completed an online survey when they provided consent that included information on their postcode of residence, language spoken at home, ECEC experience (including FDC) and qualifications and nutrition-related professional development undertaken in past 2 years. Data collection was scheduled between 1 week and 1 month after the educator provided consent and completed the survey.

Postcode of residence was used as a proxy for socioeconomic status (SES), based on the Australian Bureau of Statistics' Index of Relative Socioeconomic Disadvantage, categorised into tertiles⁽²⁰⁾. Educators and children were categorised into English-speaking or non-English-speaking

backgrounds based on their main language spoken at home (using the Australian Bureau of Statistics' Australian Standard Classification of Languages)⁽²¹⁾.

Food audit

A food audit tool was developed in Research Electronic Data Capture (REDCap) to record the amount and type of foods provided to children at FDC by families and educators based on a tool used by Kelly *et al.* (2010)⁽²²⁾. REDCap is a secure online web application used to build and manage surveys and databases for research studies⁽²³⁾. The tool classified foods into one of nine food and beverage categories (fruit, vegetables, dairy, grain (cereal) foods, meat and meat alternatives, sweet discretionary foods, savoury discretionary foods, discretionary beverages and main meal). Main meals were classified into mixed dishes; sandwich/wrap/roll; take away. A mixed dish was defined as a main meal that was provided by the educators or parent/caregiver that included more than one food group and was not a sandwich, wrap or roll or take away. The tool also recorded the ingredients in the mixed dishes and sandwich/wrap/rolls. Data collectors recorded details of packaged foods including brand name and product description. Food was weighed using Salter scales (model number 1035 SSBKDR) and photographed on an A3 grid at a 45° angle (centimetre increments)⁽²⁴⁾. To minimise handling of food, it was weighed in the serving container or plate, when appropriate. In these cases, the audit tool captured information on total weight and container weight, which was subtracted from the relevant food items. Food and beverages provided by the family were weighed and photographed in the morning before the first meal, and food and beverages provided by the educator were weighed and photographed before each meal.

A dietitian (E.K.) calculated the number of serves of each of the foods provided comparing the assessed weight of the foods with the Australian Guide to Healthy Eating standard serving sizes⁽²⁶⁾. The serves of each food group from mixed meals were calculated using Australian food composition data on Foodworks^(26,27). The food photographs were used to assist in the calculation of food serves for mixed foods, whereby the photographs were used to estimate the proportion of the total weight attributed to individual items. Shared food platters were divided by the number of children who were provided with the food as an estimation of individual serving sizes.

Discretionary foods and beverages were determined based on the Australian Guide to Healthy Eating⁽²⁵⁾ and the Australian Bureau of Statistics Discretionary Food List⁽²⁸⁾. Kilojoule content of the foods was calculated using the nutrition information panel of packaged food or Australian food composition data, if the nutrition information panel was not available. The number of serves of discretionary food was calculated by dividing the kilojoules of the food by 600 kJ (1 serve of discretionary food = 600 kJ)⁽²⁵⁾.

Healthy food provision index score

A healthy food provision index score of provided foods was created to measure the alignment of the food provided in FDC services to the Australian Guide to Healthy Eating. The score was adapted from other scores^(29,30); however, it was simplified as it was based on the food provided on 1 d in FDC and therefore could not capture overall diet quality, such as variety of vegetables or inclusion of fish or legumes in the diet that are not typically consumed daily. For each food group, a score out of 1 was assigned to indicate the degree that the child was provided with at least 50% of the recommended serves of the food group for their age while in FDC (Table 1), with a maximum of five points allocated in total for all food groups. A score of 0 indicated the food was not provided at the recommended guidelines, and a score of 1 indicated the food was provided at or above recommendations. For example, a 3-year-old child provided with 0.75 serves of vegetables would receive a score of 0.6 (0.75 divided by 1.25 serves) for this food group. Scores exceeding minimum recommendations were truncated at 1. The Australian Guide to Healthy Eating recommends mostly wholegrain and/or high cereal fibre varieties. Therefore, up to 0.5 points were given if they were provided with 50% of the recommended number of serves of grains and up to another 0.5 if at least 1 of these serves was wholegrain. For discretionary foods and beverages, this scoring system was reversed, with higher scores reflecting lower amounts provided. If more than half a serve of discretionary food was provided, then the category received a negative score up to the value of -1, and if no serves were provided, then the category was scored at 1. Children that had between 0.1 and 0.5 serves of discretionary foods received a score of 0. For example, 0.3 serves of discretionary foods resulted in a score of 0 and 1.5 serves of discretionary foods resulted in a score of -1 (0.5-1.5 serves). Scores of the individual food categories were summed, resulting in a healthy food provision index score ranging from -1 to 6 on a continuous scale, with a higher score indicating better food provision quality.

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 25 (IBM Corp.). Descriptive statistics were calculated using means and standard deviations for continuous variables, and frequencies and percentages for categorical variables. Linear mixed models were used to examine the difference between healthy food provision index scores by child, educator and service provider and family covariates (SES, main language spoken at home, educator experience, food provider (i.e. FDC or parent), educator qualification, nutrition professional development, ECEC experience, presence of a comprehensive nutrition policy (at the service provider level), type of main meal (e.g. sandwich or mixed dish) or number of meals provided). To account for the clustered nature of the data, the models included the FDC educator as a random effect. Fixed effects such as age of child, sex of child, SES and cultural background were included as covariates in the mixed models. Significance levels were set at $P < 0.05$.

**Table 1** Healthy food provision index score components and standards for scoring

Food category	Number of serves for maximum score (1–2-year-olds)	Number of serves for maximum score (2–3-year-olds)	Number of serves for maximum score (4–8-year-olds)	Maximum points awarded	Minimum points awarded
Vegetables	1*	1.25	2.25	1	0
Fruit	0.25	0.5	0.75	1	0
Dairy	0.5*	0.75	0.75*	1	0
Total grains/cereals	2.0	2.0	2.0	0.5	0
Whole grains	1.0	1.0	1.0	0.5	0
Lean meat and meat alternatives	0.5	0.50	0.75	1	0
Discretionary food and beverages	0	0	0	1	–1

*Where the Australian Guide to Healthy Eating recommendations were reported as a range, the lower range was used.

Results

The study was intended to finish once the sample size was reached; however, data collection ended in March 2020 due to COVID-19 restrictions coming into force. During the possible data collection period, ten service providers agreed to participate, four had closed down and fourteen declined. Thirty-three observation visits were conducted, and data were collected on 104 children. Thirty-two children had all their food provided from home, thirty-one children had all their food provided by educators and forty-two children had food provided by both educators and from home. Twenty-eight children had lunch and one snack, and seventy-six children had lunch and two snacks. Educator and child characteristics are described in Table 2. More than half of educators (n 19) spoke a language other than English as their main language, while half of children came from homes that spoke a language other than English as their main language. Children were aged from 11 months to 5.3 years, and the mean age of children was 3.2 (SD 1.2) years. Twenty-five educators were registered with a service provider who had a comprehensive nutrition policy.

Most children were provided with fruit (n 103) and grains (n 101) followed by dairy (n 77), vegetables (n 74), discretionary foods (n 74), lean meats and meat alternatives (n 64) and wholegrains (n 27) (Table 3). Fifty-nine children were provided with a mixed dish (n 59), and forty-two children were provided with a sandwich, wrap or roll (n 42). Sweet discretionary foods were more common than savoury discretionary foods and discretionary beverages. Sweet biscuits were the most common sweet discretionary food (n 30), followed by cakes, muffins, scones, cake-type desserts (n 12) and muesli, cereal, nut and seed style bars (n 30). Savoury biscuits were the most common savoury discretionary food (n 18), followed by processed meats (n 16) and chips and extruded snacks (n 11).

Children's age, SES and the type of main meal provided were significantly associated with the healthy food provision index score (Table 4). Children aged 11–23 months had the highest nutritional quality of food provided

compared with children aged 2–3 years and 4–5 years (3.5 *v.* 3.0 *v.* 2.4, $P=0.006$). Despite the fact that their dietary requirements were lower, on average children aged 11–23 months were provided with more serves of dairy and wholegrains and fewer serves of discretionary foods compared with the other age groups. The primary food groups associated with differences in food quality were dairy and wholegrains. Children living in low SES suburbs were significantly more likely to have a higher healthy food provision index score compared with children living in medium/high SES areas (3.1 *v.* 2.8, $P=0.03$). More vegetable serves contributed to the higher healthy food provision index score in children from lower SES areas. Children provided with mixed dishes had a higher healthy food provision index score compared with children provided with a sandwich, wrap or bread roll (3.5 *v.* 2.7, $P=0.008$). The higher score in mixed dishes was influenced by increased provision of vegetables and lean meat and meat alternatives and less discretionary foods.

Discussion

This is the first known Australian study to assess the nutritional quality and quantity of food provided to children in FDC using weighed food records and observations. Most children were not provided with recommended amounts of vegetables, wholegrains, dairy, and lean meat or meat alternatives but were provided with excess discretionary foods. Additionally, children's age, SES and type of main meal were associated with the healthy food provision index score.

Our findings are consistent with other research in FDC conducted in Australia^(16,17) and internationally⁽¹³⁾, and from Australian ECEC centre-based services^(22,31–34). For example, using diet recalls with FDC educators in South Australia for 367 children aged 1–5 years, researchers found that most children in FDC between 5 and 8 h were provided with bread/cereals (94%), fruit (89%) and discretionary foods (87%) but only 15% of children were provided with vegetables⁽¹⁶⁾. Similar to our study, a combination of food

Table 2 Sociodemographic characteristics of family day care educator and children

Educator characteristics	<i>n</i>	%
Main language spoken at home		
English	14	42
Language other than English	19	58
Socio-economic status		
Low (Quintiles 1–2)	15	46
Medium/High (Quintiles 3–5)	18	54
Sex, female	33	100
Years worked in Early Childhood Education and Care		
<10 years	17	52
≥10 years	16	48
Years working in family day care		
<10 years	24	73
≥10 years	9	27
Education		
Certificate III	7	21
Diploma	23	70
University	3	9
Nutrition-related professional development in past 2 years		
Yes	10	30
No	23	70
Child characteristics		
Age		
11–23 months	22	21
2–3 years	49	47
4–5 years	33	32
Sex, female	59	57
Main language spoken at home		
English	53	51
Language other than English	51	49
Socio-economic status		
Low (Quintiles 1–2)	44	42
Medium/High (Quintiles 3–5)	60	58

Table 3 Frequency of children provided with food groups and discretionary food and beverage items in family day care and average serve size of food groups if the foods were provided

Food category	Number (%) of children provided		Number (%) of children meeting 50% of the recommended serves of the food group for their age		Serves per child (if food provided)	
	<i>n</i>	%	<i>n</i>	%	Mean	SD
Fruit	103	99	92	89	1.3	0.8
Total grains/cereals	101	97	56	36	2.1	1.1
Wholegrains	27	26	N/A		1.5	0.9
Dairy	77	74	41	25	0.8	0.5
Vegetables	74	71	18	17	1.1	0.6
Lean meat and meat alternatives	64	61	20	19	0.5	0.3
Discretionary (total)	74	71	N/A		1.5	1.1
Sweet discretionary foods	49	47	N/A		1.4	0.8
Savoury discretionary foods	45	43	N/A		0.8	0.7
Discretionary beverages	3	3	N/A		0.7	1.9

providers was observed, including parents or educators or both⁽¹⁶⁾. One Australian intervention, Good Food in Family Day Care (1998–2000), also reported that over 90% of children were provided with fruit and grains/cereals (pre- and post-nutrition intervention); however, less than two-fifths of children aged 1–5 years old were provided with vegetables after

the intervention⁽¹⁷⁾. The intervention was conducted with educators from seven service providers and parents supplied most of the food⁽¹⁷⁾. Dietary observations in family child care homes (equivalent to FDC) in the USA also reported that children were not provided with enough vegetables and whole-grains but were close to meeting the American guidelines for

Table 4 Factors associated with healthy food provision index scores of food provided to children

Independent variables	Healthy food provision index score			
	Mean	SD	P-value	
Age	11–23 months	3.5	1.3	0.006*
	2–3 years	3.0	1.2	
	4–5 years	2.4	1.2	
Sex	Female	2.7	1.3	0.690
	Male	3.2	1.2	
Child SES†	Low	3.1	1.4	0.033*
	Medium/High	2.8	1.2	
Child language	English speaking	2.8	1.2	0.585
	Non-English speaking background	3.0	1.4	
Educator SES†	Low	3.1	1.4	0.337
	Medium/High	2.8	1.2	
Educator language	English speaking	2.9	1.2	0.686
	Non-English speaking background	2.9	1.4	
Food provider	Family	2.3	0.9	0.166
	Educator	3.7	1.1	
	Family and educator	2.8	1.4	
Nutrition policy	Comprehensive	3.0	1.3	0.691
	Not comprehensive	2.7	1.3	
Nutrition-related professional development (last 2 years)	Yes	3.4	1.3	0.502
	No	2.7	1.2	
ECEC‡ experience	<10 years	2.6	1.2	0.782
	≥10 years	3.3	1.3	
ECEC qualification	Certificate III	3.6	1.1	0.354
	Diploma	2.9	1.4	
	University	3.3	1.1	
Type of main meal	Mixed dish	3.4	1.2	0.008*
	Sandwich/wrap/roll	2.2	1.1	
Number of meals	Lunch and 1 snack	3.5	1.1	0.081
	Lunch and 2 snacks	2.7	1.3	

*Socio-economic status.

†Early childhood education and care.

fruit⁽¹³⁾. However, unlike our study, children were close to meeting the American dairy recommendations and all food was provided by the educators⁽¹³⁾. Studies from Australian ECEC centres were parents⁽³³⁾ and centres^(31,32) provided food also found that children are not being provided^(31,32) or consuming foods⁽³³⁾ in line with dietary recommendations, particularly for vegetables⁽³¹⁻³³⁾, lean meat and meat alternatives⁽³¹⁻³³⁾ and dairy^(31,33). Furthermore, compared with our study, a lunchbox audit assessing the food provided by parents to Australian preschool children in 2010 found that fewer children were provided with fruit (75%), vegetables (5%) and dairy (5%) but when they were provided with these foods, the mean number of serves were similar⁽²²⁾. Similar proportions of children were provided with discretionary foods (69%), but our study found that children were provided with slightly fewer serves (1.8 serves)⁽²²⁾.

Our study found that children aged 4–5 years had lower healthy food provision index scores compared with younger children. This was primarily driven by children in the older age category receiving more discretionary foods and less dairy, as well as their increased dietary requirements. The increase in discretionary foods in older children is comparable with other studies^(3,35) and could be attributed to older children being able to clearly vocalise and communicate

their food desires compared with younger children⁽³⁶⁾. Furthermore, despite vegetable provision remaining similar for each age group, vegetable recommendations almost double between the 2–3 and 4–8 year age groups (from 2 ½ serves/d to 4 ½ serves/d)⁽²⁵⁾. These findings are supported by a longitudinal study of Victorian children's daily intake that found vegetable intake did not change considerably from 9 months to 5 years⁽³⁵⁾. Many parents may be unaware of the increase in requirements at this age or may find the recommendations overwhelming⁽³⁷⁾.

Contrary to previous research that has indicated that children from low SES backgrounds consume more discretionary foods and less vegetables than children from high SES backgrounds⁽³⁵⁾, our study found that children living in a lower SES area were more likely to have higher healthy food provision index scores. Tovar *et al.* (2020) also found that US children attending FDC where educators had lower incomes had higher diet quality scores⁽¹⁴⁾. Conversely, Australian centre-based studies have reported no associations between SES (using postcode as a proxy) and food provided by parents⁽²²⁾ or centres⁽³¹⁾. It is important to note that postcode was the proxy for SES in our study and other factors such as parental education and income were not assessed which may have a greater impact on food provision.



We found that mixed dishes were also associated with higher healthy food provision index scores compared with a sandwich, wrap or roll. Mixed dishes included dhal, spaghetti Bolognese and mixed food platters and generally contained more vegetables and meat/meat alternatives. On the other hand, children provided with sandwiches generally had more wholegrains. While sandwiches/wraps/rolls generally contained less vegetables and lean meat and meat alternatives in this study, they can be a healthy, easy and convenient lunch option, particularly when served with healthy snack options.

Nutrition interventions in ECEC services appear to be more effective in improving the food when centres provide food compared with centres where families provide food. Australian ECEC nutrition interventions targeting the food provided by centres have found significant improvements in the provision of all food groups^(34,38) and the consumption of fruit^(34,38), vegetables^(34,38), grains/cereals^(38,39), lean meat/meat alternatives^(34,38), dairy⁽³⁴⁾ and overall diet quality scores⁽³⁹⁾. However, healthy eating and physical activity interventions involving ECEC centres where families provide food demonstrated no significant improvements in the provision⁽⁶⁾ or consumption⁽⁴⁰⁾ of food groups and discretionary foods. This could be because policy and practice changes at the ECEC level may be more likely to influence educators, cooks and directors compared with parents. Furthermore, FDC educators have expressed challenges in communicating with families about food^(15,16). One study reported that almost half (46 %) of educators did not feel confident telling parents that the quality of the food supplied was unsatisfactory⁽¹⁶⁾. Educators have also reported many barriers to communicating with parents including fear of losing business or damaging trust and relationships with families, low confidence, knowledge or skills to have challenging conversations and that parents are too busy to listen⁽¹⁶⁾. There are many factors that may contribute to educators providing more nutritious foods in comparison with families, including that ECEC qualifications involve nutrition training, educator opportunities for nutrition-related professional development, and that Education and Care Services National Regulations state that food provided by educators must be nutritious and adequate in quantity⁽⁴¹⁾. Despite these positive influences, Wallace (2019) found that educators' nutrition knowledge and attitudes can be barriers to providing healthy eating environments⁽¹⁵⁾.

Parents/caregivers experience a range of barriers to providing children with healthy food. There are many strong interpersonal and environmental factors that affect what food children are provided, including time, children's food preferences and fussy eating, parental-guilt for sending them to ECEC services (which include FDC), wanting their children to feel loved, fear of children not eating enough or being hungry, not wanting to waste food and misleading food marketing^(15,42,43). Intervention strategies should target the complex barriers parents and educators experience. Future interventions should focus on supporting families

and educators to provide children with healthy and easy to prepare lunch and snack options by replacing discretionary foods with vegetables, meat/meat alternatives and wholegrains. FDC educators should also be provided with professional development, support from their service provider and resources on communicating with families about food provision and nutrition. It should be noted that FDC educators have a number of responsibilities and many educators experience difficulties with compliance to the national regulations and quality standards⁽⁴⁴⁾. Educators should be upskilled to embed healthy eating into their pedagogical practices and utilise the service provider's nutrition policy and national policies to promote healthy eating. For example, in Australia, the promotion of healthy eating can be used to demonstrate how regulatory requirements and outcomes of the National Quality Framework are being met^(8,45).

Several limitations are present in this study. The small sample size (due to recruitment challenges and COVID-19 restrictions) means that caution must be applied as the findings might not be representative of the wider population. However, this remains the first Australian study to collect food data in FDC using weighed food records and observations. Second, the study only assessed the food provided to children on 1 d. The present study also only measured food provision, not intake. Baseline findings from the Keys to a Healthy Home randomised controlled trial found that food provided was significantly associated with the diet quality of food consumed⁽¹²⁾; however, studies have also found that children generally consume less food than provided^(13,34,38). Furthermore, we only captured food data for part of a day and do not know what children were provided for the remainder of the day. Nonetheless, these findings are still concerning and are consistent with Australian national dietary data for children's intake, which also highlight that vegetables, lean meat and meat alternatives and dairy are not being consumed in adequate amounts in children's overall diet⁽⁴⁶⁾. We did not capture any anthropometric measurements for children or educator/parent health indicators for non-communicable diseases that could have possibly contributed to the types of food provided. Postcode was used as an indicator of SES for educators and children/families; however, information on parental education and income was not assessed which may have a greater impact on food provision. Finally, the healthy food provision index score we developed is not validated.

The findings of our study suggest there is opportunity to improve the nutritional quality and quantities of food provided to children attending FDC, particularly replacing discretionary foods with vegetables, meat and meat alternatives, and dairy and choosing wholegrain alternatives over refined grains. Due to the complex and multifaceted factors contributing to the high provision of discretionary foods and suboptimal provision of food groups, many strategies are required to improve the food provided to children in FDC targeting the service provider,



educators and parents. Further research to investigate the barriers and potential solutions to providing nutritious foods to young children attending FDC is warranted.

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