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First Foods Nutrition Curriculum for New Immigrant Families: A Pilot Study

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First Foods Nutrition Curriculum for New Immigrant Families with Young Children: A Pilot Study

Introduction

The first 1000 days of life – from conception through 2 years of age – are a critical window for exposure to risk factors that influence child growth and development. Indeed, interventions to address both undernutrition¹ and overnutrition² highlight pregnancy and the infant and toddler years as a key timeframe to influence long-term health trajectories. Infant and toddler feeding lays a foundation for children's food preferences and influences their weight status in early childhood.^{3,4}

Migration is another factor associated with child⁵ and parental⁶ weight status. Families that migrate to the US enter a nutrition landscape that may significantly differ from their previous setting. Differences may include limited access to preferred foods,^{7,8} improved or worsened food security,^{9,10} availability of food for children at school,¹¹ competing demands on family meals,¹² and a change in the presence of extended family (eg, grandparent) support.¹³ Some families may also experience increased access to processed foods with high levels of fat, sugar, and salt,^{14,15} which places them at increased risk for weight gain and dental caries.

This move to a new nutritional context, along with the importance of developing healthy feeding patterns in early childhood, represents a critical opportunity to influence the long-term health outcomes of recently migrated children through nutrition education tailored to their parents. Recognizing this opportunity, the goal of our team was to develop a tailored, language-concordant nutrition education program, named First Foods, for immigrant families of children less than 2 years old. The objective of this study was to evaluate the First Foods curriculum pilot to improve knowledge and change behavior among new immigrant families of young children.

Methods

Study Design

We conducted a cohort study, whereby we administered a pre- and post-survey to participants in the 4-week First Foods curriculum. The study was approved by the Seattle Children's Institutional Review Board.

Participants

Immigrant caregivers of children less than 2 years old were invited to attend First Foods, a 4-class series. The class was advertised to include immigrant caregivers who self-identified as being members of an immigrant community based on their country of birth. Each series was offered in 1 of 5 different languages; Arabic, Dari, Somali, Burmese, and Nepali. Participants were recruited by flyers and word of mouth, in partnership with community organizations, ethnic community-based organizations, primary care clinics, and WIC. The classes occurred from March to September 2015. The classes were held in a cooking demonstration kitchen of a community-based organization in King County, Washington.

Curriculum

The First Foods curriculum was developed by a registered pediatric dietitian with input from general pediatricians experienced in the care of immigrant families. The curriculum was grounded in attachment theory and, specifically, in responsive parenting and responsive feeding.³ Since infants and toddlers have not yet achieved the ability to express their feeding and emotional needs, learning to interpret cues around feeding and creating a positive, responsive environment are critical components of responsive feeding. The curriculum included 4 classes taught over 4 weeks. The classes were based on the following themes: 1) Child Eating and Development, 2) Eating Together, 3) Food Safety, and 4) Healthy Living (Table 1). Each class involved an interactive discussion focused on the aforementioned themes, followed by a cooking demonstration of foods appropriate for feeding infants and toddlers.

We convened a language-concordant focus group with caregivers the week prior to each new language class to discuss how they perceived

migration influenced the nutrition, physical activity, and health of their families.¹⁶ Information learned during these focus groups was utilized to tailor the content of the curriculum for each language group.

Table 1. Content of the First Foods Curriculum

Theme	Class Content
Week 1: Child Eating and Development	<ul style="list-style-type: none"> • Discussion: <ul style="list-style-type: none"> ○ Signs of child development, readiness to begin solid foods, feeding cues, and age-appropriate foods to offer ○ An overview of organic foods was added based on expressed interest by parents in the pre-class focus groups • Cooking demonstration: Apple sauce with and without the peel
Week 2: Eating Together	<ul style="list-style-type: none"> • Discussion: <ul style="list-style-type: none"> ○ Challenges at family mealtime, and potential solutions ○ Feeding dynamic model described by Ellyn Satter's Division of Responsibility in Feeding¹⁷ ○ Concept of Positive Parenting³ • Cooking demonstration: Hummus and pureed zucchini and potato
Week 3: Food Safety	<ul style="list-style-type: none"> • Discussion: <ul style="list-style-type: none"> ○ Preventing and managing food allergies ○ Safety of drinking water (Taste test of tap water vs. bottled water) ○ Refrigeration and food sanitation • Cooking demonstration: Bananas, rice, and sandwiches (based on parental request in the first class)
Week 4: Healthy Living	<ul style="list-style-type: none"> • Discussion: <ul style="list-style-type: none"> ○ Minimizing sugar (including demonstration of the amount of sugar in different beverages)

	<ul style="list-style-type: none">○ Healthy Eating and Active Living for the whole family: physical activity, screen time, food choices, and portion sizes○ Dental care and health● Cooking demonstration: Potluck with instructors bringing foods parents requested in other classes (eg, salad) and participants bringing their favorite foods
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Classes were taught by the pediatric registered dietitian in partnership with a general pediatrician and interpreted into the relevant language after short segments of content were shared. Certified interpreters were bicultural community members. The same interpreter worked throughout the 4-week class curriculum and translated all recipes and handouts provided to the class. Participants who attended 3 of the 4 classes received a blender to make the recipes from the cooking demonstrations.

Pre- and Post-survey

The interpreter administered the pre-survey at the beginning of the first class and the post-survey at the end of the final class. The hard-copy survey was either self-administered in their preferred language for literate participants or administered by the interpreter who read the survey questions directly to the participant. The pre- and post-survey were identical and included 9 multiple-choice and multiple-response questions. Three questions assessed knowledge and 6 questions assessed behavior. The surveys were translated by a certified translation service (Cyracom International Inc). Prior to administering the surveys, they were reviewed by the interpreters for cultural and linguistic accuracy.

Analyses

The demographics as well as the pre- and post-surveys were managed using Research Electronic Data Capture (REDCap) tools hosted at the University of Washington.¹⁸ REDCap is a secure, web-based application designed to support data capture for research studies.¹⁸ Only individuals who completed both the pre- and post-survey were included in the

analyses. We computed descriptive statistics, chi-squared tests, and t-tests for the overall score. For questions permitting selection of multiple response options, p-values represent the change in proportion selecting each response option, comparing pre to post. For questions permitting selection of just one response, a single p-value is shown. For solid-foods knowledge, this p-value corresponds to whether the question was answered correctly or not, pre (85%) vs post (93%). For single-response behavior questions, the p-value reflects a test for trend, over ordered categories of “least ideal” to “most ideal” response, comparing pre to post.

A mixed-effects linear regression model was used to assess change in survey score (before vs. after receiving the curriculum), modeling repeated measures by individual as a random effect and time point (pre vs post) as a fixed effect. An unadjusted model was followed by 3 adjusted models, sequentially adding caregiver education (years of school), years in the US (as a proxy measure of acculturation), and language class. Predicted marginal means and 95% confidence intervals (CI) were estimated for the pre-survey and the post-survey, and pairwise comparisons were used to test statistical significance of changes in mean score over time. All analyses were conducted in Stata v14.0 (College Station, TX: StataCorp LP).

Results

Participants in the classes included 47 caregivers (91% mothers). Nearly one-third had lived in a refugee camp (Table 2). They had lived in the US a mean 5.5 years (95% CI: 3.8-7.2 years), attended a mean 8.6 years of school (95% CI: 7.1-10.1 years), and had a mean of 2.8 children (95% CI: 2.3-3.3 children). Classes ranged in size from 5 to 14 caregivers.

Table 2. Participant Characteristics

	N	%
Classes (by language)		
Arabic	14	30
Dari/Pashto	5	11
Somali	12	25
Burmese	10	21
Nepali	6	13
Caregiver type		
Mother	43	91
Father	2	4
Other (grandmother, aunt)	2	4
Lived in a refugee camp	15	32
	Mean	95% CI
Years in US	5.5	3.8-7.2
Years of school attended by caregiver	8.6	7.1-10.1
Number of children	2.8	2.3-3.3

For the 9 nutrition questions in the survey (Table 3), the maximum score achievable was 30. The mean score on the pre-survey was 12.1 (95% CI: 10.3-13.8) and on the post-survey, 17.2 (IQR: 16.3-18.0). The difference in mean score between the pre- and post-survey was statistically significant ($p < 0.001$).

Table 3. Caregiver Responses to the Pre- and Post-Survey on Nutrition Education

Question Content	Pre-Survey		Post-Survey		P-value (difference between pre-/post-surveys) [§]
Knowledge	n	%	n	%	
Means to decrease risk of cavities [‡]					
Drinking tap water because it contains fluoride ^{† ***}	10	(21)	32	(68)	<0.001
Brushing teeth [†]	40	(85)	40	(85)	1.0
Going to the dentist ^{† *}	20	(43)	31	(66)	0.02
Avoiding food with sugar [†]	29	(62)	37	(78)	0.07
Age that solid foods should be first introduced					0.18 [#]
1 mo	1	(2)	0	(0)	
3 mo	3	(6)	2	(4)	
6 mo [†]	40	(85)	44	(93)	
9 mo	3	(6)	1	(2)	
Foods that require refrigeration [‡]					
Apples	13	(28)	22	(47)	0.06
Raw chicken [†]	42	(89)	41	(87)	0.75
Milk [†]	43	(89)	42	(89)	1.0
Eggs [†]	33	(70)	35	(74)	0.64
Behavior					
Number of times per week your family sits together for a meal					0.38 ^{††}
One time/wk	1	(2)	3	(7)	
2 or 3 times/wk	13	(28)	11	(24)	
4 or 5 times/wk	12	(26)	10	(22)	
At least 1 meal daily [†]	21	(45)	22	(48)	

Approach to child refusal to eat a new food [‡]					
Force your child to eat the food	6	(13)	4	(9)	0.50
Tell child why they need to eat the food	27	(57)	28	(60)	0.83
Allow child to refuse, but don't offer again	7	(15)	8	(17)	0.78
Allow your child to refuse it, but offer it again [†]	21	(45)	22	(47)	0.84
Frequency of food as punishment					0.67 ^{††}
Never [†]	31	(69)	34	(79)	
Not very often (once a month or less)	8	(18)	4	(9)	
Often (once a week or more)	6	(13)	5	(12)	
Frequency of food as a reward [*]					0.027 ^{††}
Never [†]	11	(24)	21	(48)	
Not very often (once a month or less)	20	(43)	15	(34)	
Often (once a week or more)	15	(33)	8	(18)	
Frequency of considering amount of sugar in family foods [*]					0.033 ^{††}
Never	14	(30)	5	(11)	
Sometimes	9	(20)	11	(24)	
Always [†]	23	(50)	29	(64)	
Frequency of purchasing food at convenience store ^{***}					0.001 ^{††}
Never [†]	0	(0)	11	(25)	
1-2 times/wk	23	(53)	30	(68)	
4-5 times/wk	11	(26)	2	(5)	
Every day	9	(21)	1	(2)	

* p-value < 0.05, *** p-value < 0.001

† Denotes the correct or ideal answer

‡ Multiple response options may be selected (thus, percentages do not sum to 100). Single-response questions may not sum to 100 due to rounding.

§ For multiple response questions, p-values represent probability of significant pre-/post-survey differences for selection of each response.

P-value corresponds to whether the question was answered correctly or not.

†† These p-values reflect a test for trend using a chi square test, over “least ideal” to “most ideal” response, comparing pre to post.

Knowledge

Caregivers demonstrated an improved understanding of means to decrease risk of dental caries in 3 of 4 areas (drinking tap water ($p < 0.001$), going to the dentist ($p = 0.02$), and avoiding sugar in food ($p = 0.07$) from the pre- to the post-survey. With regards to knowledge about solid food introduction and foods requiring refrigeration, the majority of parents answered accurately, although differences in the proportion of accurate responses from the pre- to the post-survey were not statistically significant (p-values ranged from 0.06 to 1.0).

Behavior

The number of times per week that families sat together for meals did not appreciably change after the curriculum ($p = 0.69$), with the majority of families (71%) reporting they share a meal together 4 or more times per week in the pre-survey. There were no statistically significant differences in caregivers' approach to child refusal of a new food or for the frequency of the use of food as a punishment from the pre- to the post-survey ($p = 0.92$ and $p = 0.47$, respectively).

Caregivers demonstrated improvement in avoiding the use of food as a reward from the pre- to the post-survey ($p = 0.027$). There was an overall trend toward improvement in the practice of considering the amount of sugar in family foods ($p = 0.033$) from the pre- to the post-survey. Caregivers reported a significant trend toward less purchasing of food at a convenience store after participating in the curriculum ($p = 0.001$). In the post-survey 87% of caregivers reported shopping at a convenience store less than twice a week compared to 49% on the pre-survey.

Adjusted Model

After adjusting for the effects of potential confounders (caregiver education, time in the US, and language class), the difference in mean survey score was statistically significant (from 12.5 to 17.3, $p < 0.001$; Table 4); this was also true when adjusting for subsets of these covariates

(Table 4). In adjusted subgroup analyses, each language group demonstrated an improvement in its mean score (Table 5). However, this improvement should be interpreted with caution since some groups have overlapping pre- and post-survey confidence intervals of score, and there was wide variation in the pre- and post-survey scores across groups.

Table 4. Mean Survey Score Before and After Receiving the Curriculum, Adjusted for Potential Confounders*

	Mean Score (95% CI)		p-value
	Pre	Post	
Unadjusted:	12.1 (10.7-13.4)	17.2 (15.8-18.5)	<0.001
Adjusted for:			
1. caregiver education	12.4 (11.0-13.7)	17.2 (15.9-18.5)	<0.001
2. caregiver education, years in US	12.5 (11.2-13.8)	17.3 (16.0-18.6)	<0.001
3. caregiver education, years in US, and language class	12.5 (11.3-13.7)	17.3 (16.1-18.4)	<0.001

*Mixed effects linear regression models were used to assess the impact of the curriculum on survey score, adjusting for the factors shown.

Table 5. Mean Survey Score Before and After Receiving the Curriculum by Class Language, Adjusted for Potential Confounders*

	Mean Score (95% CI)	
	Pre	Post
Arabic	12.9 (11.1-14.8)	17.7 (15.9-19.5)**
Dari	7.6 (4.1-11.1)	12.4 (8.9-15.9)
Somali	10.6 (8.0-13.2)	15.4 (12.8-18.0)
Burmese	13.2 (11.2-15.3)	18.0 (15.9-20.1)**
Nepali	16.1 (13.7-18.6)	20.9 (18.4-23.3)

*Mixed-effects linear regression models by language group adjusted for caregiver education and years in US.

**Bold text indicates statistically significant difference between mean scores, pre vs. post (p<0.05)

Discussion

First Foods, a community-tailored, early-childhood feeding curriculum for immigrant parents of young children, improved nutrition-related knowledge and behavior among caregivers from a variety of immigrant communities. Specifically, caregivers who received the curriculum demonstrated change in knowledge and behavior in the areas of preventing dental caries, avoiding the use of food as a reward, considering the amount of sugar in food, and decreasing the purchase of foods at convenience stores. While improved pre- and post-survey responses were noted in these areas, there were no statistically significant differences for the other knowledge and behavior domains. The lack of changes in some domains may be due to a ceiling effect of already high prior knowledge or ideal behaviors at baseline, or could be due to the relatively short nature of the curriculum to change behaviors.

In the adjusted models, the improvement in overall score was statistically significant while adjusting for caregiver education, time in the US, and language. We did observe differences in scores by language class, which may reflect differences in cultural dynamics or education between language groups, or how the curriculum was translated by each interpreter. It may also reflect higher baseline nutrition-related knowledge and behavior for certain language groups (eg, Nepali), and may call for a higher level of nutrition education content. As class sizes were relatively small, it would be premature to draw any conclusions about findings specific to individual language classes. However, these findings suggest that there may be opportunities for additional tailoring of the curriculum to address language- and culture-specific areas of strength and need.

Parental feeding practices are influential on child eating behavior.¹⁹ Caregivers attending the First Foods curriculum decreased their use of food as a reward from the pre- to the post-survey. Rewards are a form of enhanced responsiveness to external food cues and are associated with dietary behaviors in childhood that contribute to obesity.²⁰ The effectiveness of the First Foods curriculum on decreasing use of food as a reward is one area in which the curriculum may have the potential to prevent obesity. Parental attempts at controlling food, and utilizing food as

a punishment, can contribute to emotional eating, which is also associated with obesity risk. Future iterations of First Foods will utilize different approaches to enhance the education around not using food as a punishment. Similarly, we will craft additional and new messages around how to approach child refusal of food. There was an absolute decline in the number of parents who forced their child to eat when they refused foods from the pre- to the post-survey; however, this should be interpreted with caution as it was not statistically significant. Ideally, we would like all families to avoid forcing their children to eat, as coercive feeding is associated with risk of obesity and eating disorder development.^{21,22}

Similar to early feeding, early dental care lays the foundation for oral health over the life course. The improved knowledge around the methods to prevent dental caries from the pre- to the post-survey is encouraging, given that 46% of immigrant and refugee children from similar countries of origin in Canada were found to have early childhood caries in a recent study.²³ Health education and community outreach efforts for welcoming new community members were recommended in prior studies on oral health, in particular around changing dietary practices related to refined sugar, and improved access to fluoride and preventive dental health care.²⁴ The incorporation of oral health into early childhood feeding education is a natural fit in terms of content, and may spread the reach of oral health education messaging.

The trend in caregivers' behavior toward increasing their consideration of sugar content in food could have positive implications for both dental health²⁵ and obesity prevention,²⁶ as well as longer term chronic health conditions like diabetes mellitus type II and cardiovascular disease²⁶. Children in immigrant families were more likely to have higher sucrose consumption than children whose parents were born in Sweden.¹⁵ In a study of young families in Boston, children born outside the US were found to have more healthful food consumption than the US-born children in the study sample.²⁷ This difference in findings about whether or not immigrant families had more healthful food consumption may be related to many factors including access to foods, acculturation, and their nutrition context before immigration. Providing nutrition education to families early on in their immigration and their child's lives may be a critical period for

education that supports existing healthful behaviors or changing behavior around sugar consumption for new immigrant families with young children.

The statistically significant decrease in frequency of buying food at a convenience store may suggest that families increased shopping at grocery stores with more availability of fresh foods and produce, or that they were consuming less processed food. Food purchased at convenience stores tends to have poorer nutritional quality, and lower concentrations of produce availability is associated with more sugar-sweetened beverage purchases.²⁸ Prior research supports the view that home-prepared food is healthier than food prepared outside the home.²⁹ During its discussion and didactic sessions, First Foods emphasizes cooking at home from scratch and includes a cooking demonstration at each class. The survey, however, did not explore how frequently caregivers were making a home-prepared meal. Future evaluations for First Foods should incorporate an evaluation of the quality of nutrition purchases, and the frequency of consuming home-prepared foods.

Over two-thirds of the families of caregivers in the study ate together at least 4 days per week. Our findings mirror those of a nationally representative sample that found that foreign-born families consume family meals on average 5.8 times per week, which was more than their non-foreign-born counterparts.³⁰ Family meals are a mechanism by which children receive role modeling around eating behaviors.²⁰ Nutrition education programs should continue to emphasize sharing meals together at least 3 days per weeks as it is associated with a reduction in being overweight, eating unhealthy foods, and disordered eating.²⁰

Limitations

This study should be considered in the context of its limitations. Caregivers attending the First Foods curriculum demonstrated an interest in child feeding which may suggest they are more likely to make a behavior change. In addition, their responses to the pre- and post-survey may reflect social desirability bias and may not be generalizable. However, given that some but not all domains showed changes suggests that caregivers answered as honestly as possible in their self-report. The differences in mean scores by language group should be considered in

the context of the small sample size overall, and by group. The post-survey was taken on the same day that the group learned about healthy eating, active living, and dental care. The proximity of the course content with the administration of the post-survey may have influenced the participants' responses.

Also, the survey did not assess the literacy of the caregivers, and this may have affected their ability to accurately answer the survey. The research team took multiple steps to support caregivers in completing the surveys: the surveys were translated by a certified translation service into the language of the class group. The interpreters circulated around the room and were available to help answer questions. We did not pilot the class handouts or utilize an evidence-based quality control approach to assess their usability. This will be an area of focus in the next steps of this work.

Lessons learned from this pilot study may inform policy, preventive care, and programs related to delivery of healthy eating and active living content to immigrant families.

Future Policy, Preventive Care, and Programmatic Recommendations

- Early childhood feeding programs are a natural place to incorporate education about prevention of childhood obesity and early childhood caries.
- Nutrition education curricula developed for the general population in the US (e.g., via Women, Infants and Children Supplemental Nutrition [WIC], school meals, etc.) could be tailored for immigrant communities based on their specific experiences both before and after migration (i.e., related to food security and cultural foods).
- The Early Learning sector may benefit from incorporating some of the key findings of this study into curricula around early childhood feeding. For instance, Head Start decreased the rise in children's BMI by kindergarten through increased physical activity, limited screen time, parent education, and following strict nutrition goals.³¹ Incorporation of lessons learned from immigrant populations may broaden the applicability of the Head Start programming.

- Although pediatricians, family physicians, and other providers have frequent preventive health care encounters with children in the first 3 years of life,³² the majority have limited understanding of the immigrant experience and received minimal training on the specific nutritional risks that new immigrant children (including refugees) face. These clinicians are well poised to support the nutrition transition of immigrant families, and can incorporate evidence-based counseling to improve the nutritional health of these children. Additionally, they can connect young families and encourage use of nutritional programming like WIC, since prior studies have demonstrated that around 30% of refugee families were not participating in WIC services.³³ The results from studies such as this may be disseminated through continuing medical education programs and provider guidelines on the care of immigrant children. Such training should include discussion of the potential pre-migration challenges that could impact early child feeding among immigrant families, including food scarcity³⁴ and dependence on bottled water for drinking, as well as the unfamiliar threats to child health in their new home, such as poor quality foods offered at convenience stores.

Conclusion

The First Foods curriculum, developed as a partnership between a pediatric dietitian, pediatricians, and community-based organizations, demonstrated promise in positively influencing the knowledge and behavior around early childhood feeding for the caregivers of young children in immigrant communities.

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