New Findings from the Feeding Infants and Toddlers Study 2008

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Abstract

The purpose of this chapter is to describe the infant feeding practices among infants and toddlers (aged 0–24 months) and to describe food group consumption patterns of these infants and young children (0–48 months) participating in the 2008 Feeding Infants and Toddlers Study (FITS). The FITS 2008 is a cross-sectional survey of a national sample of US children (n = 3,273). Results indicate a longer duration of breastfeeding; however, 17% of infants received cow’s milk before the recommended age of one year. Introduction of complementary foods also appears to be delayed until about 4–6 months. There was a decline in consumption of infant cereal after 8 months that may be contributing to iron deficiencies in the 9–11 months age group. Consumption of 100% juice (particularly among infants) and the daily consumption of desserts or candy, sweetened beverages (particularly among 12- to 20-month-olds), and salty snacks is lower than in the 2002 survey. Overall, 10–20 and 30% of children were not consuming any fruit or vegetable, respectively, in a given day. More preschoolers were drinking 2% milk than whole milk, but about one third were still drinking whole milk. Despite some of these positive changes, improvements in young children’s diet still are needed.

Introduction

Providing adequate early childhood nutrition is a major concern across the globe. Improper infant feeding, including issues related to breastfeeding, use of human milk substitutes and complementary feeding are linked both with overall inadequate nutrient and food consumption patterns and concerns related to energy imbalance and excessive weight gain [1]. For preschoolers
(2- to 4-year-olds), issues such as increased frequency of eating and increased portion sizes are linked with overall poor dietary patterns [1]. Limited information exists from large, national samples in the US that can contribute to our understanding of the parental behaviors potentially leading to early childhood obesity. The previous Feeding Infants and Toddlers Study (FITS), conducted in 2002 on a national random sample, was instrumental in documenting the feeding patterns of children from 4 to 24 months of age [2, 3]. These data provided incredible insights into some of the problems that may be contributing to the increased rates of obesity at an early age, such as the early introduction of foods during infancy that are high in fat, sugar and sodium reflective of diets found in older children and adults [2]. With the completion of yet another survey conducted in 2008, we have the opportunity to explore how food consumption patterns have changed over time. This newer survey includes children beyond the age of 2 years. Thus, the purpose of this paper is to describe the infant feeding practices in terms of breastfeeding and use of human milk substitutes as well as the introduction of complementary foods among infants and toddlers (aged 0–24 months) and to describe food group consumption patterns of these infants and young children (0–48 months) participating in FITS 2008.

Methods

Study Design and Response Rates

The FITS 2008 is a cross-sectional survey of a national random sample of US children from birth through 47 months of age similar to the initial survey conducted in 2002, but with an expanded age group [4]. The recruitment of subjects, the sampling frame, sample characteristics, and data collection and quality assurance procedures have been previously described in detail by Briefel et al. [5]. Among respondents who completed the recruitment interview, 78% completed a 24-hour dietary recall. The overall analytic response rate among those located with an eligible child was 47%. All instruments and procedures were reviewed and approved by Mathematica Policy Research’s independent Institutional Review Board (Public/Private Ventures in Philadelphia, PA, USA).

Sample

The FITS 2008 sample size for the dietary analysis includes 3,273 children aged 0–48 months. The results presented in this article are divided primarily into four groups according to the following age ranges: infants aged 0–5.9 months (meaning from birth up to 6 months; n = 382), older infants aged 6–11.9 months (n = 505), toddlers aged 12–23.9 months (n = 925), and young children aged 24–47.9 months (n = 1,461). It is important to note that because of the variable feeding practices present in the younger age groups, data will often be mentioned in terms of nine smaller subgroups – infants aged 0–3.9 months (n = 216), 4–5.9 months (n = 166), 6–8.9 months (n = 249), and 9–11.9 months (n = 256); toddlers aged 12–14.9 months (n = 243), 15–17.9 months (n = 251), 18–20.9 months (n = 219), and 21–23.9 months (n = 212), and finally young children aged 24–47.9 months (n = 1,461). These separations serve to clarify nutritional differences inherent in breastfeeding rates over time and illuminate
New Findings from the FITS 2008

certain findings within the survey data relevant to the increasing reliance upon other forms of food intake as the child develops during the first 4 years of life.

Statistical Analysis
All foods and beverages reported in the 24-hour dietary recalls were assigned by Mathematica nutrition researchers to food groups in a manner consistent with those used for the food group analysis in the 2002 FITS [2]. The 2002 food groups were updated and expanded, as needed, to incorporate new foods and beverages reported in the FITS 2008 and to address the research objectives on consumption of foods and food groups/subgroups.

We used the food group data to calculate the percentage of children who consumed specific foods or food groups at least once in a day. One-day estimates from 24-hour recalls for the purpose of estimating group means has been previously shown to be appropriate [6]. All reported foods and beverages are included in the estimates, regardless of the amount consumed. Estimates are based on foods as consumed, i.e. food mixtures, such as soups, pizza, or pasta-based dishes, are considered single items and were not broken down into their constituent ingredients. In this manner, the estimates of the percentages of infants and toddlers consuming vegetables and fruits should be considered as lower-bound estimates.

Sample weights were calculated to account for nonresponse and to weight the sample to known population demographic characteristics. All estimates (e.g. means, proportions) were calculated using the Statistical Analysis System (version 9.1.3, 2004, SAS Institute, Cary, NC, USA) and accounted for the weighting and design effects. Standard errors were calculated using SUDAAN (release 9, 2005, Research Triangle Institute, Research Triangle Park, NC, USA).

Results

Population Characteristics
About 56% of the dietary sample was non-Hispanic white, 14% non-Hispanic black, 21% Hispanic, and 8% other race/ethnicity. About one third (35%) of children were first born, 48% were in child care, and 30% were receiving benefits from the Special Supplemental Nutrition Program for Women, Infants, and Children. About half (51%) of the children's mothers worked outside the home, and 46% had a college degree or higher. About 13% of the sample had annual household incomes below USD 20,000 and 16% above USD 100,000. Additional information on sample characteristics is described elsewhere [5].

Infant Feeding Practices
In 2008, rates for infants and toddlers aged from 0 to 23.9 months being ‘ever breastfed’ were high (78.5 ± 1.3%, mean ± standard error). Figure 1 shows little difference between the three youngest age groups (0–5.9 months, 6–11.9 months, and 12–24 months) in terms of their having ever been breastfed, characterized by a range of percentages from 74.9 ± 4.2 to 83.8 ± 3.6% for children aged 6–8.9 and 21–23.9 months, respectively. The percentage of infants currently breastfeeding was highest for the 0–3.9 months age subgroup (59.5 ± 5.2%), while a considerably smaller percentage from the next
subgroup (4–5.9 months of age) were currently breastfeeding (42.5 ± 5.1%). Around the one-year age milestone, breastfeeding continues to decrease: 36.7 ± 5.0% of infants aged 9–11.9 months were breastfeeding, whereas only 15.1 ± 3.1% of 12- to 14.9-month-old children were doing so. A decrease in breastfeeding with increasing age was consistent throughout the older age subgroups, with rates of breastfeeding among toddlers aged 15–23.9 months in the single digits.

Figure 2 shows the percentage of infants and toddlers consuming different types of milk at least once a day, thus more than one type of milk can be consumed. The only age group for which breastfeeding was the leading milk source was the 0–3.9 months infant group; 57.5 ± 5.3% of these infants consumed breast milk on any given day, while 56.5 ± 5.6% consumed formula. For 4- to 5.9-month-olds, 42.2 ± 5.1% consumed breast milk on a given day and 65.3 ± 5.0% consumed formula. Cow’s milk is first seen among 6- to 8.9-month-olds, with 5.3% reporting consumption, and the proportion increases to 16.6% among the 9–11.9 months age group. As expected, breast milk and formula decrease as milk sources in the 2nd year of life, with cow’s milk serving as the primary form of milk for toddlers. Nearly 90% of toddlers aged 21–23.9 months consumed cow’s milk on a daily basis, whereas breast milk and formula were only consumed by 5.6 ± 2.3 and 1.3 ± 0.8% of children, respectively. Likewise, children aged from 24 to 47.9 months relied almost exclusively on cow’s milk. Of the different kinds of cow’s milk consumed by toddlers, the most common was whole milk (consumed by 59.8 ± 4.8 to 68.7 ± 4.8% of those toddlers aged 12–23.9 months). As these children aged, consumption of reduced fat forms of milk (including 1–2% fat and non-fat milks) became increasingly common; reduced fat milks were consumed daily by 14.1,
49.8 and 71.0% of children aged 12–14.9 months, 24–29.9 months and 36–41.9 months, respectively. There was an increase in the percentage of older toddlers (21–23.9 months old) consuming flavored milk on a daily basis, 11.2 ± 4.4%, markedly up from 1.0 ± 0.5% among 18- to 20.9-month-old toddlers.

The use of complementary foods is shown across all age groups in figure 3. For infants aged 0–3.9 months, there was negligible consumption of complementary foods other than grains (10.9%, predominately in the form of infant cereal). Introduction of the other complementary foods took place to some degree at 4–5.9 months of age, with the majority (52.0%) of children in this age group consuming grains (fig. 3); specifically, 50.4% of children aged 4–5.9 months were consuming infant cereal within the grains food group (fig. 4). Infant cereal consumption peaked in the 6–8.9 months age group at a level of 79.1%, tailing off gradually to a level of 8.0% by 15–17.9 months. Referring again to figure 3, with increased age from 0 to 11.9 months, there was a consistent pattern of increase in the percentage of children consuming from each of the complementary food groups (grains, vegetables, fruits/juices, meats/fish/eggs/nuts, and sweets/sweetened beverages/salty snacks). In the 4–5.9 months age group, vegetables and fruits had all three surged in importance to the complementary diet, with 62.8, 76.9 and 38.5% of infants consuming from these groups, respectively. By the last quarter of the first year of life, increases in the percentages of children experiencing intake of grains, vegetables and fruits stabilizes at high levels: 92.2, 72.3 and 89.8%, respectively. Protein and sweet intake contin-
ued steady growth halfway into the 2nd year, when all complementary groups showed somewhat consistent consumption levels at or above 60%.

**Grains**

By the age of 6–8.9 months, nearly 90% of children consumed some grain product daily, and by the beginning of the 2nd year grain intake had plateaued at a level approaching 99% among 12- to 14.9-month-old toddlers (fig. 3) By 12–14.9 months, less than one quarter of children consumed infant cereals, down from 79.1 ± 3.5% at 6–8.9 months of age (fig. 4). During the span between 6–8.9 and 12–14.9 months, consumption of any non-infant cereal at least once per day increased from 7.7 ± 2.2 to 62.5 ± 4.6%. At the end of the 2nd year, non-infant cereal intake had maintained a constant consumption level around 60% among toddlers. In the 4th year of life, negligible amounts of infant cereal was consumed, while a steady 50% of children consumed non-infant cereal, two thirds of which was whole grain (data not shown). Presweetened non-infant cereals were consumed in increasing amounts from age 12–14.9 months (19.1 ± 3.2%) to 21–23.9 months (30.0 ± 4.6%), whereas non-presweetened cereals decreased from 47.4 ± 4.9 to 30.0 ± 4.9% over the same age interval. For children of 2 and 3 years of age, these 30% intake levels of both presweetened and non-sweetened were maintained with little variation. Over the entire span from 12 to 47.9 months of age, whole-grain cereals were eaten far more commonly than non-whole grain (by a factor of 2 to 3) across all age groups in which non-infant cereals were consumed. Bread and rolls were consumed at least once a day by 2.6 and 14.3% of infants aged

![Graph showing consumption of various complementary foods by age groupings in the first 18 months of life in the FITS 2008.](image-url)
6–8.9 and 9–11.9 months of age and then remained at roughly 30% for all age groups thereafter. Other major sources of grain were: snack foods such as crackers, pretzels and rice cakes; rice and pasta; sandwiches, macaroni, pizza and mixed pastas (such as spaghetti and lasagna). Each of these food types was consumed by small percentages of infants younger than one year, but achieved higher and relatively stable levels of consumption among toddlers (data not shown).

**Fruits and Juices**

Fruits and fruit juices were introduced in many cases (21.8 ± 3.9%) to the diets of 4- to 5.9-month-old infants, and soon became commonplace (fig. 3 and 5), present in the diets of approximately 90% of toddlers between 12 and 23.9 months of age. After 9 months of age, 100% fruit juice contributes to approximately 50% or greater of total fruit intake (fig. 5). The intake of baby food fruit decreased by the middle of the 2nd year, from 50.2 ± 5.4% for infants aged 6–8.9 months to 15.9 ± 3.7% for toddlers 6 months older; in contrast, non-baby food fruit rose from 21.2 ± 5.2 to 68.8 ± 4.4% over the same 6-month interval. Non-baby food fruits began to be consumed by the majority (51.9 ± 5.0%) of children at age 9–11.9 months and became more common yet (72.2 ± 4.6%) as children aged to 24 months. Bananas were the primary source of fresh fruit through the end of the first year, at which point apples and grapes became more common in the diets of toddlers; applesauce and peaches served as the primary canned fruits consumed when children were no longer being fed baby food fruits.

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**Fig. 4.** Percentage of children consuming various forms of grain by age groupings in the first 4 years of life in the FITS 2008.
Vegetables

Vegetables were introduced to the diets of infants similarly to fruits, with a quarter of those aged 4–5.9 months consuming any vegetable at least once a day (table 1). Unlike fruits, however, vegetables never attained the same high levels of intake throughout the later age groups, though they grew rapidly in importance to children’s diets between 4 and 11.9 months. Approximately 70% of older infants (over 6 months), toddlers and 2- and 3-year olds ate any vegetable at least once a day. Over half of infants consumed baby food vegetables at age 6–8.9 months, while just 15% of toddlers 6 months older did so. As baby food consumption decreased between these two age groups, cooked vegetable consumption increased by four times to 61%, at which point it remained relatively constant through the remainder of the second year of life. The proportion of children consuming dark green vegetables (such as broccoli, greens and lettuce), orange vegetables (such as carrots and sweet potatoes) and other vegetables such as mashed potatoes, corn, peas, onions and tomatoes) at least once a day varied across the ages as shown in table 1. The proportion consuming French fries was negligible at 6–8.9 months of age, increased to 6.3% at 9–11.9 and then remained in the range of 15–20% thereafter.

Meats, Fish, Eggs, and Nuts

Percentages of infants and toddlers consuming different types of protein sources are presented in table 2. While fruits and vegetables were first introduced to infants between 4 and 5.9 months of age, we see that meats and proteins were not introduced until slightly later, at 6–8.9 months, during which time nearly half of children consumed a protein source at least once a day,


| Table 1. Percentage of children consuming different types of vegetables at least once in a day |
|---------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|                               | 0-5 months | 6-11 months | 12-23 months | 24-35 months | 36-47 months |
| 0-3.9  | 4-5.9  | 6-8.9  | 9-11.9 | 12-14.9 | 15-17.9 | 18-20.9 | 21-23.9 | 24-29.9 | 30-35.9 | 36-41.9 | 42-47.9 |
| Any Vegetable                  | 1.5 ± 0.9a | 25.9 ± 4.6 | 62.8 ± 5.3 | 72.3 ± 4.8 | 72.4 ± 4.7 | 70.8 ± 5.0 | 72.1 ± 4.1 | 68.1 ± 5.7 | 70.2 ± 4.0 | 71.8 ± 3.9 | 66.8 ± 3.9 | 69.8 ± 3.8 |
| Baby food vegetables           | 1.1 ± 0.8a | 24.3 ± 4.6 | 51.3 ± 5.3 | 33.8 ± 4.3 | 15.1 ± 3.5 | 7.6 ± 2.3a | 2.7 ± 1.6 | 1.5 ± 1.0 | 0.2 ± 0.1a | 0.1 ± 0.1a | 0.6 ± 0.5a | 1.0 ± 0.8a |
| Cooked vegetables              | 0.4 ± 0.4a | 1.8 ± 0.7a | 15.2 ± 3.5 | 45.4 ± 5.0 | 61.0 ± 4.8 | 60.7 ± 5.1 | 69.2 ± 4.2 | 62.9 ± 5.7 | 62.8 ± 4.4 | 62.7 ± 4.4 | 57.9 ± 4.1 | 55.8 ± 4.3 |
| Raw vegetables                 | 0.0 ± 0.0 | 0.0 ± 0.0 | 0.0 ± 0.0 | 4.8 ± 1.9a | 6.1 ± 1.9a | 9.5 ± 2.3 | 8.6 ± 2.7a | 15.6 ± 4.5 | 21.7 ± 4.0 | 24.7 ± 4.6 | 16.5 ± 2.3 | 24.0 ± 3.5 |
| Types of vegetables            |       |       |       |       |       |       |       |       |       |       |       |       |
| Dark green vegetables          | 0.0 ± 0.0 | 0.0 ± 0.0 | 2.0 ± 1.6a | 10.9 ± 3.6 | 10.9 ± 3.2 | 6.5 ± 1.8a | 12.6 ± 4.5 | 8.7 ± 2.6a | 11.4 ± 3.1 | 16.6 ± 4.1 | 14.9 ± 3.9 | 7.9 ± 1.8 |
| Deep yellow vegetables         | 0.8 ± 0.7a | 20.5 ± 4.3 | 36.0 ± 4.9 | 30.3 ± 4.1 | 24.4 ± 4.5 | 15.1 ± 3.6 | 20.7 ± 5.1 | 15.4 ± 4.7 | 12.5 ± 2.5 | 15.9 ± 4.1 | 11.6 ± 2.8 | 16.0 ± 3.6 |
| White potatoes                 | 0.4 ± 0.4a | 0.6 ± 0.4a | 5.4 ± 2.5a | 20.1 ± 3.6 | 32.4 ± 4.6 | 29.6 ± 5.0 | 26.1 ± 4.2 | 31.5 ± 5.6 | 36.2 ± 4.4 | 33.4 ± 4.4 | 21.6 ± 3.1 | 31.1 ± 3.9 |
| French fries and other fried potatoes | 0.0 ± 0.0 | 0.0 ± 0.0 | 0.8 ± 0.6a | 6.3 ± 2.3a | 18.5 ± 3.8 | 11.6 ± 3.7 | 13.8 ± 3.2 | 16.7 ± 3.7 | 17.6 ± 3.5 | 20.6 ± 4.1 | 14.0 ± 2.8 | 21.4 ± 3.5 |
### Table 1. Continued

<table>
<thead>
<tr>
<th></th>
<th>0–5 months</th>
<th>6–11 months</th>
<th>12–23 months</th>
<th>24–35 months</th>
<th>36–47 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0–3.9</td>
<td>4–5.9</td>
<td>6–8.9</td>
<td>9–11.9</td>
<td>12–14.9</td>
</tr>
<tr>
<td>Other starchy vegetables</td>
<td>0.1 ± 0.1a</td>
<td>1.8 ± 0.9a</td>
<td>12.4 ± 3.5</td>
<td>12.6 ± 2.7</td>
<td>11.8 ± 2.1</td>
</tr>
<tr>
<td>Other vegetables</td>
<td>0.3 ± 0.3a</td>
<td>8.1 ± 3.3</td>
<td>23.9 ± 4.9</td>
<td>28.4 ± 4.4</td>
<td>26.8 ± 3.7</td>
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<tr>
<td>Sample size</td>
<td>216</td>
<td>166</td>
<td>249</td>
<td>256</td>
<td>243</td>
</tr>
</tbody>
</table>

Data from 2008 FITS.

*Point estimate is considered imprecise because of small sample size and uncommon or very common event.*

*Includes 100% vegetable juice.*

*Includes commercial baby food, cooked vegetables, and raw vegetables.*

*Reported dark green vegetables include broccoli, spinach and other greens, and romaine lettuce.*

*Reported deep yellow vegetables include carrots, pumpkin, sweet potatoes, and winter squash.*

*Reported starchy vegetables include corn, green peas, immature lima beans, black-eyed peas (not dried), cassava, and rutabaga.*

*Other reported vegetables include artichokes, asparagus, beets, Brussels sprouts, cabbage, cauliflower, celery, cucumber, eggplant, green beans, lettuce, mushrooms, okra, onions, pea pods, peppers, tomatoes/tomato sauce, wax/yellow beans, and zucchini/su.*
### Table 2. Percentage of children consuming meat or other protein sources at least once in a day (± standard error)

<table>
<thead>
<tr>
<th>Protein Sources</th>
<th>0–5 months</th>
<th>6–11 months</th>
<th>12–23 months</th>
<th>24–35 months</th>
<th>36–47 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any meat or protein source</td>
<td>0.0 ± 0.0</td>
<td>3.1 ± 2.0</td>
<td>38.5 ± 5.4</td>
<td>91.4 ± 2.3</td>
<td>91.0 ± 2.8</td>
</tr>
<tr>
<td>Baby food meat</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
<td>4.6 ± 1.9</td>
<td>2.1 ± 0.9</td>
<td>0.9 ± 0.6</td>
</tr>
<tr>
<td>Non-baby food meat</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
<td>3.6 ± 1.3</td>
<td>60.4 ± 4.8</td>
<td>74.9 ± 3.7</td>
</tr>
<tr>
<td>Other protein sources</td>
<td>0.0 ± 0.0</td>
<td>0.2 ± 0.2</td>
<td>12.6 ± 3.7</td>
<td>59.4 ± 4.5</td>
<td>60.8 ± 5.3</td>
</tr>
<tr>
<td>Dried beans and peas, vegetarian meat</td>
<td>0.0 ± 0.0</td>
<td>3.1 ± 1.6</td>
<td>2.0 ± 0.8</td>
<td>12.5 ± 3.5</td>
<td>11.5 ± 3.4</td>
</tr>
<tr>
<td>Protein sources in mixed dishes</td>
<td>0.0 ± 0.0</td>
<td>2.9 ± 2.0</td>
<td>25.8 ± 5.0</td>
<td>33.2 ± 4.6</td>
<td>24.5 ± 4.7</td>
</tr>
<tr>
<td>Sample size</td>
<td>216</td>
<td>166</td>
<td>249</td>
<td>256</td>
<td>243</td>
</tr>
</tbody>
</table>

Data from 2008 FITS.

*Point estimate is considered imprecise because of small sample size and uncommon or very common event.

*Includes baby yogurt.

*Includes baby food and toddler dinners as well as mixed dishes such as beans and rice, chili, pasta dishes and soup.
### Table 3. Percentage of children consuming desserts, sweets, salty snacks and sweetened beverages at least once in a day

<table>
<thead>
<tr>
<th></th>
<th>0–5 months</th>
<th>6–11 months</th>
<th>12–23 months</th>
<th>24–35 months</th>
<th>36–47 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Type of Dessert, Sweet, or Sweetened Beverage</td>
<td>0.3 ± 0.2a</td>
<td>4.8 ± 2.2a</td>
<td>17.0 ± 4.5</td>
<td>43.0 ± 5.0</td>
<td>62.8 ± 4.6</td>
</tr>
<tr>
<td>Desserts and candy</td>
<td>0.0 ± 0.0</td>
<td>4.2 ± 2.1a</td>
<td>11.2 ± 2.1</td>
<td>35.9 ± 4.8</td>
<td>53.9 ± 4.8</td>
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<tr>
<td>Baby food desserts</td>
<td>0.0 ± 0.0</td>
<td>1.2 ± 1.2a</td>
<td>2.8 ± 1.0a</td>
<td>11.9 ± 3.9</td>
<td>2.0 ± 1.0a</td>
</tr>
<tr>
<td>Cakes, pies, cookies, and pastries</td>
<td>0.0 ± 0.0</td>
<td>0.7 ± 0.7a</td>
<td>7.9 ± 1.8a</td>
<td>22.5 ± 3.6</td>
<td>40.4 ± 4.9</td>
</tr>
<tr>
<td>Ice cream, frozen yogurt, pudding, Other desserts</td>
<td>0.0 ± 0.0</td>
<td>1.4 ± 1.4a</td>
<td>0.9 ± 0.7a</td>
<td>6.5 ± 3.2a</td>
<td>10.3 ± 3.4</td>
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<tr>
<td>Candy</td>
<td>0.0 ± 0.0</td>
<td>0.8 ± 0.8a</td>
<td>0.0 ± 0.0</td>
<td>0.5 ± 0.4a</td>
<td>6.6 ± 2.4a</td>
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<tr>
<td>Other Sweets</td>
<td>0.3 ± 0.2a</td>
<td>0.0 ± 0.0</td>
<td>1.2 ± 0.9a</td>
<td>6.5 ± 2.5a</td>
<td>7.7 ± 1.8a</td>
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<tr>
<td>Milk flavorings</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
<td>1.4 ± 1.4a</td>
<td>0.9 ± 0.6a</td>
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<tr>
<td>Sugar, syrup, preserves</td>
<td>0.3 ± 0.2a</td>
<td>0.0 ± 0.0</td>
<td>1.2 ± 0.9a</td>
<td>5.2 ± 2.1a</td>
<td>6.8 ± 1.6a</td>
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<tr>
<td>Sweetened Beverages</td>
<td>0.0 ± 0.0</td>
<td>0.6 ± 0.6a</td>
<td>5.0 ± 4.3a</td>
<td>10.7 ± 3.2</td>
<td>14.3 ± 3.0</td>
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<tr>
<td>Carbonated sodas</td>
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<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
<td>2.1 ± 1.5a</td>
<td>1.4 ± 0.8a</td>
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<td>Category</td>
<td>Sample Size</td>
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<td>5.0 ± 4.3</td>
<td>6.3 ± 2.6</td>
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<td>-----------</td>
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<td>-----------</td>
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</tr>
<tr>
<td>Fruit–flavored drinks</td>
<td>216</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
<td>1.8 ± 1.2</td>
<td>0.7 ± 0.7</td>
</tr>
<tr>
<td>Sweetened tea and coffee</td>
<td>166</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
<td>0.1 ± 0.1</td>
<td>1.3 ± 0.7</td>
</tr>
<tr>
<td>Sport drinks</td>
<td>249</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
<td>0.1 ± 0.1</td>
<td>2.3 ± 1.1</td>
</tr>
<tr>
<td>Other</td>
<td>243</td>
<td>0.0 ± 0.0</td>
<td>0.0 ± 0.0</td>
<td>1.4 ± 1.3</td>
<td>0.0 ± 0.0</td>
</tr>
<tr>
<td>Whole grain</td>
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<td>0.0 ± 0.0</td>
<td>1.4 ± 0.9</td>
<td>2.4 ± 1.4</td>
</tr>
</tbody>
</table>

Data from 2008 FITS.

*Point estimate is considered imprecise because of small sample size and uncommon or very common event.

bIncludes potato chips, popcorn, cheese curls/puffs, tortilla chips, and other types of chips and salty snacks.
usually in the form of yogurt or baby food dinners. Similar to the growth pattern observed regarding fruit in the infant diet, meats and proteins surged in importance at the end of the first year (over 75%), by which time the majority of children had graduated to eating non-baby food meats. From 12 months until the end of the 4th year, 90% of children eat at least some protein on any given day. From the age of 9 months, the leading meats were chicken and turkey, which together represented the meat intake of 21.7 ± 4.4% of 9- to 11.9-month-old infants; for 2- to 4-year olds, chicken and turkey were consumed by 36–47% of children. Hot dogs, sausages and cold cuts were consumed predominantly by toddlers and children at slightly lower levels than chicken and turkey (data not shown). In addition to discrete types of meats, 20% of toddlers between 12 and 47.9 months of age consumed meat in mixed dishes such as soups or vegetable/rice/meat mixtures. Approximately two thirds of toddlers and children through age 4 consumed non-meat sources of protein daily, chief among them yogurt and cheese (but also including meat substitutes, eggs and nuts), which contributed considerably to the protein levels among children in their 2nd year.

Sweets, Sweetened Beverages, and Salty Snacks

Shown in table 3 is the rapid increase in consumption of sweets and sweetened beverages from infancy to the 4th year of life. From 0 to 5.9 months of age, there is almost no considerable intake of sweets among infants, with a small proportion of children eating either baby food desserts or ice cream. By 6–9 months of age, nearly one fifth of infants consumed a sweet on any given day, primarily in the form of cookies and fruit-flavored drinks. Within 3 months, this value nearly triples to 43%, and within another year it doubles again to 80% at the end of the 2nd year, only to climb further into the 90% range by age 4. In 2008, one third of toddlers and young children were reported to consume candy. Although there was a 2-fold increase in the intake of salty snacks from the beginning to end of the 2nd year, these snacks contributed no considerable percentage of whole grain consumption to the children’s diet. Lastly, sweetened beverages (including carbonated sodas and fruit-flavored drinks) were consumed by 10% of older infants, 38% of older toddlers, and 58% of 3-year-olds; approximately 10% of children over one year of age consumed soda at least once per day.

Discussion

Developing good eating habits early in life is important for one’s long-term health status. [7–9] The FITS 2008 data illustrate that some positive changes have occurred since the last survey was conducted in 2002 while concern still exists in other areas. Of great importance is what appears to be a longer duration of breastfeeding followed by a delay in the introduction of complementary
foods. The 2002 FITS revealed that breastfeeding occurred in just 40, 26 and 21% of infants aged 4–5.9, 6–8.9 and 9–11.9 months, respectively [3]. In 2008, however, levels of breast milk consumption in these same age groups were 42, 33 and 33%. This pattern of a longer duration of breastfeeding has also been documented by others for the same time period [10]. Both a longer duration of breastfeeding and a delayed introduction of complementary foods are positive trends given their suggested role in the development of childhood obesity [11, 12]. The American Academy of Pediatrics (AAP) recommends exclusive breastfeeding throughout the first 6 months of life but also states that the introduction of complementary foods can occur around 4–6 months when the infant is developmentally ready [13, 14]. The 2008 survey shows that more children are beginning complementary foods at 6 months than in 2002. For example, data from the 2002 FITS showed that 29% of infants younger than 4 months were introduced to complementary foods, and this number was negligible in 2008. Of those aged 4–5.9 months in 2002, 65% consumed any infant cereal, 39% consumed fruit and 36% consumed a vegetable [3]. In 2008, each of these levels was lower (52, 22 and 26%, respectively); these percentages therefore suggest a more appropriate pattern of complementary food introduction in 2008.

On the other hand, not consistent with AAP guidelines was the continued use of cow’s milk prior to 1 year of age, with 17% of children falling into this category in 2008, as compared with 20% in 2002 [2]. In 2008, approximately 20–30% of children were fed reduced fat milk on a daily basis during their 2nd year, which also conflicts with the recommendations of the AAP [13]; in 2002, 20–40% of children consumed reduced fat milk as toddlers [2]. While AAP recommends whole milk for children 12–24 months old [13], the American Heart Association recommends 2% milk for children in this age group [15]. This conflicting recommendation may make it hard for parents to know which type of milk to feed their child. It is important to keep in mind, that whatever the source of milk, ensuring adequate intake of both total fat and essential fatty acids in the diets of toddlers requires special effort and attention.

Foods rich in iron are recommended to be introduced around 4–6 months of age. [16] Infant cereal, a food that meets this need, was seen to be consumed in 2008 by a lower percentage of infants in two age groups, 4- to 5.9 (50.4%)- and 9- to 11.9 (51%)-month-olds, compared to the 2002 survey; 64.8% of 4- to 5.9-month olds and 63.8% of 9- to 11.9-month-olds [2]. While delaying the introduction of any complementary food is appropriate for the younger age group, a lower consumption in the older age group is of concern given the inadequate intake of iron in this age group reported by Butte et al. [17], which implies that other rich sources of iron are not being consumed by infants in this age group. This was indeed the case since a significantly lower percentage of infants in this age group were reported to be consuming baby meats. Furthermore, 43% of infants in this age group were consuming non-infant cereals in 2008, consistent with a level of 44% from 2002 [2]. While
non-infant cereals can be used to encourage the development of certain feeding skills, they contain less iron on a per gram basis as infant cereal [18].

The interpretation of how well parents adhere to recommendations regarding fruits and vegetables is more difficult to interpret. While we see a significantly lower percentage reporting consumption of any 100% juice as well as any fruits and vegetables at 4–5.9 months of age – another characteristic of the 2008 data which is in line with delaying the introduction of complementary foods – and a lower percentage of infants 6–11 months of age consuming any 100% juice with a sustained percentage of any fruit consumption, there was still a substantial proportion of infants and toddlers who did not consume any fruit or vegetable in a given day. The proportion not consuming any vegetables was even greater than that of fruits which is consistent with studies showing a preference of fruits at this age [19, 20]. In both 2002 and 2008, about 30% of older infants did not consume a vegetable each day, while about 25% did not eat fruit [2]. This finding of less than adequate fruit and vegetable intake among infants and toddlers is in line with others [21, 22] and is of concern given the World Health Organization’s conclusion that dietary habits from childhood through adulthood could impact one’s risk of cancer [23].

On a positive note, significant reductions in the percentage of infants and toddlers consuming any desserts or candy were seen in 2008. This pattern existed among children aged 6–20.9 months but disappeared starting around 21–23 months. In 2002, for instance, 46% of infants 7- to 8-months-old consumed a sweet, whereas in 2008 only 17% of those 6- to 9-months-old ate a sweet at least once a day [1]. In a similar manner, reductions in the percentage consuming sweetened beverages were observed (data from 2008 reflect a consistent decrease of 10% among 12- to 20.9-month-old toddlers), and for salty snacks among 4- to 11.9-month-olds [2]. Reductions in these foods which are contributors of discretionary calories are appropriate for these age groups.

**Conclusions**

The newest data from FITS appear to indicate that parents/caregivers may have taken to heart the advice of healthcare providers and public health messages that resulted from the publication of the 2002 survey. These positive changes include the longer duration of breastfeeding, a delay in the introduction of complementary foods, and a lower percentage of infants and toddlers consuming fruit juices, desserts, sweets, sweetened beverages, and salty snacks. There are, however, still concerns regarding low iron intake for 9- to 11.9-month-old infants, low fruit and vegetable intake for all children from 6 months to 4 years of age, as well as concerns over the use of cow’s milk prior to one year of age and the use of reduced fat milks in the 2nd year of life. Furthermore, it appears that while we have made strides in the first year of
life, and to some extent in the 2nd year of life, the dietary habits of children after 12 months, and especially 2–4 years of age, are still reflective of the diets of older children and adults. [24–26] We now need targeted messaging to parents to keep monitoring and making wise food choices for their children as they grow older given that adequate and high-quality foods during the early years are of paramount importance for one’s overall health and for the development of healthy eating habits [8, 23].

References

Discussion

Dr. Stettler: I have one clarification and one question. The clarification is about fruits and vegetables in infants and toddlers. Was the percentage that you showed for children who consumed full servings as defined by USDA?

Dr. Siega-Riz: No, it’s any, it’s not full servings.

Dr. Stettler: Isn’t the recommendation before age 2 years of less than 5 servings of fruits and vegetables?

Dr. Siega-Riz: It’s 5.

Dr. Stettler: Do you have any data on flavored milk?

Dr. Siega-Riz: We do have data on flavored milk, and actually it is in the article in the symposium. But I don’t have those, there are too much data to show, but flavored milk is in there.

Dr. Villalpando: In the early stages, can you tell if it’s full breastfeeding or any breastfeeding in the first 6 months of age?

Dr. Siega-Riz: We do have the data on exclusive breastfeeding. That is right now actually being analyzed so I don’t have those data because you have to take into account the other. That’s based on self-reports, so we can’t verify that it is exclusive breastfeeding. The data that I am showing to you are actually on any breastfeeding, and it could have been mixed feedings.

Dr. Pandey: This study was conducted in America. Does it mean that it was weighted for the American population?

Dr. Siega-Riz: Basically, this is a random sample of mothers who have given birth and children under the age of 5. What we end up doing then is based on those characteristics we use the Census data to actually assign weights to the different children in order that they are reflected back to the representative sample for the United States. We do that for 2002 as well as 2008 so that it reflects what is happening at those two different time points. So, you do get the fact that we have two different populations between 2002 and 2008, but they are reflective of what is going on in the United States because we are using Census data to actually weight the samples up.

Dr. Lack: One big question is have you or are you able to look at introduction of allergenic foods such as eggs, peanuts and so on in addition to milk? That information would be very valuable.
Dr. Siega-Riz: We have the information there, and this is the first pass at the analysis. Because we collected 24-hour recall data, we actually have the type of food, so we will be able to look at that.

Dr. Lack: That would be fascinating. The second question I have is, do you intend to go back to the same cross-sectional cohorts 2 or 3 years later to see whether their diet early on is predictive of diet a few years down the line? These patterns might be set very early.

Dr. Siega-Riz: You have to understand that these are cross-sectional. I don't believe that they actually collected information that would allow them to go back. That was not necessarily one of their intentions.

Dr. Agarwal: Did you find out whether in the families where food and green vegetables consumption was low parents were purchasing green vegetables and fruits? Were the parents consuming green vegetables and fruits themselves?

Dr. Siega-Riz: We did not actually ask parents about parent's about their consumption, so we can't necessarily compare the parents versus the children.

Dr. Ganguly: I have two small questions. First, did you stratify the diet patterns according to the socioeconomic class, and were there any noticeable differences? Second, are there any cultural differences in the consumption of cow's milk in children less than one year of age?

Dr. Siega-Riz: We looked at women who participate in the WIC (Women, Infants and Children) program which is a program in the United States that provides food assistance to individuals below 185% of poverty, so it's considered a low-income group. We have done the analysis to look at differences between the participants of WIC in 2002 versus those in 2008, and we see similar changes. In fact, we are seeing the same sort of positive outcomes in our lower income population. The second question was whether or not we looked at differences in cow's milk by culture. We haven't necessarily done that. Unfortunately, I would say that once you start stratifying the sample by different ethnicities, there are going to be such small samples that you are not going to be able to tell very much. But we are interested in looking at maybe non-White, maybe Hispanic, to be able to understand some of those differences, but even there we are going to have to group the ages to be able to look at differences across ethnic groups.

Dr. Reidy, did you want to mention something?

Dr. Reidy: Yes, as Dr. Siega-Riz said, looking at the WIC and the non-WIC populations, the changes over time have been similar in those two populations. But there are some very interesting differences with WIC children who are the lower income children in the US: significantly less breastfeeding, significantly less infant cereal, we saw a drop off in infant cereal after 8 months, that drop off is even bigger in the WIC children. We saw more whole milk being introduced before a year, even less vegetable consumption than in the general population and even more white potatoes, so there are several trends that are pretty concerning that are different in that WIC population.

Dr. Klish: I know that 50% of your subjects were college educated and the other 50% were not. Were you able to analyze who is getting the messages based on level of education?

Dr. Siega-Riz: We haven't done those analyses as of yet, by maternal education status.

Dr. Kleinman: And just to clarify, this survey was done probably just before the changes in the WIC food package.

Dr. Siega-Riz: They were definitely done before the changes in the WIC food package. The other thing to remember is the fact that WIC has a low prevalence of breastfeeding to begin with anyway.
Dr. Mohanty: I would like to know what the ethnicity of these children was, were they American Whites, African-Americans, American Indians? And question two is: has there been any change in feeding habits over these 8 years?

Dr. Siega-Riz: I am not so sure that there have been changes in feeding habits. The characteristic of the population in 2008 were as follows: 56% are non-Hispanic white, 14% are non-Hispanic black, 21% are Hispanic, and you also see that 30% of the population belongs to WIC, 35% are first born, and 46% have a college education or higher. As I said, because we weight the sample back to the United States Census, in fact there are differences between 2002 and 2008, and so we know that there are differences in our population at those two time points. The purpose of this paper was to basically show that there are different trends, and so in fact we are showing different trends and the kids are getting fed between the two time periods.

Dr. Mohanty: What is it that changes their feeding pattern? Is it recommendations from the American Academy of Pediatrics or some other agency in America?

Dr. Siega-Riz: I am not a pediatrician, I am a nutrition epidemiologist and I am a registered dietician. What I can tell you is the American Academy of Pediatrics sort of makes the consensus that really trickles down. There is a lot of different agencies that sort of adopt that recommendation, that actually help promote it. So, I think you are actually seeing it being promoted in many different sort of avenues, and parents have heard from the pediatricians, parents have heard from the nutritionists, it has been in the lay public, the institute of medicine has had different kinds of reports on obesity among our children and has actually brought some of these issues up to the public.

Dr. Mohanty: Are media advertisements influencing a lot?

Dr. Siega-Riz: Dr. Stettler, do you have anything to say about media advertisements?

Dr. Stettler: For those who are not based in the US, there are very good dietary guidelines for Americans but all of them, so far, have been age 2 and above. So below age 2 what people usually use are the recommendations of the American Academy of Pediatrics, so to answer your question, that's the authority in the US for nutrition up to age 2. After age 2, the US Department of Agriculture has dietary guidelines. Now regarding exposure to media, there is very little regulation in the US. There has been a change recently within industry self-regulation of advertising to children but that may have been after 2008, I don’t remember, it’s around that same period (http://www.bbb.org/us/children-food-beverage-advertising-initiative/).

Dr. Siega-Riz: I must admit, because of the emphasis on childhood obesity in our country, there are many programs, and there are many community programs that have trickled down to head start programs for lower income children that are actually sort of adopting these recommendations in order to get kids to eat healthier. So, I would imagine that if we are to do this again, I would hope that we would actually see some more of these positive trends.

Dr. Kleinman: There have been a number of surveys to look at what parents listen to when it comes to medical advice and dietary guidelines. Physicians remain highly regarded sources of this information, but have less influence because of the many other sources available to parents, through the internet and media. Advertising is highly influential and of course we know that children spend an inordinate amount of screen time each day.

Dr. Siega-Riz: And the one thing I want to add, unfortunately I don't have the slides from the talk that we gave at the American Academy of Pediatrics, but in this survey we were able to ask the question of how many of these children actually have a TV in their room and how many hours of television and screen time they were doing. In fact, I dare to say, even under the age of 2 it’s an incredible number of how many kids
are being exposed to television and they are actually being fed in front of television. So, I think it’s becoming more prevalent and clearly an area of concern.

_Dr. Birch:_ Can you provide information about differences between the 2002 and the 2008 FITTS samples?

_Dr. Siega-Riz:_ There are differences in who participated, but once we weighted up to the United States population, we were actually weighting it up and we were actually describing what’s happening in America at those two different time points. So, what’s happening then between 2002 and 2008 is not necessarily due to the differences in the population but it’s describing really what’s happening, how they are being fed. And we are seeing that in 2008 we have more Hispanics, we have actually some more higher educated individuals, but that’s what’s happening in our population.

_Dr. Lack:_ I understand that you are saying the change in demographics or characteristics you don’t believe explain some of the changes in diet that you have seen, but I just wonder how generalizable your data are to the population because I see 46% of mothers have a college degree or higher, that sounds like a very high level of education. You could argue that the changes in the 6 years took place because you are looking at a very educated population that will take on public health messages more.

_Dr. Siega-Riz:_ Let me take this a little bit further. We have 46% of the mothers in the sample that got surveyed, but then when we weighted it up to the United States, you actually end up downweighting that number because there is less higher educated people. When you create the weights, you are actually reflecting it back to who is living in the United States, so even though you have greater higher educated women in your sample, you are downweighting them to make them representative to who is living in the United States at that time point. That’s the difference.

_Dr. Lack:_ I understand, that answers my question. Related to that, it would be interesting to see if you compare 2002 and 2008 in the college-educated versus non-college-educated families whether that might give you an idea of the cause of this being education, whether you see a difference in one group and not in the other.

_Dr. Siega-Riz:_ We haven’t at all touched the data yet to understand what the determinants of these changes are; and that’s what we need to do, it’s to be able to understand the changes in these behaviors and what’s driving those changes, and we haven’t done the analysis to answer that question yet.

_Dr. Jones:_ Was the sampling done on a week-end or a week day, because there could be a difference in dietary intake? In many parts of the world, there is quite marked seasonal variation, particularly in fruit and vegetable intake, and so was the sampling frame over a whole 12 months or was it in a particular season?

_Dr. Siega-Riz:_ In fact, the dietary intake was one day of dietary intake among all the children and then a small subgroup actually had a second day of dietary intake, and they were mixed between week days and week-ends. And as far as the season is concerned, I don’t remember. Dr. Reidy, do you remember what the season was? I thought that the season was supposed to mimic what we had in 2002.

_Dr. Reidy:_ Actually, the 2002 data were collected in spring-summer, and this was more summer-fall. So, they overlapped quite a bit, but they were a little bit different. Some of the literature that we had consulted indicated that there weren’t huge changes in young children in terms of dietary intake.

_Dr. Jones:_ Mine has to do with vitamin K levels in the blood which are predominantly going to come from green vegetables, and there clearly is marked seasonal variation in vitamin K levels in Australia.

_Dr. Siega-Riz:_ One of the things that we can look at, and you’ll see that we actually did look at the data baby food versus table foods, is to see if there are some seasonal changes. But that’s one of the other layers of analysis that we haven’t necessarily done yet.
Dr. De Beer: I am very interested in your study because we have now done a couple of food consumption surveys in the country. My first question concerns the 24-hour recall methodology which in itself has got certain limitations, and perhaps you want to comment on that. The second question that I have is having potatoes as part of your vegetable group, because by taking that out I think the whole thing changes quite significantly. And the last thing that I want to ask is you mentioned that one of the reasons you saw some changes was based on pediatric recommendations and it related to the breastfeeding duration that was now increased. You said it was the recommendations from the pediatricians. My question to you is, have you actually asked the mums where they get the information from and what causes mums to do what they are doing?

Dr. Siega-Riz: So, 24-hour recall data actually are very good. They are the best data that we have for assessing dietary intake, it’s better than a food frequency questionnaire, some would say. In fact, it allows us to provide more absolute levels of intake. The other thing we have to remember is that we are not necessarily looking at individual intakes, we are looking at group means, so one 24-hour recall to look at the group mean here was considered to be scientifically valid, and we did work with the mums to try to get that information for children who are in day care as well. That’s probably one of the biggest stumbling blocks in collecting dietary information for children of this young age group. There is a lot of them who are spending time in child care. The second question, can you just remind me what that was?

Dr. De Beer: It was related to the potatoes.

Dr. Siega-Riz: As a nutritionist I agree with you. I like to sometimes be able to look at the data with or without potatoes to see really how much contribution it is. So my colleague Barry Popkin and I wrote this classic paper on adolescent nutrition that looked at changes in adolescent dietary behaviors from 1965 through 1994. We actually took out or looked at what proportion of vegetable consumption came from potatoes, and it was one third, it was huge. So, yes, in fact we could argue that perhaps we should be taking that out and looking at it. However, I will also argue that potatoes, if not fried, are a good source of vitamin C, so it’s not necessarily something that we should totally get rid of from the diet, it has a place in the diet. I just wish it wasn’t as prominent. And then the last one was?

Dr. De Beer: The pediatric recommendation.

Dr. Siega-Riz: I think, as my colleague alluded to, when you talk to women, and I talk to a lot of pregnant women because I actually do a lot of research in pregnant women and follow them up through the first year of life of the infants, they will actually tell you that they are influenced not only by their doctor but they are influenced by their mother and other family members and friends. So, it really depends on the cultural upbringing of that particular woman as to who is going to be the most influential person in her making that child feeding decision. I think we need to understand a little bit better about the culture and the culture that that woman has been brought up in to be able to understand. I don’t remember if we actually asked the question, did we?

Dr. Reidy: No, we didn’t, but I wanted to just comment on the recommendation piece. In 2002, it was just about when the AAP came out with their juice recommendation, and that got amazing press for many years after that. I really do think that the recommendation and then the way it was played out in the lay press, pros and cons of juice and how bad juice is, I have no evidence but it seems like that must have been a driving factor behind at least that one change that we saw, I think the timing was perfect for that.

Dr. Mace: Have you tried to stratify your data with the BMI of the parents?
Dr. Siega-Riz: No, and we don't have BMI of the parents. It would all be based on self-reports, so you can only imagine.

Mr. Fryer: With the trends in the 2008 survey of decreasing iron-rich infant cereal and increasing whole milk consumption, has there been any negative impact shown on iron deficiency in the US recently?

Dr. Siega-Riz: That's what I was actually commenting, that in fact these data we can also look at and it's not from a clinical measure, it's from diet and actually looking at the recommended intakes based on the Food and Nutrition Board in the United States. So, we can actually see that there was a slightly higher proportion of children from 9 to 11 months old that have lower intakes of iron. They were below the estimate average requirement, so that's what we were making that comment on.

Dr. Lack: Between 2002 and 2008, there might have been changes in the number of fathers taking care of their infants as a proportion and actually reporting the diet of their infants. Have you looked at the percentages between the two time points and specifically whether fathers report dietary intake in a different way to mothers or feed their children in a different way to mothers?

Dr. Siega-Riz: We do have the information on who the caregiver is, but we have not looked to see whether it's the mother or the father. You bring up some interesting things that would be nice to be able to study, and I am not aware of any studies that I can report. I don't know if anybody has studied differences in feeding behaviors, whether it's a mother or a father actually being the primary caregiver.

Dr. Pandey: Just a comment. We have learned that nutrition at periconceptual age is decisive in the child's food preferences later on in life. So if a child makes a particular food choice, is he/she guided by his/her taste or is it the parents' taste that decides or maybe the genetic predisposition? I think it is not so simple.

Dr. Siega-Riz: I think you are asking a question that a lot of us are very interested in teasing out. I do study maternal nutrition during pregnancy, and I can tell you from our cohort of over 5,000 pregnant women that we have had in North Carolina, and I have colleagues who have actually done similar studies in Massachusetts and Michigan and in Seattle, that we actually see that pregnant women are consuming about 35–40% of the calories from fat, that in fact you see they are not meeting their recommendations of fruits and vegetables and specially not for fiber, and you are also seeing a high consumption of sweetened beverages. When we look at differences by whether it's a first-time mum or a second- or a third-time mum, you actually see the first-time mum is more likely to watch what she is eating, and then as subsequent pregnancies come along, it relaxes a little bit more. We need more of those studies that we are able to then follow and correlate infant feeding behaviors between the mum in pregnancy and the child growing up. Some of us are doing that work, and I think you will actually get to see it. There are some studies that just look at parents feeding behaviors and how it correlates with their child, what the child is consuming, and you do see a pretty high correlation between the two.

Dr. Shreffler: Are you collecting any basic self-reported information about health status of the kids just to see how that might influence dietary choices, eczema, allergies and other problems?

Dr. Reidy: We did ask about a few things. We did ask about food allergies specifically, and then if the children had eaten normally that day or if they were sick.

Dr. Siega-Riz: So, it wouldn't be as detailed as I have seen in some of our cohort studies, where we looked at wheezing and coughing and development of asthma, and whether asthma was diagnosed, like the cohort studies Matthew Gillman and myself have done.