Marshallese Beliefs, Perceptions, and Practices Related to Child Feeding Among Marshallese in the United States: Implications for Childhood Obesity

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ABSTRACT

INTRODUCTION: Obesity affects more than 40 million children globally. Efforts to promote proper nutrition in an attempt to reduce childhood obesity should consider maternal beliefs and cultural customs around food. Little is known regarding child feeding, including weaning practices and foods consumed in the first years of life among Marshallese children, a sub-group of Pacific Islanders, residing in the United States.

METHODS: This study aims to explore the influences on introduction of complementary foods among Marshallese mothers and caregivers residing in the United States, to serve as the basis for promotion of improved nutrition. Focus groups and demographic surveys were conducted with Marshallese mothers and caregivers (N = 27) to explore child-feeding beliefs, perceptions, and practices.

RESULTS: All mothers reported breastfeeding their infants, and 80% reported using some type of milk supplementation. There was a difference in mother and caregiver responses regarding which first foods to introduce and average age of introduction.

DISCUSSION: Analysis revealed three themes identified as being influential for child-feeding practices: Marshallese breastfeeding customs, introduction of solid foods, and Marshallese family feeding customs.

KEYWORDS: Pacific Islander, community-based participatory research, Marshallese, child feeding, complementary foods

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Introduction

The World Health Organization (WHO)[1] and the American Academy of Pediatrics recommend exclusive breastfeeding until 6 months with appropriate complementary foods introduced after 6 months, as the period of 6 to 24 months is a vulnerable period for nutrition. Early introduction of formula or complementary foods and discontinuation of breastfeeding increase the risk of obesity, diabetes, and sudden infant death syndrome.[2] Poor nutritional status and increased morbidity from infectious disease are associated with declining exclusive breastfeeding rates.[3] Exclusive breastfeeding rates at 6 months of age have increased slightly since 2009 in the United States, but at 22%, remain below the Healthy People 2020 target of 25.5%.[4] The association between timing of complementary foods and childhood obesity is not clear, but evidence is strong that exclusive breastfeeding until at least 4 months decreases the risk of obesity.[5] Among children below 2 years in the United States, approximately 8.1% are above the 95th percentile for weight-for-length, increasing their risk of obesity.[6]

Obesity affects more than 40 million children globally.[7] Early-life interventions targeting eating patterns during the first 1000 days of life are essential to promote proper nutrition and growth. Establishing healthy eating habits during childhood helps promote a healthy lifestyle into adulthood.[8] Efforts to promote proper nutrition in an attempt to reduce childhood obesity should consider maternal beliefs and cultural customs around food. A national survey of Marshallese mothers residing in the United States found that at 4 months of age, 64% of infants were breastfeeding but only 31% were exclusively breastfeeding.[1] In addition, this survey indicated that Marshallese infants traditionally receive early introduction of complementary foods. Current data on dietary intake in the Marshall Islands are based on a 2007 survey, finding a 16% exclusive breastfeeding rate during the first 6 months and complementary food introduction as early as 2 months.[3] In the Marshall Islands, introductory first foods include juices and pureed fruit with canned milk. Coconut products are traditional weaning foods.[3] Nutritional deficiencies are common in the Marshall Islands, with one study indicating that pre-school children are at high risk for anemia, vitamin A deficiency, and iron deficiency.[9] Although studies have explored child-feeding beliefs, knowledge, and practices of culturally diverse mothers,[10,11] research focused on the Marshallese population in the United States is lacking.

Background

The Marshall Islands are a group of small low-lying islands located in the Pacific. Following World War II, over a 20-year period, the United States conducted nuclear testing in the Marshall Islands, detonating more than 65 nuclear bombs

around the Marshall Islands.[12] As a result of radiological effects, islanders experienced hair loss, skin lesions, and were forced to relocate to other islands separating families and disrupting Marshallese culture.[12] Nuclear fallout also created dangerous conditions creating contaminated fish and soil poisoning thus contaminating the food supplies. Historically, the Marshall Islanders were agriculturally self-sufficient living on a diet comprising local plants and fish.[13] Disruption of cultural practices and changes in food supplies were also due to islander's being relocated with families separated by the need to move from contaminated areas. There were major restrictions placed on consumption of native foods due to ground contamination from nuclear fallout.[12] The inability of Pacific Islanders to be self-sufficient in food production led to significant diet changes which included a diet of mainly rice and canned meat provided by the US Government.[13]

In 1986, the Republic of the Marshall Islands (RMI) entered into the Compact of Free Association (CFA) with the United States.[12] This compact allows the United States to maintain military access to the RMI including surrounding waters and air space.[12] The compact allows individuals from the RMI to come to the United States to work and live without a visa, as long as they have a valid Marshallese passport. Migration from the RMI to the United States has occurred since the compact, but has significantly increased over the past 10 years.[13] The CFA enables residents from the Marshall Islands to travel back and forth between the United States and the Marshall Islands with ease.[14] This increase in travel and adaption of US culture has led to further disruption of traditional customs around eating and foods ingested.

Community-based participatory research (CBPR) is an approach to research that is often used to help improve health outcomes within a specific community setting.[15] CBPR engages communities as equal partners in identifying community needs, developing research ideas, and implementing the findings.[15–17] In 2013, the University of Arkansas for Medical Science (UAMS) and the University of Arkansas (UARK), Fayetteville, established a CBPR partnership with the Marshallese community in Arkansas. Marshallese community leaders identified infant-feeding practices as a high-priority issue in their effort to address obesity.[18] Significant health care disparities, including obesity, diabetes, and cardiovascular disease, exist among the Marshallese residing in the United States when compared with the general US population.[19] The research question guiding this study was as follows: What are the child-feeding beliefs, customs, and practices among Marshallese mothers and caregivers of children under 3 years, in Northwest Arkansas?

Methods

Recruitment and sampling

A descriptive qualitative design approach, using focus-group interviews and surveys with Marshallese mothers and caregivers, was chosen to explore child-feeding beliefs, perceptions, and practices. Participants were recruited through community organizations, specifically the Arkansas Coalition of Marshallese (ACOM), pastors, and other community contacts developed through prior CBPR fieldwork. The inclusion criteria were Marshallese women with children 1 to 3 years of age and caregivers of those children. Caregivers were included based on Marshallese community co-investigator input and were defined as someone other than the parent who cares for the child. Most often caregivers are identified as grandparents living in the family home or older women (aunties) in the Marshallese community. Marshallese community co-investigators felt it was important to include all caregivers despite their age or relationship because they have significant caregiving responsibilities and influence over child feeding within the Marshallese community. Caregivers and mothers were interviewed in separate focus groups.

Participant characteristics. There were four focus groups conducted. No new themes or sub-themes emerged during the fourth session suggesting saturation was reached. Each group consisted of mothers or caregivers, and the group size ranged from six to nine with an average focus-group size of six participants. The mean age was 31 years for mothers and 52.8 years for caregivers. The average length of time living in the United States was 8.8 years (N = 27). All mothers (N = 13) had some formal education, only two had lower than a ninth-grade education. Four graduated high school, with two of those completing at least 1 year in college. Every mother reported they had received prenatal care and 8 out of 13 were currently accessing Women, Infants, and Children (WIC).

Data collection

From November 2016 to February 2017, a purposive sample of 27 participants participated in four focus groups. A female bilingual (Marshallese and English) research manager, trained in research methods, facilitated each focus group. A guide with open-ended questions and sub-questions was used to encourage participants to speak candidly while maintaining consistent inquiries across the focus groups (Table 1). The focus-group guide was developed in partnership with the CBPR team and through extensive fieldwork. Marshallese CBPR leaders provided counsel and direction, during several meetings with the researchers, in the development of focus questions on beliefs, perceptions, and experiences regarding infant and child feeding. Questions regarding how the supplemental food and education from the US Department of Agriculture WIC program affected feeding practices were created based on input from the Marshallese members of the research team. Focus groups took approximately 1 hour and were conducted at the office of the primary community partner, ACOM. Participants were provided with a meal and given a US$20 gift card for their participation.

Table 1. Semi-structured interview guide: topics and example sub-questions.

1. When, and if, you introduce solids to your baby, what made you decide it was time?
   (a) Who influenced you the most in this decision?
   (b) What did you give them first other than milk?
   (c) How did you decide what to give them first?
   (d) What are your thoughts about this?
2. When do you think is the best time to introduce solids?
   (a) Do members of your family agree with you on when to introduce solids to your child?
   (b) Are there certain foods that infants and small children should avoid?
3. What type of rice do you eat and how do you prepare it?
   (a) How often do you eat rice? Your baby?
   (b) When did you or your caregiver first give rice to your children?
   (c) How do you prepare rice for your family?
   (d) Tell me more?
4. What fruits and vegetables do you eat? Your baby?
   (a) How often?
   (b) Who decides which fruits/vegetables to buy?
   (c) What prevents you and your family from eating more fruits/vegetables?
5. Has WIC affected your feeding practices?
   (a) If so, how has this affected how you feed your baby?
   (b) Can you tell me more?
   (c) What are examples of changes you made after WIC?
   (d) What has WIC or your doctor told you about when and how to introduce solids to your baby?
6. What does your baby mainly drink?
   (a) Who decides what they drink?
   (b) Has WIC influenced this?
   (c) How much fruit juice does your baby drink?
7. Who selects and purchases the food that is eaten in your home?
   (a) Who prepares the meals?
   (b) Who in your family eats first?

A summary of the project and consent form was reviewed by the participants prior to participation; all materials were provided to the participants in their native language. The materials were also available in English; no participants requested the English version. After written consent, participants completed a brief written survey including questions on demographic characteristics (Tables 2 and 3). Study procedures were conducted in accordance with all applicable government regulations and UARK research policies and procedures. All protocols and procedures performed in this study were approved by the UARK Institutional Review Board (IRB; #16-07-010).

Data analysis

Focus groups were audio recorded and transcribed verbatim by a female bilingual community co-investigator. Transcripts were translated from Marshallese to English and checked for accuracy by two bilingual research managers. Cultural consideration directed the recruitment of female co-investigators and translators. The CBPR team coded transcripts for emergent themes and collaboratively discussed the themes to ensure scientific rigor and inter-coder agreement. The authors started with initial coding that consisted of naming each data segment with short summations. This process helped organize the data for purposes of assigning focused codes. The focused codes were used to identify and develop the most salient themes within the data. There were three primary coders and one confirmation coder. Codes were organized in a codebook. The qualitative results were organized into three emergent themes that reveal Marshallese women's infant- and family child-feeding customs. Through-out the process, the Marshallese community co-investigators provided feedback to ensure that the nuanced meanings of participants' responses were captured. Marshallese community co-investigators' input was particularly crucial in ensuring that the findings and discussion presented were interpreted accurately.

Table 2. Mother survey (N = 13).

	MEAN	SD	N
Mothers' age (years)	31	7.9	13
Highest grade completed	10.7	3.4	13
Prenatal care	Yes = 13	0	13
Length of time in the United States (years)	8.3	6.1	13
Currently enrolled in WIC?	Yes = 8 No = 5	0.5	13
Did you breastfeed?	Yes = 13	0	13
Age solid food was introduced (months)	10.2	4.1	9[a]
What food did you introduce first (top 3 responses)?	Banana		11
	Carrot		
	Baby food		

[a]Not all participants responded.

Table 3. Caregiver survey (N = 14).

	MEAN	SD	N
Caregivers' age (years)	52.8	9.8	14
Length of time in the United States (years)	9.1	7.0	14
Age that is appropriate to introduce food (months)	7.6	2.8	11[a]
Age solid food was introduced (months)	11	1.9	10[a]
What foods did you introduce first (top 3 responses)?	Rice		13[a]
	Fish		
	Soup		

[a]Not all participants responded.

Results

All mothers reported breastfeeding their infants, and 80% reported using some type of milk supplementation. Mothers reported the mean age to introduce solids to be 10.2 months. Caregivers reported the appropriate age to introduce solids to infants was 7.6 months, but when asked what age the caregiver actually introduced solids, the mean age was 11 months.

Marshallese infant-feeding beliefs, perceptions, and practices

Participants described Marshallese infant/child feeding from birth through 3 years. There were three themes identified: (1) breastfeeding customs, (2) introduction of complementary foods, and (3) family feeding customs. Themes that emerged from the data were selected after rigorous review and coding. Selected quotes are provided to exemplify the themes (Table 4).

Breastfeeding customs. Overall, participants discussed breastfeeding infants as a preventive measure against illnesses and a means of providing comfort. Supplementation was also described as used sometimes out of both necessity and convenience. Additional supplements (artificially flavored drink, coffee creamer, and soda) were discussed as a necessity during times of poverty and when nothing else was available while in the Marshall Islands and the United States. Cow's milk was discussed with distrust and concern as a source for nutrition, both in the Marshall Islands and in the United States.

Introduction of complementary food. Within the theme of introduction of complementary foods, two sub-themes emerged: (1) timing and (2) type of complementary foods introduced.

Timing. Children's interest was identified as the main influence as to when complementary foods were introduced, and the timing for the introduction of complementary feeding differed between mothers and caregivers. For mothers, introduction of solid foods was largely described as dependent on dentition and ability to chew food. Caregivers offered concerns about choking and physiologic myths. A common thread in the discussion with caregivers was caregiver chewing of food for the younger children. Discussion about softening the food for consumption as a preventive measure was provided as the rationale for "pre-chewing" the complementary foods. Average timing of introduction of complementary foods for mothers was 10.2 months and for caregivers 11 months.

Types of complementary foods introduced. The types of foods first offered to infants differ between mothers and caregivers. Mothers are more likely to offer fruits and vegetables, whereas caregivers are more likely to offer rice, fish, soup, and breadfruit. Candy and soda were mentioned by both mothers and caregivers as not good for children, but acknowledged it was often provided due to the child's desire for such foods as they got older and could "ask" for specific foods.

Family feeding customs. Discussions of family feeding customs about the Marshallese staple diet pre-dominated the focus groups. Although this was not specific to child feeding, it is an important factor in the types of foods available and provided to Marshallese children. All participants agreed that rice is offered as a part of most meals. Rice was discussed as a food that is filling and inexpensive. Caregivers also stated that rice is something they had available in the islands and was consumed daily by Marshallese migrants. Feeding frequency was often determined by food availability, "until the pot is empty." Most mothers and caregivers report eating rice at least twice daily. Coconut was also discussed as needed to flavor foods and make them more appealing to eat. Staple diets of both mothers and caregivers included fruits, vegetables, and rice. Mentioned vegetables were "greens" but also starchy fruits such as pumpkin, breadfruit, and bananas. Spicy foods were described as not typically given to children by both mothers and caregivers.

Discussion

This study explored the child-feeding beliefs, perceptions, and practices of Marshallese mothers and caregivers residing in Arkansas, in an effort to improve optimum nutrition to reduce health disparities, specifically childhood obesity. The inclusion of caregivers in addition to mothers provided a more holistic view of child-feeding practices among the Marshallese community. Differences among mother and caregiver responses identified variations in foods first introduced and in perceived ideal age of food introduction. Based on CBPR stakeholder input, caregivers are often the decision-makers in meal planning and prepare most of the family meals. They also are home caring for the children and provide support/advice for the mothers of young children.

The findings from this study support previous research that most Marshallese mothers in the United States are breastfeeding.[18] The focus groups revealed some conflicting information concerning exclusive breastfeeding. Most mothers do not exclusively breastfeed although when asked about breastfeeding, they did not qualify the amount of breastfeeding or offer information about supplementation. Exclusive breastfeeding was not clearly defined in this study and should be assessed in future studies among Marshallese mothers.

The early introduction of solids is defined as introduction of complementary foods before 6 months of age.[20,21] Compliance to infant feeding recommendations in the United States is low.[22] However, in this study, participants reported introduction of complementary feeding at a mean age of 10.2 months (mothers) and 7.6 months (caregivers). Further study on the delayed introduction of solid foods, due to belief that later introduction prevents illness and breastfeeding provides comfort, needs to be explored. Caregivers reported the appropriate age to introduce solids to infants was 7.6 months, but when asked what age the caregiver actually introduced solids, the

Table 4. Themes: Marshallese mothers' and caregivers' infant-feeding beliefs and practices (N = 27).

THEMES	MOTHERS' AND CAREGIVERS' QUOTES
Breastfeeding customs	*Mothers*: "So, this is what we think is important, for the child to be breastfed because when they are sick they won't take the bottle, they should be breastfed with us so they can get stronger in their health." (FG3) "Because we are Marshallese it is our tradition to breastfeed because it's important and there are some types that we might give the bottle to them and (we) get distracted, they might be hurt." (FG3) "Well when they (WIC) asked me if I wanted to take it (breast pump) I said I didn't but I still breastfed and did both. He took the bottle and the breast." (FG3) *Caregivers*: "When they were still newborn, they were bottle fed liquid." (FG2) "Well for me my children have always been bottle fed." (FG2)
Introduction of complementary feeding 1. Timing	*Mothers*: "When they have teeth to chew then we can introduce." (FG1) "Eight months to a year, because that is when they start growing teeth." (FG4) "I decided when to first feed my child when I saw that my child wasn't developing well with just milk. I first introduce it when my child was 3 months old." (FG1) *Caregivers:* "They would say, don't feed the child solid food for you would stretch the child esophagus." (FG1) "Yes, so I made a decision to feed my child when she starts having teeth both upper and lower gum." (FG2) "When she was three months old. Reason is, the powder (formula) wasn't helping the child develop well." (FG1)
2. Type of complementary feeding	*Mothers*: "I wanted him or her to start off with vegetables that is why I offer carrots." (FG3) "I start feeding my children, six months foods that are not too solid and then at 9 months, that's when I add ramen noodles and rice." (FG4) "Like banana. Orange because it delicious to them." (FG3) "Just like I said that my children find bananas that were delicious and that was the first food they ever ate, it was banana and I mashed it for them. Well, the reason for my decision was because there was a lot and they're were right in front of eyes. And broccoli, it's delicious to them. As soon as you boil them they become soft, I mash them to feed my baby, he also likes it. And the reason I chose these foods is because they were around for me to give them." (FG3) *Caregivers*: "They can have rice, jaibo, jakkob." (FG1) "I add on ramen noodles and rice to their diets." (FG2) "Since the pancake is soft, I would just give it to the child." (FG2) "But there are certain foods we can't just give a child for we're worry they might choke on it." (FG2) "Breadfruit, but make sure to mash it well so child can eat it." (FG1)
Family feeding customs 1. Foods to avoid	*Mothers*: "If referring to diabetes, . . . (Chronic illness) can prevent us from eating lots of apples and bananas." (FG4) "And also those that are too spicy, some children likes them but we don't want them to eat it." (FG2) "If referring to diabetes, . . . (Chronic illness) can prevent us from eating lots of apples and bananas." (FG4) *Caregivers*: "And also those that are too spicy, some children likes them but we don't want them to eat it." (FG2)
2. Rice	*Mothers*: "Without rice, our belly wouldn't be satisfied." (FG1) "But I started giving her rice when she was 15 months . . . As for my older son, he ate rice when he turned one, but when I cooked him rice, it was softer than regular rice . . . so, we all agree that we start feeding our children rice at the age of one." (FG3) *Caregivers*: "Also in the middle of the night, it is common for us Marshallese." [referring to eating rice] (FG2) "Well at my house when the pot is empty, they'll cook it again." (FG2)
3. General customs	*Mothers*: "When they were little, it was our choices and now that they are older, we don't force them, they can have whatever they want." (FG1) "Like I mentioned, it depends on how you've raised them. If you had make it for them since they were little and they're used to it, they would eat it. But if you didn't add veggies into their diets since little when you would see very few of them eating their vegetables." (FG1) *Caregivers*: "We are so used to having coconut in our foods. Back in the islands, if there is no coconut flakes, milk, the goods wouldn't taste great." (FG1)

mean age was 11 months. This could be due to interpretation of what solids mean. Caregivers also described introducing solid food by chewing the food for the infant prior to feeding the food. This food could be viewed as appropriate in texture and no longer a solid food.

Family cultural practices may conflict with types of foods recommended by health care professionals.[10,22,23] Caregivers who are often part of the family unit provide advice and support to mothers concerning culture, specifically child feeding. Caregivers are also primary care providers for the children and

may adhere to traditional cultural beliefs and practices. Most caregivers described fear of choking and esophageal stretching as a rationale for chewing the food for the child prior to feeding. In addition, economic factors played a role in the type of complementary foods introduced. Marshallese caregivers understand the health benefits of fruits and vegetables but recommendations for fresh fruits and vegetables require resources that may be difficult to obtain. Rice is a primary food in the Marshallese culture and is readily available at most family meals. Culture and the family unit emerged as a significant influence on child and family feeding beliefs, perceptions, and practices. Also influential for child-feeding practices are social context, historical factors, and social determinants of health.[10,23–25]

Childhood obesity is strongly linked to early feeding practices which include supplemental feeding practices while breastfeeding, breastfeeding duration, and timing and type of complimentary feeding.[26,27] Marshallese mothers and caregivers are important decision-makers for feeding practices that could affect childhood obesity rates in Marshallese children. This is important due to studies linking obesity to a number of escalating chronic illnesses in the Marshallese.[28,29]

Limitations

The limitations for this study included purposeful sampling and small sample size from a single geographic area, which could negatively affect generalizability. Due to the nature of focus groups, participants may have given perceived socially acceptable responses rather than information that was accurate, on focus-group questions and surveys. Confusion when using terms such as "milk" and "solids" could have also created incorrect or timing misconceptions for the interpreter or participants. Exclusive breastfeeding is a concept that requires additional explanation and defining criteria to ensure accurate reporting of breastfeeding rates. In addition, the age range for participant's children was 1 to 3 years; recollection of early feeding practices may include recall bias. Despite these limitations, this is the first study to report Marshallese mothers' and caregivers' beliefs, perceptions, and practices of child feeding in the continental United States.

Future Research

This exploratory study has provided insight concerning Marshallese mothers' and caregivers' beliefs, perceptions, and practices of child feeding. This knowledge is important for the planning of health education and health care for this population. A larger population base from a more diverse geographic area is needed. More specific information concerning exclusive breastfeeding would provide deeper insight into child-feeding practices. Additional information concerning what guidelines mothers and caregivers are receiving from their health care provider and how they use the information to guide child-feeding practices would benefit future health care practice.

Conclusion

This study offers insight into the child-feeding beliefs, perceptions, and practices of Marshallese mothers and caregivers. This information may provide support for health programs which support healthy families and transitions for Marshallese migrants. As an exploratory study, additional efforts to explore the concepts provided are needed. Innovative education strategies are required to support this growing population. Understanding what roles mothers and caregivers play in the decisions made concerning child feeding is important to the health of the next generation and can inform the cultural tailoring of nutrition education interventions. Exploring child-feeding beliefs, knowledge, and practices of the Marshallese population serves as a foundation to further research on the prevention of childhood obesity and nutritional deficiencies in this population.

Author Contributions

KVJ, AS, MS, and VS all contributed to the design of the study. KVJ, AS, MS, and BA participated through data collection, analysis, article writing and critical review. MS and BA performed data analysis. PM supported research design and review of the article.

Compliance with Ethical Standards

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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