



Published in final edited form as:

J Acad Nutr Diet. 2014 October ; 114(10): 1587–1593. doi:10.1016/j.jand.2014.04.021.

Knowledge, Attitudes and Beliefs That May Influence Infant Feeding Practices in American Indian Mothers

Cara L. Eckhardt, PhD, MPH,

Assistant Professor, Portland State University, School of Community Health, 506 SW Mill Street, Suite 450, Portland, Oregon 97201, Tel: 503-725-4569, Fax: 503-725-5100

Tam Lutz, Doctoral Candidate, MPH, MHA,

Junior Investigator/Project Director, Northwest Portland Area Indian Health Board, 2121 SW Broadway, Suite 300, Portland, OR 97201, Tel: 503-416-3271, Fax: 503-228-8182

Njeri Karanja, PhD,

Senior Investigator, Kaiser Permanente Center for Health Research, 3800 N. Interstate Avenue, Portland, OR 97227, Tel: 503-335-2400, Fax: 503-335-2424

Jared B. Jobe, PhD,

National Heart, Lung and Blood Institute, NIH (retired), Home Address (not for publication): 105 Dornoch, Williamsburg, VA 23188, Tel: 757-229-1496, Fax: n/a

Gerardo Maupomé, PhD, DDPH, and

Professor, Indiana University School of Dentistry, 415 Lansing Street, Indianapolis, IN 46077, Tel: 317-274-5529, Fax: 317-274-5425

Cheryl Ritenbaugh, PHD, MPH

Professor, Department of Family & Community Medicine, The University of Arizona, 1450 N. Cherry Ave., Tucson, AZ 85719, Tel: 520-626-1033, Fax: 520-626-2030

Cara L. Eckhardt: c.eckhardt@pdx.edu; Tam Lutz: tlutz@npaihb.org; Njeri Karanja: Njeri.Karanja@kpchr.org; Jared B. Jobe: jljobe@hotmail.com; Gerardo Maupomé: gmaupome@iu.edu; Cheryl Ritenbaugh: ritenbau@email.arizona.edu

Abstract

The promotion of healthy infant feeding is increasingly recognized as an important obesity prevention strategy. This is relevant for American Indian (AI) populations, who exhibit high levels of obesity and low compliance with infant feeding guidelines. The literature examining the knowledge, attitudes and beliefs (KAB) surrounding infant feeding within the AI population is sparse and focuses primarily on breastfeeding, with limited information on the introduction of

© 2014 Academy of Nutrition and Dietetics. Published by Elsevier Inc. All rights reserved.

Corresponding Author (will also handle reader requests for reprints): Cara L. Eckhardt, PhD, MPH, Assistant Professor, Portland State University, School of Community Health, 506 SW Mill Street, Suite 450, Portland, Oregon 97201, Tel : 503-725-4569, Fax: 503-725-5100, c.eckhardt@pdx.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

CONFLICT OF INTEREST DISCLOSURE

None of the authors (listed below) of the submitted manuscript have any conflicts of interest—including financial interests, relationships or affiliations—relevant to the subject of the manuscript.

solid foods and related practices that may be important in an obesity prevention context. This research presents descriptive findings from a baseline KAB questionnaire on infant feeding and related behaviors, administered to mothers (n=438) from five Northwest AI tribes that participated in the Prevention of Toddler Overweight and Teeth Health Study (PTOTS). Enrollment occurred during pregnancy or up to 6 months postpartum. The KAB questionnaire focused on themes of *Breastfeeding/Formula Feeding* and *Introducing Solid Foods*, with supplemental questions on *Physical Activity*. Knowledge questions were multiple-choice or true/false. Attitudes and beliefs were assessed on Likert scales. Descriptive statistics included frequencies and percents, and means and standard deviations. Most women knew basic breastfeeding recommendations and facts, but fewer recognized the broader health benefits of breastfeeding (e.g., reducing diabetes risk), or knew when to introduce solid foods. Women believed breastfeeding to be healthy and perceived their social networks to agree. Attitudes and beliefs about formula feeding and social support were more ambivalent. This work suggests opportunities to increase the perceived value of breastfeeding to include broader health benefits, increase knowledge about solid foods, and strengthen social support.

Keywords

American Indian/Alaska Native; breastfeeding; infant feeding; solid foods; knowledge; attitudes and beliefs

The promotion of healthy infant feeding is increasingly recognized as an important strategy to prevent childhood obesity and related health problems.¹⁻⁴ Breastfeeding may contribute to lowering obesity risk by improving appetite regulation.⁵⁻⁷ Although the mechanisms are not as well understood, several studies suggest a relationship between the premature introduction of solid foods into the diet and an increase in obesity risk.^{8,9} This is particularly relevant for American Indian (AI) and Alaska Native (AN) populations, who have high levels of childhood obesity and low compliance with current infant feeding guidelines.

Data from the Pediatric and Pregnancy Nutrition Surveillance System indicate that the prevalence of childhood obesity is highest among AI/AN children (21.1%), compared to children in other racial and ethnic groups.¹⁰

With respect to breastfeeding, the World Health Organization and the American Dietetic Association recommend exclusive breastfeeding for the first 6 months of life while the American Academy of Pediatrics recommends 4-6 months of exclusive breastfeeding, with the introduction of solid foods after that period and continued breastfeeding until at least 12 months.¹¹⁻¹³ Recent nationally representative data indicated that only 13.2% of AI/AN infants were exclusively breastfed for 6 months,¹⁴ and only 20.7% were breastfed for 12 months.¹⁵

There are fewer studies regarding the introduction of solid foods, however a recent cross-sectional study showed that many U.S. children received solid foods prior to 6 months of age. Data were presented by food and showed, for example, that 50.4±5.1% received infant cereals.¹⁶ Although this study included AI/AN subjects, results were not stratified.

Parental efforts to achieve healthy infant feeding are strongly influenced by personal beliefs and culture; thus, understanding these forces is imperative for constructing successful interventions.¹⁷ The literature examining the knowledge, attitudes and beliefs (KAB) that may influence infant feeding within the AI/AN population is sparse and focuses primarily on breastfeeding, with limited information on the introduction of solid foods or other related topics relevant to the early prevention of obesity, such as physical activity.^{18–23}

The primary objective of this paper is to help fill gaps in the current understanding of the knowledge, attitudes and beliefs in AI populations that influence infant feeding practices, with inclusion of information on the introduction of solid foods and related behaviors. This may help inform targeted public health efforts within this at-risk group.

METHODS

Study Design and Subjects

Descriptive findings are presented from a KAB questionnaire on infant feeding practices administered at baseline to mothers in five Northwest AI tribes enrolled in The Prevention of Toddler Overweight and Teeth Health Study (PTOTS).²⁴ The primary focus of the KAB questionnaire was infant feeding, including information on solid foods, while a small portion of the questionnaire was devoted to physical activity in infants to provide supplemental information on this related topic relevant to the early prevention of obesity.

The PTOTS study design is described elsewhere.²⁴ Briefly, PTOTS was a cluster-randomized controlled trial. Women from six communities comprising five Northwest AI tribes were recruited in their second or third trimesters of pregnancy, or up to 6 months postpartum, via referral by study site coordinators from maternal and child tribal health programs, including the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). Mother-child dyads (n=575) were randomized by community to the intervention or comparison condition. The intervention encompassed multiple strategies to prevent obesity beginning in infancy. The participating tribes partnered with the Northwest Portland Area Indian Health Board, the Kaiser Permanente Center for Health Research, and the National Heart, Lung and Blood Institute to conduct the study, which ran from 2005 to 2012. The study protocol was approved by the tribes and the Northwest Portland Area Indian Health Board Institutional Review Board.

Survey Tool

The KAB questionnaire²⁵ was developed for the PTOTS study in three stages. First, to inform the attitudes and beliefs component, focus groups were conducted with community members that included the target population, fathers and community elders. Second, the literature was searched for existing questionnaires, as well as current infant feeding and physical activity recommendations, to inform the knowledge component. Third, although a formal psychometric analysis of the questionnaire was not performed, the questionnaire was pretested and revised iteratively three times: with project staff members of child-bearing age, with mothers and caregivers in the target communities who were not part of the study, and finally with the first wave of 50 study participants.

The PTOTS KAB questionnaire addressed three themes: the majority of questions focused on *Breastfeeding/Formula Feeding* and the *Introduction of Solid Food*, and a smaller number of questions on *Physical Activity* were included to provide supplemental information on this related topic. Knowledge questions were framed as multiple-choice or true/false questions covering relevant facts and current infant feeding^{11–13,26,27} and physical activity recommendations.²⁸ Attitude and belief questions were assessed via 7-point Likert scale responses gauging beliefs about the healthfulness of breastmilk and formula, the appropriate introduction of solid foods, control over feeding choices, desirable physical activity levels for infants, and beliefs and perceptions of social support in this context. The original questionnaire consisted of 42 questions. Two questions were excluded from analysis, one due to ambiguous wording and one due to low response related to inconspicuous placement on the questionnaire document. Results are presented for the remaining 40 questions: 25 knowledge questions (11 on *Breastfeeding/Formula Feeding*, 10 on the *Introduction of Solid Foods* and 4 on *Physical Activity*), and 15 attitude and belief questions (5 per theme). Results are also shown for an additional section that asked participants to identify, from a provided list of 10 options, the types of people they consulted for advice about infant feeding.

Data Collection and Analysis Sample

The KAB questionnaire and a short demographic questionnaire were administered to study participants upon enrollment in the PTOTS study. Questionnaires were self-administered in the presence of PTOTS staff, who clarified questions as needed. Photocopies of completed questionnaires were kept on site, and originals were mailed in batches to the Northwest Portland Area Indian Health Board for data entry and cleaning. The PTOTS project coordinator checked all questionnaires for completeness. Omitted and ambiguous answers were reported to site coordinators to resolve with participants. Participants with incomplete data were excluded from analysis, producing an analysis sample of n=438 mothers (76% of the 575 mother-child dyads enrolled). All statistical analyses were conducted using STATA Software (release 11, 2009, StataCorp LP, College Station, TX).

Statistical Methods

Baseline data were pooled across tribes to increase sample size; preliminary analyses revealed only a few small differences by tribe for only a few individual knowledge responses, with no systematic differences in summary scores.

Demographic data (e.g., age, education and adult household composition) were described using frequencies and percents for categorical variables, and means and standard deviations for continuous variables.

Frequencies and percents of correct responses for each individual knowledge question are presented by theme. Additionally, within each theme, a summary knowledge score was created by summing all correct responses. A total knowledge summary score was created by summing the total number of correct responses across themes. For each summary score, the population-average frequency and percent of total possible correct responses is presented.

Responses to the attitude and belief questions are presented as means and standard deviations (SD) of the 7-point Likert scale responses.

RESULTS AND DISCUSSION

Knowledge

Knowledge results appear in Table 2. Within the *Breastfeeding/Formula Feeding* theme, almost all women recognized that breast milk supplies all the nutrition a baby needs during the first few months of life. Fewer women were aware of some of the broader health benefits of breastfeeding. For example, only 39% recognized that breastfed babies have a reduced risk of diabetes. Misconceptions about breastfeeding were present, with a minority of women recognizing as false the notion that breastfeeding women lose the weight gained during pregnancy more slowly than other women.

With respect to questions within the theme of *Introducing Solid Foods*, just over half of respondents recognized 6 months as the recommended age for introducing solids, while knowledge of specific strategies for the successful and safe introduction of healthy solid foods was varied. For example, while almost all women were able to recognize foods that are not choking hazards, less than half recognized that fruit is not a common source of food allergies, and few mothers realized that toddlers may need to be offered a new food up to 12 times before they accept it.

Within the *Physical Activity* theme, most respondents recognized that babies do not require playpens and high chairs to be safe and that daily movement is recommended. Respondents were less certain about the importance of organized play and minimizing prolonged sitting.

Overall, subjects answered an average of 63% of questions correctly. Within themes, summary scores were highest for questions pertaining to *Breastfeeding/Formula Feeding*, followed by *Introducing Solid Foods*, then *Physical Activity*.

Attitudes and Beliefs

Responses to the attitude and belief questions appear in Figure 1. Within the *Breastfeeding/Formula Feeding* theme, study participants tended to believe strongly that exclusive breastfeeding for the first 6 months of life is healthy and believed their social networks to agree. Respondents did not have strong feelings one way or the other about whether formula feeding for the first 6 months of life is healthy, nor did they perceive their social networks to have strong feelings either way.

Within the theme of *Introducing Solid Foods*, respondents tended to believe, although not strongly, that waiting until baby is 6 months old before giving solid foods is healthy, and they perceived their social networks to somewhat agree. Women reported feeling high levels of control about when to introduce solid foods.

Responses for *Physical Activity* showed that most respondents recognized the negative effects of television on play, and agreed that movement aids in child brain development. On the other hand, respondents did not seem to have strong feelings on whether TV is

educational, whether it keeps kids occupied, or whether parents have a sense of how much television their children watch.

Social Support Networks

Study participants were asked where they “get advice about when and what to feed my baby” and were asked to check as many as applied from a list of ten types of peers and professionals. The three types chosen most often were mother, sister, mother-in-law, or sister-in-law (78.5%), followed by WIC staff (70.8%), and the doctor (62.1%). The remaining options (i.e., my friends, my grandmother or aunt, PTOTS staff, Maternal and Child Health staff, early intervention/Head Start, the nurse, and other) were each selected by <40% of respondents.

Key Findings and Contributions to the Literature

Literature addressing infant feeding practices in the AI population is sparse, and primarily covers breastfeeding recommendations and practices.^{18–23} The present study found that most women recognized breastfeeding as a healthy and desirable behavior, a finding in keeping with other reports.^{18,19,21} The present study appears novel in posing questions about the broader health benefits of breastfeeding in the context of obesity prevention. With the extremely high prevalence of diabetes in the AI population,^{29–31} the finding that few women were aware of the association of breastfeeding with a reduction in diabetes risk in children draws attention to a knowledge gap that could be targeted to enhance the perceived value of breastfeeding.

Given the focus on breastfeeding in the existing infant feeding literature in AI populations, the present study offers unique insight into potential areas for targeted education to support the introduction of healthy solid foods, such as clarifying the appropriate age for the introduction of solid foods, and providing information to assure mothers that fruits are not a common source of allergies and that new foods may need to be offered many times before they are accepted. Such strategies could support exclusive breastfeeding by averting the premature introduction of solid foods, and might increase the success of introducing fruits and vegetables into the diet.

Other studies of infant feeding in AI populations have highlighted the importance of social networks in providing support for breastfeeding.^{18–23} Overall, the present study found that women perceived their support networks to agree that breastfeeding is healthy, but participants were not asked whether their perceptions differed by type of support person (e.g., different types of family members or peers). Others have shown that the perception of social support may vary by the type of support person considered, with perceived stronger support from grandmothers and less support from husbands, as an example.¹⁹ The present study appears unique, however, in asking about the perceived beliefs of family and friends about formula feeding. Results indicate that respondents did not perceive their support networks to think of formula feeding as either healthy or unhealthy. It is possible that this somewhat indirect lack of added support for breastfeeding may work to limit the translation of knowledge and intent to breastfeed into practice. These findings suggest a need to

strengthen social support to promote breastfeeding, without denigrating the value of formula feeding.

Finally, this study appears unique in including questions about recommended physical activity levels for infants; highlighting the connection between diet and physical activity. Although results were limited to varied responses on only a few questions, this contribution highlights the need to further fill this gap in the literature.

Limitations

While the KAB questionnaire was the product of a thoughtful process intended to deliver timely and culturally relevant questions, formal psychometric testing was not conducted due to limited resources. Some quality issues became apparent during analysis. As discussed previously, two questions were excluded from analysis due to ambiguous wording and low response. Furthermore, some questions were multiple-choice questions with up to six possible responses, while others were true/false questions with only two possible responses. Thus, if guessing, women would have been more likely to exhibit “lower knowledge” on the multiple-choice questions than the true/false questions by chance alone, which could have biased conclusions regarding the areas of weakest knowledge. Finally, while the knowledge questions preceded the attitude and belief questions on the questionnaire document, it is possible that the phrasing of some of the attitude and belief questions (e.g., “waiting until a baby is 6 months old before giving solid foods is healthy”) could have caused respondents to infer the correct responses to related knowledge questions, causing false inflation of observed knowledge.

CONCLUSIONS

Public health interventions to promote healthy infant feeding are needed in the AI population. Successful interventions must be responsive to what mothers know and believe, yet research providing this information is sparse within the AI population. Women in the present study lacked a nuanced understanding of the benefits of breastfeeding, and had gaps in knowledge about when and how to successfully introduce solid foods. Furthermore, this study found that women perceived their social networks to regard breastfeeding as healthy, but to be ambivalent about formula feeding. These novel findings provide insight into potential areas for improving infant feeding practices in the AI population, including: enhancing education about the timing and methods for the introduction of solid foods, strengthening social networks to support healthy infant feeding choices, and expanding the perceived value of breastfeeding to include broader health benefits, particularly in the context of childhood obesity.

Acknowledgments

This work was supported by: NIH Grant# HL081624, through the National Heart Lung and Blood Institute.

We are grateful to the tribal governments of the following communities for supporting this work: the Coeur d’Alene Tribe, the Confederated Salish and Kootenai Tribes, Confederated Tribes of the Umatilla Indian Reservation, and the Yakima Indian Nation. The following key staff assisted the study team and provided advice on ways to implement the study in their communities.

Coeur d'Alene Tribe: Benewah Medical Center Community Health Program: Sue Bates, Cathy Armstrong, Kacy Ross, Andy Rae Zachary, Veronica Torpey and Robin Hodgson.

Confederated Tribes of the Colville Reservation: Tribal Health Program: Zekkethal Vargas, Rebecca Hunt, Dee GunShows, Mary Fry, Rena Whiteman, Sharon Peterson, Quail Orr, and Diane Mills.

Confederated Salish and Kootenai Tribes: Department of Human Resources Development: Arlene Templer, Betty Weaselhead, Marcia Billedeaux, Weemus Wilder, Camilla Kenmille, Tribal Health Department: Barb Plouffe and Salish Kootenai College: Anita Dupuis, Margaret Wheeler and Carol Tenney.

Confederated Tribes of the Umatilla Indian Reservation: Yellowhawk Tribal Health Center Community Health Program: Tim Gilbert, Charlie Picard, Debra Shippentower, Wenona Laso, Carrie Sampson and Sydelle Harris.

Yakama Indian Nation: Yakama Tribal Health Maternal Child Health Program: Rosalie George, Evelyn Broncheau and Gail Ganuelas.

Disclosure

The only funding and support for this project came from the NIH grant disclosed in the Copyright Transfer forms signed by the authors. The NIH grant was "Primordial Prevention of Overweight in AI Children" (U01 HL081624).

References

1. Birch LL, Ventura AK. Preventing childhood obesity: what works? *Int J Obes.* 2009; 33(Suppl 1):S74–81.
2. McPherson ME, Homer CJ. Policies to support obesity prevention for children: a focus on of early childhood policies. *Pediatr Clin North Am.* 2011; 58(6):1521–1541. [PubMed: 22093867]
3. Campbell KJ, Hesketh KD. Strategies which aim to positively impact on weight, physical activity, diet and sedentary behaviours in children from zero to five years. A systematic review of the literature. *Obes Rev.* 2007; 8(4):327–338. [PubMed: 17578382]
4. Hesketh KD, Campbell KJ. Interventions to prevent obesity in 0–5 year olds: an updated systematic review of the literature. *Obesity.* 2010; 18(Suppl 1):S27–35. [PubMed: 20107458]
5. Brown A, Lee M. Breastfeeding during the first year promotes satiety responsiveness in children aged 18–24 months. *Pediatric Obesity.* 2012; 7(5):382–390. [PubMed: 22918888]
6. Disantis KI, Collins BN, Fisher JO, Davey A. Do infants fed directly from the breast have improved appetite regulation and slower growth during early childhood compared with infants fed from a bottle? *The International Journal of Behavioral Nutrition and Physical Activity.* 2011; 8:89.10.1186/1479-5868-8-89 [PubMed: 21849028]
7. Bartok CJ, Ventura AK. Mechanisms underlying the association between breastfeeding and obesity. *Int J Pediatr Obes.* 2009; 4(4):196–204. [PubMed: 19922033]
8. Huh SY, Rifas-Shiman SL, Taveras EM, Oken E, Gillman MW. Timing of solid food introduction and risk of obesity in preschool-aged children. *Pediatrics.* 2011; 127(3):e544–551. [PubMed: 21300681]
9. Moss BG, Yeaton WH. Early Childhood Healthy and Obese Weight Status: Potentially Protective Benefits of Breastfeeding and Delaying Solid Foods. *Matern Child Health J.* 2013;10.1007/s10995-013-1357-z
10. Dalenius, K.; Borland, E.; Smith, B.; Polhamus, B.; Grummer-Strawn, L. *Pediatric Nutrition Surveillance 2010 Report.* Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2012.
11. WHO Media Centre. World Health Organization Statement, January 15, 2011, Exclusive breastfeeding for six months best for babies everywhere. http://www.who.int/mediacentre/news/statements/2011/breastfeeding_20110115/en/. Accessed February 1, 2014
12. James DC, Lessen R. Position of the American Dietetic Association: promoting and supporting breastfeeding. *J Am Diet Assoc.* 2009; 109(11):1926–1942. [PubMed: 19862847]
13. Section on B. Breastfeeding and the use of human milk. *Pediatrics.* 2012; 129(3):e827–841. [PubMed: 22371471]

14. CDC. Centers for Disease Control and Prevention National Immunization Survey Data, Exclusive Breastfeeding Rates at Six Months by Socio-Demographics Factors, Among Children Born in 2007. http://www.cdc.gov/breastfeeding/data/NIS_data/2007/socio-demographic.htm. Accessed February 27, 2014
15. CDC. Centers for Disease Control and Prevention National Immunization Survey Data, Breastfeeding Rates by Socio-Demographic Factors, Among U.S. Children Born in 2007. http://www.cdc.gov/breastfeeding/data/NIS_data/2007/socio-demographic_any.htm. Accessed February 27, 2014
16. Siega-Riz AM, Deming DM, Reidy KC, Fox MK, Condon E, Briefel RR. Food consumption patterns of infants and toddlers: where are we now? *J Am Diet Assoc.* 2010; 110(12 Suppl):S38–51. [PubMed: 21092767]
17. May AL, Dietz WH. The Feeding Infants and Toddlers Study 2008: opportunities to assess parental, cultural, and environmental influences on dietary behaviors and obesity prevention among young children. *J Am Diet Assoc.* 2010; 110(12 Suppl):S11–15. [PubMed: 21092764]
18. Rhodes KL, Hellerstedt WL, Davey CS, Pirie PL, Daly KA. American Indian breastfeeding attitudes and practices in Minnesota. *Matern Child Health J.* 2008; 12(Suppl 1):46–54. [PubMed: 18266094]
19. Wright AL, Naylor A, Wester R, Bauer M, Sutcliffe E. Using cultural knowledge in health promotion: breastfeeding among the Navajo. *Health Educ Behav.* 1997; 24(5):625–639. [PubMed: 9307898]
20. Houghton MD, Graybeal TE. Breast-feeding practices of Native American mothers participating in WIC. *J Am Diet Assoc.* 2001; 101(2):245–247. [PubMed: 11271699]
21. Dodgson J, Struthers R. Traditional breastfeeding practices of the Ojibwe of Northern Minnesota. *Health Care Women Int.* 2003; 24(1):49–61. [PubMed: 12746031]
22. Dodgson JE, Duckett L, Garwick A, Graham BL. An ecological perspective of breastfeeding in an indigenous community. *J Nurs Scholarsh.* 2002; 34(3):235–241. [PubMed: 12237985]
23. Martens PJ. Prenatal infant feeding intent and perceived social support for breastfeeding in Manitoba first nations communities: a role for health care providers. *Arctic Med Res.* 1997; 56(4): 104–120.
24. Karanja N, Aickin M, Lutz T, et al. A Community-Based Intervention to Prevent Obesity Beginning at Birth Among American Indian Children: Study Design and Rationale for the PTOTS Study. *J Prim Prev.* 2012; 33(4):161–174. [PubMed: 23001689]
25. Maxwell JD, Ang L, Brooke OG, Brown IR. Vitamin D supplements enhance weight gain and nutritional status in pregnant Asians. *BJOG.* 1981; 88(10):987–991.
26. Satter, E. *Child of Mine: Feeding with Love and Good Sense*, Revised and Updated Edition. Boulder, CO: Bull Publishing Company; 2000.
27. USDA United States Department of Agriculture Food and Nutrition Service. Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). website. <http://www.fns.usda.gov/wic/women-infants-and-children-wic>. Accessed February 27, 2014
28. NASPE National Association for Sport and Physical Education. *Active Start: A Statement of Physical Activity Guidelines for Children from Birth to Age 5*. 2. Reston, VA: American Alliance for Health, Physical Education, Recreation and Dance; 2009.
29. Moore K. Youth-onset type 2 diabetes among American Indians and Alaska natives. *J Public Health Manag Pract.* 2010; 16(5):388–393. [PubMed: 20689386]
30. Pavkov ME, Knowler WC, Hanson RL, Nelson RG. Diabetic nephropathy in American Indians, with a special emphasis on the Pima Indians. *Curr Diab Rep.* 2008; 8(6):486–493. [PubMed: 18990306]
31. Diagnosed diabetes among American Indians and Alaska Natives aged <35 years—United States, 1994–2004. *MMWR Morb Mortal Wkly Rep.* 2006; 55(44):1201–1203. [PubMed: 17093386]

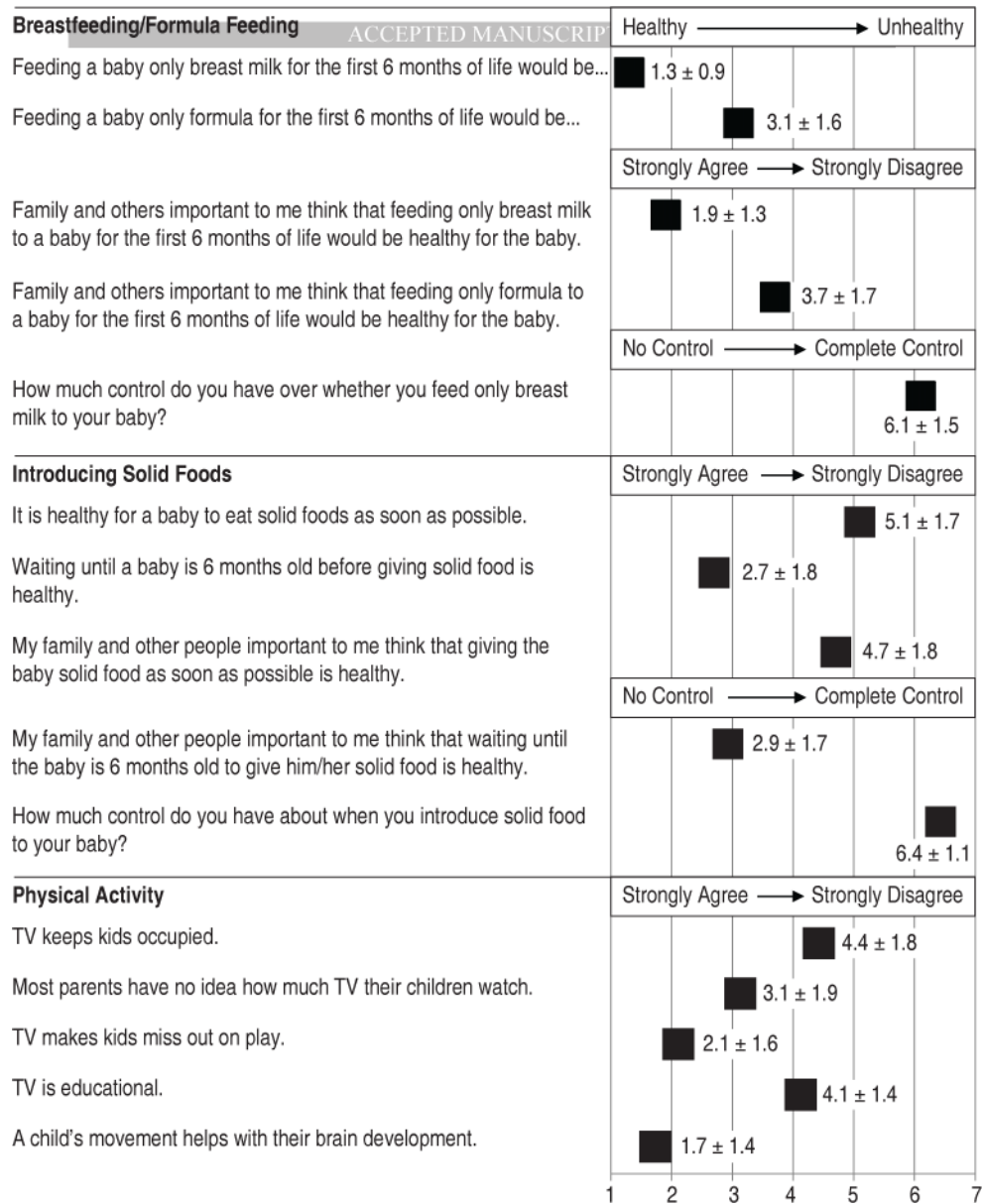


Figure 1. Means ± standard deviations of responses to attitude and belief questions posed on a 7-point Likert scale on a knowledge, attitudes and beliefs questionnaire on infant feeding and physical activity administered at baseline to mothers participating in the Prevention of Toddler Overweight and Teeth Health Study (PTOTS), n=438

Table 1

Demographic characteristics at baseline of mothers participating in the Prevention of Toddler Overweight and Teeth Health Study (PTOTS), n=438

Continuous Variables	Mean±SD
Age	25.3±5.8
Categorical Variables	Frequency (%)
Education	
Less than H.S. ^a diploma/G.E.D. ^b	120 (27.4)
H.S. diploma/G.E.D.	248 (56.6)
Advanced degree	70 (16.0)
Adult household composition	
Single parent only	33 (7.5)
Spouse/life partner only	194 (44.3)
Spouse/partner + other adults	128 (29.2)
Other adults but no spouse/partner	83 (18.9)

^aHigh School

^bGeneral Educational Development test

Table 2

Frequency of correct answers to individual knowledge questions, and summary knowledge scores from a knowledge, attitudes and beliefs questionnaire on infant feeding and physical activity administered at baseline to mothers participating in the Prevention of Toddler Overweight and Teeth Health Study (PTOTS), n=438

Individual Questions: Breastfeeding/Formula Feeding	Frequency of Correct Response^a (%)
<i>False:</i> ^b Babies who receive only breast milk for the first few months of life become picky eaters as toddlers	429 (98.0)
<i>True:</i> Breastfed and bottle fed babies generally give you a sign when they are full	410 (93.6)
<i>True:</i> Babies who receive only breast milk for the first few months of life get all the nutrition they need from breast milk	401 (91.5)
<i>False:</i> Babies who receive only breast milk for the first few months of life have as many allergies as formula fed babies	380 (86.7)
<i>True:</i> Baby formula must never be warmed in the microwave	362 (82.7)
It is <i>never</i> ^c OK to prop the bottle when baby is lying down	350 (79.9)
<i>True:</i> Babies who receive only breast milk for the first few months of life have fewer ear infections	280 (63.9)
At 4–7 days baby should have 5–6 wet or poopie diapers if getting enough breast milk	265 (60.5)
<i>True:</i> Babies who receive only breast milk for the first few months of life are less likely to develop diabetes when they get older	171 (39.0)
<i>False:</i> Mothers who breastfeed lose the weight gained during pregnancy more slowly	134 (30.6)
<i>True:</i> Babies who receive only breast milk for the first few months of life have less “smelly” diapers	127 (29.0)
Individual Questions: Introducing Solid Foods	Frequency of Correct Response (%)
<i>Yogurt and mashed bananas</i> are NOT a choking hazard	418 (95.4)
<i>False:</i> It is OK to give 3 month old baby cow’s milk if you run out of formula	416 (95.0)
<i>False:</i> It is not possible for a small child to know when they are full	342 (78.1)
A baby should be introduced to a cup by the age of 8–12 months	283 (64.6)
<i>True:</i> Always wait 5–7 days before introducing a new food or giving your child a food she did not like before	271 (61.9)
<i>Baby drooling a lot</i> is NOT a sign that baby is ready for solid food	257 (58.7)
The best time to introduce solid food is 6 months	237 (54.1)
<i>Fruit</i> is not a common source of food allergies	202 (46.1)
A one day old baby’s stomach is the size of a marble	188 (42.9)
A toddler may need to be offered new food 12 times before they accept it	67 (15.3)
Individual Questions: Physical Activity	Frequency of Correct Response (%)
<i>True:</i> Toddlers and preschoolers should have at least 1 hour of movement per day	414 (94.5)
<i>False:</i> Babies need to stay in playpens and high chairs to remain as safe as possible	285 (65.1)
Each day toddlers should play in an organized way for 30 minutes	200 (45.7)
Toddlers and preschoolers should NOT sit without moving for more than 60 minutes	30 (6.9)
Summary Knowledge Scores	Mean Percent and Frequency of Total Possible Correct Responses

Individual Questions: Breastfeeding/Formula Feeding	Frequency of Correct Response^a (%)
Breastfeeding/formula feeding	69% (7.6/11)
Introducing solid food	61% (6.1/10)
Physical activity	53% (2.1/4)
Total knowledge	63% (15.8/25)

^a Responses to individual questions are shown in descending order of frequency of correct answers within each theme

^b Correct responses for true/false question are indicated in bold

^c Correct responses for multiple-choice questions are indicated in bold (correct response taken from the multiple-choice options on the questionnaire document)