

Nutrient intakes of young children: Implications for long-day child-care nutrition recommendations

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Abstract

Objective: To develop nutrition recommendations for food provided during long-day child-care hours, expressed in terms of a percentage of recommended dietary intakes (RDIs) for nutrients.

Design: Secondary analyses of nutrient intake data from the Australian Bureau of Statistics' 1995 National Nutrition Survey. Total daily intakes and intakes from lunch and daytime snacks (i.e. long-day child-care hours) were examined.

Subjects: Children aged two to five years ($n = 793$).

Setting: Males and females from all Australian states and territories.

Main outcome measures: The proportion of the mean total daily nutrient intake consumed during long-day child-care hours in quantitative amounts and in percentage RDI.

Results: The mean daily intakes of energy, vitamin A, thiamin, niacin, zinc, iron and calcium were all above 100% RDI. On average, young children derived 40 to 51% of total 24-hour nutrient intake and approximately 43 to 107% of RDI for the nutrients examined from lunch and snacks. Iron was the only nutrient with a mean intake less than 50% of the RDI for lunch and day-time snacks. However, the total mean daily intake exceeded the RDI.

Conclusion or application: The recommendation that 'at least 50% of the RDI for nutrients be provided to children during long-day child-care' is consistent with children's current eating patterns. Further research, legislation, policy development, resources and training will be required to implement this recommendation. (*Nutr Diet* 2002;59:187-90)

Key words: child-care, nutrient intake, nutrition recommendations

Introduction

In Australia, 28% of children attend long-day child-care and 18% attend family day care, with more than 177 000 children using long-day child-care centres in 1996 (1). Long-day child-care is defined as formal child-care that is provided in a centre for a minimum of eight hours per day, five days per week (2).

The food eaten by children during long-day child-care makes an important contribution to their overall nutritional intake at a time that is critical for physical and mental development.

Formal child-care providers require specific guidelines for the provision of food for children in their care. Such recommendations can be justified if they are based on both the daily nutrient requirements of children and on the proportion of food eaten while in child-care. Care

needs to be taken not to overestimate these requirements as this may result in increased cost and wastage.

In some Australian states, the child-care legislation which relates to nutrition contains broad statements only. In Queensland, for example, centres are required to provide 'adequate and nutritious food' for children in their care (3). However, this is not supported with guidelines on the amounts and types of food required.

Previous recommendations relating to the provision of food for children in long-day child-care include: at least 50% of the Recommended Dietary Intake (RDI) for nutrients (New South Wales (4) and Victoria (5)); 50 to 67% of the RDI for all nutrients (Western Australia (6)); 67% of daily food requirements (South Australia (7)); and at least 50 to 67% of nutritional requirements (American Dietetic Association (8)).

There is no evidence to show that children who attend long-day child-care centres are at greater nutritional risk than children who are cared for at home (9). However, studies of children in child-care centres have revealed that their intakes at lunch and the two snack times do not meet 50% of RDI for some nutrients. In Australia, energy, iron, calcium and zinc are the most common nutrients consumed at levels less than 50% of RDI during long-day child-care (7,10-13). Landers et al. (14), in their study of the nutrient intake of children both in and outside of formal child-care hours, found intakes of iron, calcium and energy over the entire day did not meet recommended amounts.

US studies of nutrient intakes during long-day child-care have reported intakes of energy (15-18), iron (15-20), calcium (15,20), zinc (17,18,20), thiamin (15,20), niacin (15,18), vitamin A (17), magnesium (17) and folic acid (17,21) to be low.

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The aim of this study was to provide an evidence-base for recommendations addressing the nutritional contribution of meals provided during long-day child-care. Secondary analyses of the 1995 National Nutrition Survey were undertaken to determine total nutrient intake and its distribution throughout the day in two- to five-year-old children. Results were compared with the RDIs—the target for daily nutrient intake (22).

Method

Data were obtained from the Australian Bureau of Statistics' 1995 National Nutrition Survey Confidentialised Unit Record File for children aged two to five years (n = 793) (23). This household survey, run in conjunction with the National Health Survey (24), collected information on food and beverage consumption on the day prior to the interview, using a 24-hour recall. The dietary information for children aged two to four years was provided by a parent, guardian or close relative, preferably the person responsible for preparing the participant's meals (24). Children aged five years and over were asked to provide their own food intake data with the assistance of an adult household member (24). The dietary intake questions covered breakfast, snacks, lunch, dinner and supper (24). Full details about the survey, including sample design and selection, are published elsewhere (25).

Data for children aged between two and five years were selected for secondary analyses to reflect the most common ages of children attending long-day child-care services. The nutrients most commonly reported as being below desired levels in the diets of children attending formal child-care were selected for consideration, these being vitamin A, thiamin, niacin, zinc, iron and calcium (7,10–13,15–18,20,14). As the RDI for some nutrients are age-dependent, data for children aged two to three years and those aged four to five years were analysed separately. The RDI for iron for both age groups is a range (6 to 8 mg), so the middle value, 7 mg, was used as the RDI.

Three outcome measures were considered:

- the mean intake of energy, vitamin A, thiamin, niacin, zinc, iron and calcium over the 24-hour period;
- the contribution of lunch and day-time snacks to total mean intake of these nutrients;
- the contribution of lunch and day-time snacks to nutrient intake expressed as a percentage of RDI.

To estimate food consumed by young children during hours comparable to the long-day child-care period lunch and day-time snacks (i.e. foods or beverages eaten between meals) were selected for analysis. Nutrient values for other meal types such as brunch were not included due to very small numbers of children consuming these meals.

Mean daily intakes for nutrients as a percentage of RDI, as well as intakes for lunch and day-time snacks were calculated as the average of all individual's intake as a percentage of RDI; that is the

$$\frac{\text{Sum (individual intake/RDI x 100)}}{\text{number of individuals}}$$

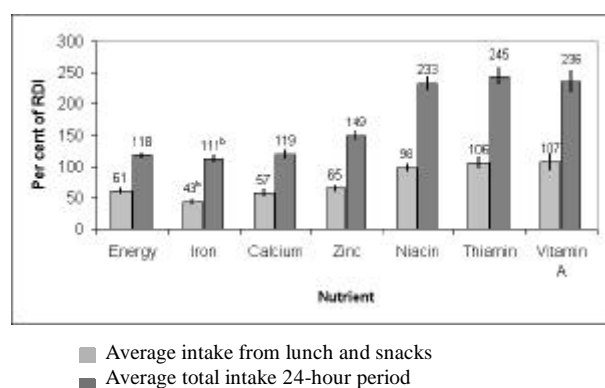
The 95% confidence intervals (CI) were calculated.

Data presented in this study have been weighted to the Australian population by age, sex and metropolitan residence (25). All data were analysed using SAS 8.2 (SAS Institute Inc, Cary, NC, SAS OnlineDoc?, version 8, 1999).

Results

As shown in Figures 1 and 2, the mean 24-hour intakes of the nutrients of interest for children aged two to five years were above 100% of the RDI, while the RDI for energy was exceeded for two- to three-year-olds (118%) and approximated RDI for four- to five-year-olds (98%).

Figure 1. Total intake and intake from lunch and snacks^(a) as a percentage of Recommended Dietary Intake (RDI) (22), for children aged two to three years from the National Nutrition Survey (23) (n = 383)

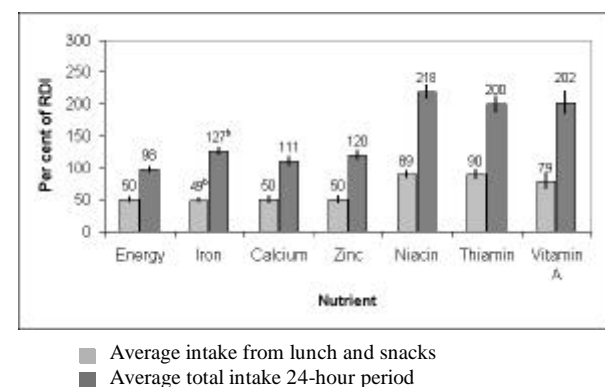


Vertical bars indicate the 95% confidence interval for the mean percent of RDI for each nutrient.

Figures above bars are mean percentage of RDI.

- (a) Snacks include all food and beverage snacks, excluding supper.
 (b) The RDI for iron is 6 to 8 mg. The middle of this range was used for comparisons (7 mg).

Figure 2. Total intake and intake from lunch and snacks^(a) as a percentage of Recommended Dietary Intake (RDI) (22), for children aged four to five years from the National Nutrition Survey (23) (n = 410)



Vertical bars indicate the 95% confidence interval for the mean percent of RDI for each nutrient.

Figures above bars are mean percentage of RDI.

- (a) Snacks include all food and beverage snacks, excluding supper.
 (b) The RDI for iron is 6 to 8 mg. The middle of this range was used for comparisons (7 mg).

Table 1. Nutrient intake data for children aged two to five years from the National Nutrition Survey 1995 (22, 23)^(a)

Intake data	Age group	Energy	Iron ^(b)	Calcium	Zinc	Niacin ^(c)	Thiamin	Vitamin A ^(d)
Mean intake over 24 hours	2–3 years (n = 383)	6350 kJ (6144–6555)	7.8 mg (7.5–8.1)	834 mg (790–877)	6.7 mg (6.4–7.6)	23.3 mg (22.4–24.2)	1.2 mg (1.2–1.3)	707 ug (657–756)
	4–5 years (n = 410)	7053 kJ (6851–7256)	8.9 mg (8.5–9.2)	777 mg (738–817)	7.2 mg (6.9–8.2)	26.2 mg (25.2–27.2)	1.4 mg (1.3–1.5)	707 ug (665–750)
Percentage of total mean intake	2–3 years (n = 383)	51 (50–53)	40 (39–42)	46 (44–48)	44 (42–45)	43 (41–44)	43 (41–45)	44 (42–47)
contributed by lunch and snacks	4–5 years (n = 410)	51 (50–53)	40 (39–42)	44 (42–46)	42 (40–44)	41 (40–43)	44 (42–45)	42 (40–44)

(a) 95% Confidence Intervals in brackets

(b) Middle of the RDI range for iron used (7 mg)

(c) Niacin values are niacin equivalents

(d) Vitamin A values are retinol equivalents

Lunch and snacks provided between 43% to 107% of the RDI for these nutrients, with iron being the only nutrient with a mean intake less than 50% of the RDI. However, iron intakes at other meals resulted in a total mean intake over a 24-hour period that exceeded the RDI.

Table 1 shows the mean total nutrient intakes and intakes from lunch and snacks as a percentage of the mean 24-hour intake. Lunch and snacks contributed between 40% and 51% of 24-hour intake for the nutrients of interest.

Discussion

Children derived approximately 40 to 51% of their daily total nutrient intake and in excess of 50% of the RDI from lunch and snacks for all nutrients of interest except for iron (43% for two- to three-year-olds, 49% for four- to five-year-olds). The RDI were met for all the nutrients, over the 24-hour period. This evidence supports the provision of at least 50% of the RDI for vitamin A, niacin, thiamin, iron, zinc, calcium and energy from lunch and day-time snacks as a practical recommendation for usual long-day child-care hours.

The New South Wales 'Caring for Children' project showed that even after an intervention in long-day child-care centres, many centres failed to provide 50% of the RDI for nutrients in one meal and two snacks (12). Two other key Australian studies have also shown that meeting 50% of the RDI for some nutrients is often not achieved in eight hours of child-care (10,14). The contribution of meals other than lunch and snacks provided between 60 to 140% of RDI. Thus the recommendation for 50% of RDI to be provided during long-day child-care provides some safety margin for the 'at-risk' nutrients of interest.

The sample for the 1995 National Nutrition Survey included children within and outside formal care settings. The results are therefore not necessarily representative of children who attend child-care centres and can only be used as a guide. Long-day child-care itself may influence eating patterns, both within hours of care or outside these hours. Factors such as early morning time constraints and late afternoon fatigue may affect food intake at breakfast and at night and this requires more research. To assist with further research some additional data should be collected in future national surveys. The 1995 National Nutrition Survey provides data on where food was obtained and includes a category for 'childcare centre, family day care' but food brought from home and con-

sumed at child care cannot be identified (25). Data on the number of hours children spent in care on the day of the 24-hour record and where meals were eaten, would allow study of the effects of long-day child-care on the intake of meals outside care hours and of the nutrient intake of children who bring food from home to child care.

Conclusion

This research indicates that the recommendation that 'at least 50% of the RDI for nutrients be provided to children while in long-day child-care for eight hours' is appropriate. It is consistent with children's current eating patterns. Further research on the effect of long-day child-care on food intake both within and outside hours of care is required to confirm this finding. In order to implement the above recommendation, consistent food-based recommendations must be developed, promoted and supported through policy initiatives, state licensing and/or national accreditation standards and resources and training for child-care centre staff and parents. The collection of more detailed data by future National Nutrition Surveys would assist in providing a clearer picture of food intake by children attending long-day child-care centres.

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