

Calcium and Vitamin D Intake in Children with Perceived Atopic Disease Versus Healthy Children and Corresponding Parental/Caregiver Attitudes Towards Dairy Products

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Objectives and Hypothesis

- Determine if atopic and non-atopic children are meeting daily recommended intakes of calcium and vitamin D from food or supplements
- Explore behaviors and beliefs of parents/caregivers (PCs) about milk and dairy products

Hypothesis: Children with atopic disease are not consuming adequate calcium and vitamin D, due in part to negative parental beliefs towards milk and dairy products.

Background

- Milk and dairy products (MDPs) are increasingly perceived to be deleterious to health and are declining in popularity.¹
- Appropriate consumption of MDPs protects effects against obesity, diabetes, and cardiovascular disease. There is no association between intake and cancer or all-cause mortality.^{2,3}
- MDPs are sources of calcium and vitamin D, nutrients important to develop bone density during childhood and reduce future risk of osteoporosis and fracture. These nutrients are difficult to consume in adequate amounts with the standard American diet.^{4,5}
- Lactose intolerance, common in older and non-White populations, and milk allergy, most prevalent in infants and young children, are common concerns impacting MDPs intake.⁶
 - Overestimation of milk allergy is common. Parents may mistake coincidental gastrointestinal illness or other condition for milk allergy. Indiscriminate use of IgE testing by physicians and other health care professionals and IgG testing by consumers also contributes to misdiagnoses.^{7,8}
- Identification of true milk allergy is important to avoid unnecessary dietary restrictions which decrease quality of life and increase risk of nutritional deficiencies.⁹

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Methods

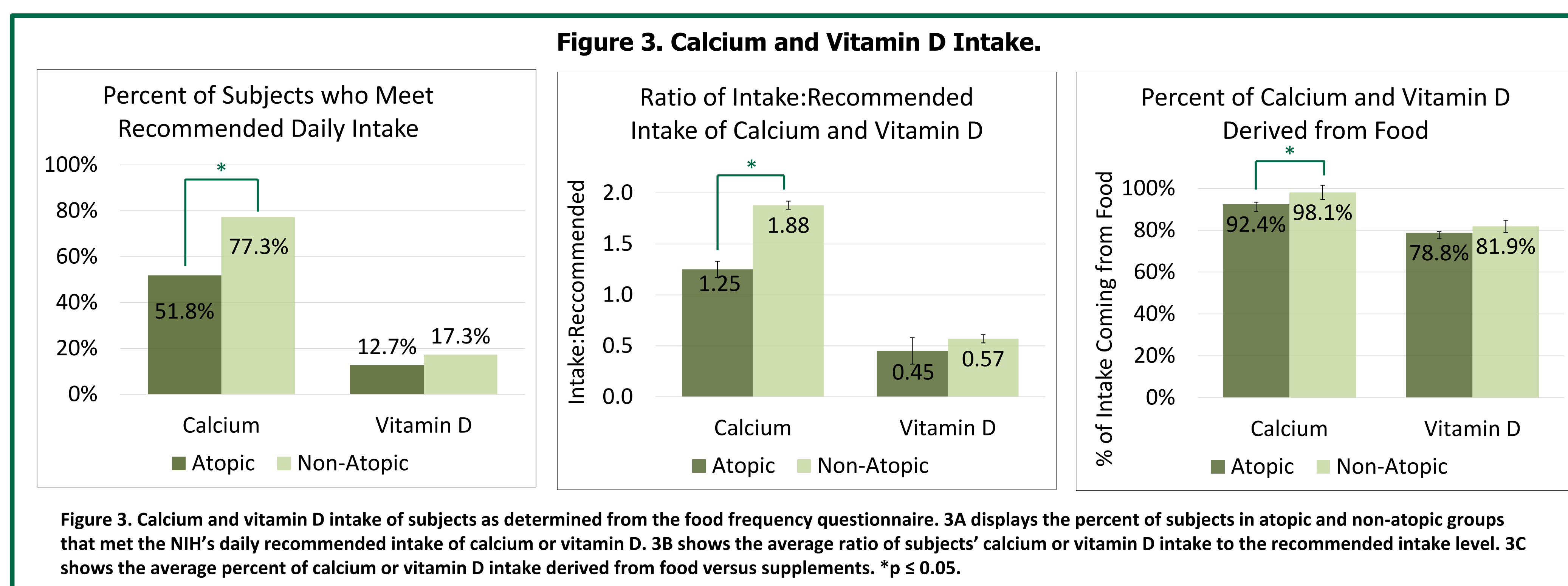
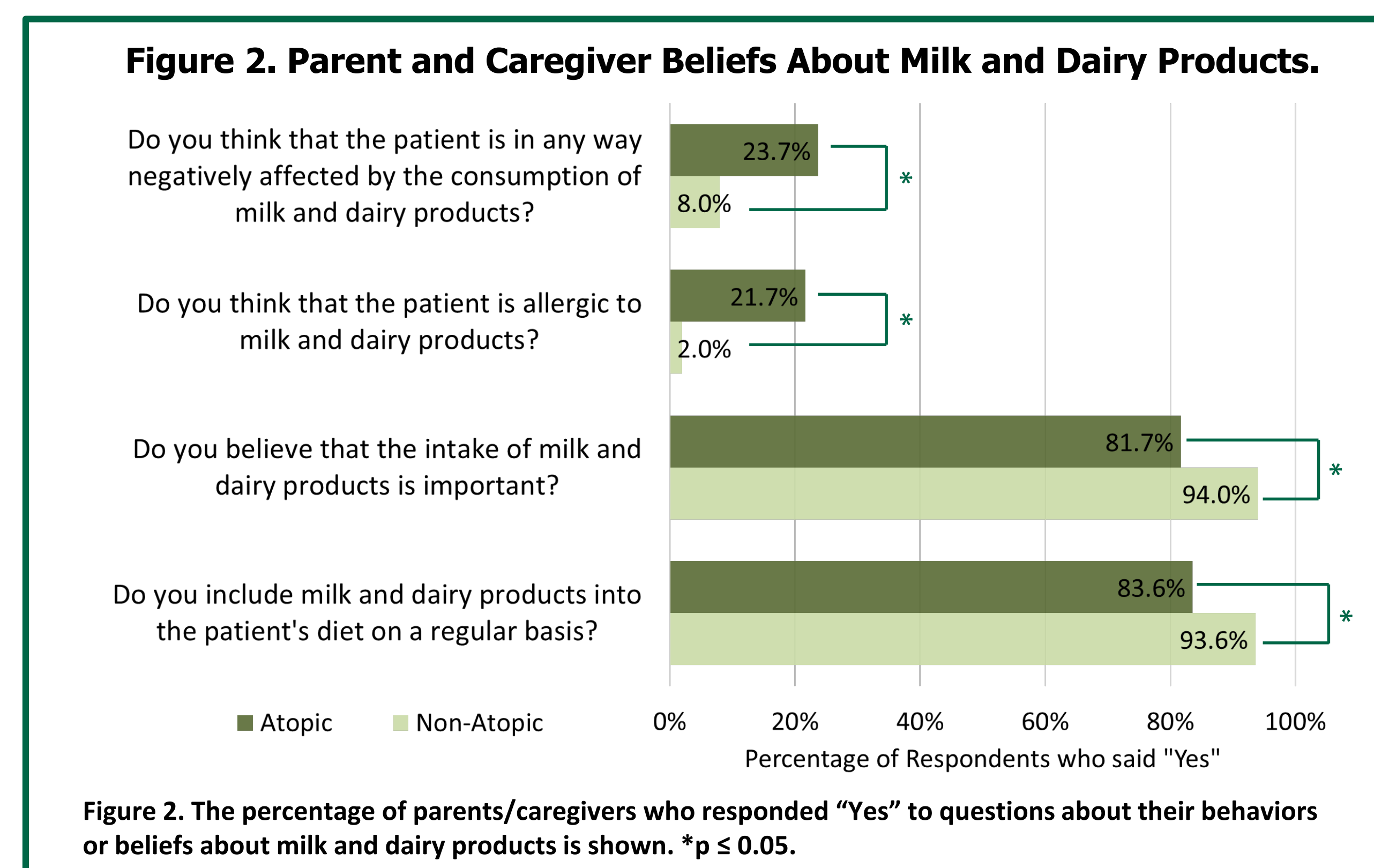
- A previously validated food frequency questionnaire (FFQ) and belief survey were administered to 220 parents/caregivers (PCs) of children aged 3-13 years.
 - Atopic Group: 110 PCs of children with a diagnosed atopic disease (allergic rhinitis, asthma, food allergy, and/or atopic dermatitis) receiving care at an outpatient allergy clinic
 - Non-Atopic Group: 110 PCs of children without atopic disease and chronic healthcare problems that could impact dietary intake (ex. non-atopic chronic inflammatory diseases, cystic fibrosis, cancer, eating disorders, etc.) receiving care at an outpatient general pediatrics clinic
- Subjects were selected consecutively. A member of the research team informed PCs of the study, obtained verbal consent, and remained with the PCs to address questions as they completed the survey.
- Calcium and vitamin D intake were calculated from FFQ responses and compared to NIH recommended daily intake for the child's age.
- Data were analyzed for differences between atopic and non-atopic groups across demographic information, PCs behavior and attitude towards MDPs and frequency of sufficient calcium and vitamin D intake using chi-square analyses ($\alpha = 0.05$).

Results

Figure 1. Demographic Information of Subjects.

| Characteristic | Atopic (n=110) | Non-Atopic (n=110) |
|-------------------|----------------|--------------------|
| Age—years | | |
| Median [Range] | 7 [3-13] | 6 [3-13] |
| Sex—% (n) | | |
| Male | 58% (64) | 47% (52) |
| Female | 42% (46) | 53% (58) |
| Race—% (n) | | |
| Caucasian | 56% (62) | 26% (28) |
| Hispanic/Latino | 10% (11) | 24% (26) |
| African American | 12% (13) | 25% (27) |
| Asian | 7% (8) | 9% (10) |
| Native American | 2% (2) | 0% (0) |
| Multiracial | 11% (12) | 16% (17) |
| Unspecified | 2% (2) | 2% (2) |

Figure 1. The demographic composition of the study population is shown. * $p \leq 0.05$.



Discussion

- 77.3% of non-atopic and 51.8% of atopic children meet the daily recommended calcium intake ($p < 0.001$)
 - The ratio of FFQ-calculated calcium intake to daily recommended level is 1.25 ± 0.08 in the non-atopic and 1.88 ± 0.13 in the atopic group ($p < 0.001$) indicating that average intake nears the daily recommendation in both groups
 - A significantly larger percent of calcium intake in the atopic (7.6% of daily intake) versus non-atopic (1.9% of daily intake) group is from supplements ($p < 0.001$)
- Both groups have inadequate vitamin D intake—82.7% of non-atopic and 87.3% of atopic children do not meet the daily recommended intake level ($p = 0.345$)
 - The ratio of FFQ-calculated vitamin D intake to daily recommended level is 0.57 ± 0.04 in the non-atopic and 0.45 ± 0.04 in the atopic group ($p = 0.051$)
- Significantly more PCs of non-atopic versus atopic children include milk and dairy products (MDPs) in their child's diet (93.6% vs. 83.6%, $p = 0.010$) and believe intake of these products is important (94.0% vs. 81.7%, $p = 0.009$)
- 21.7% of PCs of atopic versus 2.0% of PCs of non-atopic children believe their child is allergic to MDPs ($p = 0.003$)
 - 3 children in the atopic group (2.7%) have physician-diagnosed IgE-mediated milk allergy
- When the 3 children with diagnosed milk allergy were excluded from analysis, results for calcium and vitamin D intake and PCs beliefs did not change significantly

Conclusion

- Neither the atopic nor non-atopic groups completely meet the daily recommended calcium and vitamin D intake levels.
 - The non-atopic group performs better in calcium consumption than the atopic group.
 - Both atopic and non-atopic groups have poor consumption of vitamin D.
- Parents/caregivers (PCs) of atopic children have more negative beliefs about milk and dairy products (MDPs) and are less likely to include them in their child's diet than PCs of non-atopic children. They also overestimate the possibility for milk allergy.
- Non-atopic and atopic children are at risk of insufficient calcium and vitamin D intake.
- Further investigation is needed to determine extent of PCs nutritional knowledge and define negative beliefs PCs have regarding MDPs.