

# Population response to change in infant feeding guidelines for allergy prevention

Dean Tey, MBBS, FRACP,<sup>a,b,c</sup> Katrina J. Allen, MBBS, BMedSc, FRACP, FAAAAI, PhD,<sup>a,b,c,d</sup> Rachel L. Peters, MPH,<sup>b,c</sup> Jennifer J. Koplin, PhD,<sup>b,e</sup> Mimi L. K. Tang, MBBS, PhD, FRACP, FRCPA, FAAAAI,<sup>a,b,c</sup> Lyle C. Gurrin, PhD,<sup>b,e</sup> Anne-Louise Ponsonby, MBBS, FAFPHM, FRACP, PhD,<sup>b,c</sup> Adrian J. Lowe, PhD,<sup>b,e</sup> Melissa Wake, MD, FRACP,<sup>b,c,f</sup> and Shyamali C. Dharmage, MBBS, MSc, MD, PhD,<sup>b,e</sup> for the HealthNuts study investigators *Parkville and Melbourne, Australia, and Manchester, United Kingdom*

**Background:** It is unknown whether population infant feeding practices have changed since recently revised Australian allergy guidelines removed recommendations to delay allergenic solids. **Objectives:** We sought to determine whether updated 2008 guidelines were associated with changes in feeding practice and to determine whether sociodemographic factors influenced this response.

**Methods:** In a population-based, cross-sectional study (HealthNuts) of 5276 infants recruited between 2007 and 2011 in Melbourne, Australia, parents reported on infant feeding practices. Multinomial logistic regression was used to investigate the associations between recruitment year and feeding practices and whether these associations were modified by sociodemographic factors.

**Results:** Compared with participants recruited in 2007-2009, those recruited in 2009-2011 were more likely to introduce solids at age 4 months (adjusted multinomial odds ratio [aMOR], 1.21; 95% CI, 1.02-1.45;  $P = .032$ ) and less likely to introduce solids at age 6 months (aMOR, 0.80; 95% CI,

0.69-0.92;  $P = .002$ ), egg after 6 months (aMOR, 0.82; 95% CI, 0.71-0.94;  $P = .004$ ), and peanut after 12 months (aMOR, 0.70; 95% CI, 0.49-0.98;  $P = .037$ ). Although parents recruited in 2009-2011 were less likely to formula feed (aMOR, 0.84; 95% CI, 0.72-0.98;  $P = .023$ ), formula-fed infants were more likely to be given a partially hydrolyzed formula (aMOR, 1.37; 95% CI, 1.12-1.70;  $P = .003$ ). These changes were significantly stronger among families with a higher socioeconomic status and those without a family history of allergies.

**Conclusion:** Updated national allergy guidelines are associated with reduced delay in introduction of solids, egg, and peanut and an increase in partially hydrolyzed formula use among formula-fed infants. Higher socioeconomic status and absence of family history of allergies were associated with better uptake of feeding guidelines. (*J Allergy Clin Immunol* 2014;133:476-84.)

**Key words:** Food allergy, infant feeding, solids, egg, peanut, formula, weaning, family history, guidelines

From <sup>a</sup>the Department of Allergy and Immunology, <sup>b</sup>Murdoch Childrens Research Institute, and <sup>c</sup>the Centre for Community Child Health, Royal Children's Hospital, Parkville, and <sup>d</sup>the Department of Paediatrics and <sup>e</sup>the Centre for Molecular, Environmental, Genetic and Analytic Epidemiology, University of Melbourne; and <sup>f</sup>the University of Manchester.

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Corresponding author: Katrina J. Allen, MBBS, BMedSc, FRACP, FAAAAI, PhD, Murdoch Children's Research Institute, Royal Children's Hospital, Flemington Road, Parkville, Victoria 3052, Australia. E-mail: [katie.allen@rch.org.au](mailto:katie.allen@rch.org.au).

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With the high prevalence and reportedly increasing rates of IgE-mediated food allergies globally,<sup>1,2</sup> one of the key hypotheses is that timing of allergenic solids introduction might affect the development of food allergy.<sup>3</sup> Du Toit et al<sup>4</sup> reported that Jewish children in the United Kingdom had higher rates of peanut allergy than Jewish children in Israel (relative risk, 5.8; 95% CI, 2.8-11.8;  $P < .001$ ) and suggested that this was possibly linked to the earlier introduction of dietary peanut in Israeli children. Similarly, we recently reported<sup>5</sup> that there was an increased risk of challenge-confirmed egg allergy when egg consumption was delayed to age 10 to 12 months (adjusted odds ratio, 1.6; 95% CI, 1.0-2.6) and after age 12 months (adjusted odds ratio, 3.4; 95% CI, 1.8-6.5) in comparison with those who first introduced egg at age 4 to 6 months.

Given this evidence and other similar reports,<sup>6-11</sup> global allergy prevention guidelines<sup>12,13</sup> have recently been revised to remove previous advice to delay the introduction of potentially allergenic foods. However, despite widespread updating of infant feeding guidelines, there is a paucity of reports on the effect of public health guidelines on changing a population's feeding practices.<sup>14</sup> There is also a lack of understanding as to whether key sociodemographic factors, such as maternal country of birth, socioeconomic status, and family history of allergies, influence the family's uptake of such recommendations.

In Australia the previous recommendations by the National Health and Medical Research Council in 2003 were to introduce solids around the age of 6 months and, where there is a strong family history of allergies, to delay dietary egg, nuts, and shellfish until the age of 1 to 3 years.<sup>15</sup> In September 2008, at the same time as international feeding guidelines were being reviewed, the Australasian Society of Clinical Immunology and Allergy introduced new

*Abbreviations used*

aMOR: Adjusted multinomial odds ratio  
MOR: Multinomial odds ratio

recommendations for all infants, irrespective of family history of allergy, to commence complementary foods between the ages of 4 and 6 months, with express advice that allergenic solids, such as egg and peanut, need not be excluded.<sup>16</sup> Similarly, in 2008, the Australian state of Victoria's Department of Health removed its previous recommendation to delay introduction of allergenic solids (eg, egg and peanut until after age 10 months), whereas mothers were advised to introduce solids at age 6 months (rather than at age 4-6 months, previously).<sup>17,18</sup> The Australasian Society of Clinical Immunology infant feeding guidelines were otherwise unchanged, including a normal diet for the mother during both pregnancy and lactation and the recommendation to use a partially hydrolyzed formula in place of standard cow's milk formula for infants with a family history of allergic disease if complementary formula feeding was required in the first 4 to 6 months of life.

Objective 1 of our study was to document the effect of changed national guidelines on infant feeding practices in the HealthNuts cohort, a large population-based study of infants, and the development of food allergy over the first year of life. During the 4-year recruitment period from 2007 to 2011, amendment of a key Australian feeding guideline in 2008 provided a unique opportunity for us to study whether actual feeding practices, particularly introduction of potentially allergenic foods, changed in the same period. Objective 2 was to explore whether the effect of guidelines is driven by food allergy or higher sociodemographic status.

**METHODS**

**Design and recruitment**

The HealthNuts study's methods have been previously detailed.<sup>19</sup> In brief, HealthNuts researchers attended 121 council-run immunization sessions across Melbourne, Victoria, Australia, between September 2007 and August 2011, aiming to recruit all 11- to 15-month-old infants attending for their 12-month scheduled immunization. More than 90% of infants in Melbourne receive their 12-month immunizations, with approximately half administered by council-run immunization sessions and the remainder administered either by general practitioners or state/community health agencies.<sup>19</sup>

Ethical approval was obtained from the Office for Children HREC (reference no. CDF/07/492), the Department of Human Services HREC (reference no. 10/07) and the Royal Children's Hospital HREC (reference no. 27047). Parents or guardians provided written informed consent.

**Procedures**

During the 15- to 20-minute compulsory observation period after vaccination, a study nurse administered a skin prick test with single-tine lancets (Stallergenes, Antony, France) to 4 of 5 foods (egg white, peanut, sesame, cow's milk, or shellfish [*Pandalus borealis*]; ALK-Abelló, Madrid, Spain), 10 mg/mL histamine (positive control), and saline (negative control). While waiting for the skin prick test, parents completed a detailed interviewer-administered questionnaire that included information on the age of egg and peanut introduction. A second 8-page self-administered questionnaire collected information on family history of allergies and type of formula used.

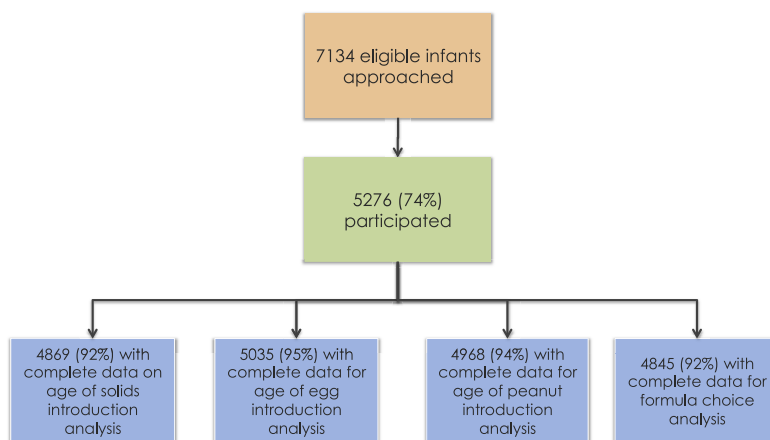
**Exposure measure**

We compared the feeding practices of participants recruited from September 2009 to August 2011 after the implementation of the updated Australasian Society of Clinical Immunology and Allergy infant feeding guidelines in September 2008 against participants recruited from September 2007 to August 2009.

**Primary outcome measures: Infant feeding in response to guideline changes**

We categorized variables to measure participants' responses to the Australasian Society of Clinical Immunology and Allergy guidelines on infant feeding.<sup>16</sup> Age of solids introduction was categorized into less than 4 months, 4 months, 5 months, 6 months, and greater than 6 months. Age of egg and peanut introduction was initially categorized into less than 4 months, 4 to 6 months, 7 to 12 months, and greater than 12 months. However, because of the low number of participants who introduced egg (n = 44 [0.9%]) and peanut before age 4 months (n = 9 [0.2%]), the first 2 categories were combined to age 6 months or less for the analysis comparing the first versus the second half of recruitment. The age of introduction of egg and peanut was categorized as greater than 12 months when parents reported that they had not as yet commenced these in their child's diet. Egg introduction was defined as ingestion of either cooked egg (boiled, scrambled, fried, or poached) or baked egg (egg-containing cakes, biscuits, or similar products), whichever was earlier.

Formula feeding was categorized as ever or never formula fed. Among formula-fed participants, formula choice was defined as the first formula used because the majority (78%) of participants used only 1 formula. This was further categorized into 3 groups: regular cow's milk, partially hydrolyzed formula, or other, which included extensively hydrolyzed, amino acid-based, soy, lactose-free, goat/sheep, antireflux, and anticolic formulas. In Australia, during the study period, extensively hydrolyzed formulas and amino acid



**FIG 1.** Study participation.

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