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Maternal Infant Feeding Behaviors and Disparities in Early Child Obesity

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Abstract

Background: Although disparities in child obesity exist during infancy, the underlying mechanisms are unclear. Assessing dissimilarities in feeding practices, styles, and beliefs may provide a better understanding of these mechanisms. This study sought to identify modifiable maternal-infant feeding behaviors that may contribute to disparities in early child obesity.

Methods: This study is a cross-sectional analysis comparing mothers with infants (2 weeks to 6 months old) in a low-risk group of high-income white mothers to a high-risk group of low-income Hispanic mothers. Regression analysis was used to explore relationships between each group and (1) infant feeding practices, including breastfeeding, giving juice, and adding cereal to bottles, (2) controlling feeding styles, (3) beliefs about infant hunger and satiety, and (4) infant weight status.

Results: The sample included 412 mothers (low-risk group, $n=208$; high-risk group, $n=204$). The high-risk group was less likely to exclusively breastfeed (adjusted odds ratio [AOR], 0.43; 95% confidence interval [CI], 0.22–0.83), more likely to introduce juice (AOR, 12.25; 95% CI, 3.44–43.62), and add cereal to the bottle (AOR, 10.61; 95% CI, 2.74–41.0). The high-risk group exhibited greater restrictive and pressuring feeding styles and was more likely to believe that mothers can recognize infant hunger and satiety and less likely to believe that infants know their own hunger and satiety. High-risk infants were more likely to have a weight-for-length percentile >85th percentile (AOR, 2.66; 95% CI, 1.10–6.45).

Conclusions: Differences in infant feeding behaviors may contribute to disparities in early child obesity. Longitudinal studies are needed to determine the effect of these differences on child obesity.

Introduction

Eliminating health disparities is a public health priority.[1] Low-income and ethnic minority subgroups are more likely to experience adverse health outcomes, including child obesity.[2] Disparities in child obesity exist in the first 2 years of life, suggesting that their origins begin during infancy.[3,4] Although these disparities are well characterized, the underlying causes are not well described, especially within the first 6 months of life. Assessing dissimilarities in maternal-infant feeding behaviors among groups that differ not only in ethnicity, but also in multiple socioeconomic factors may provide new insights into the mechanisms underlying disparities in early child obesity.

Behaviors that might contribute to disparities in child obesity include differences in (1) obesigenic infant feeding practices, such as decreased exclusive breastfeeding, introducing juice, and adding cereal to the bottle, (2) controlling or nonresponsive feeding styles, in which parents regulate feeding without responding to infant feeding cues, and (3) beliefs about infant hunger and satiety. Detecting these early differences may explain why certain groups, in particular, low-income Hispanic families, are most vulnerable to disparities in early child obesity.[4]

In order to identify modifiable behaviors that may contribute to these disparities, this study compared two samples of mothers with infants 2 weeks to 6 months old with socioeconomic, ethnic, and educational characteristics associated with varying risk of child obesity. This study hypothesized that, compared to high-income, primarily white mother-infant pairs, low-income, Hispanic mother-infant pairs, known to be at high risk of early child obesity, would be (1) more likely to display obesigenic infant feeding practices, (2) more likely to exhibit controlling feeding styles, (3) less likely to believe that infants can recognize their own hunger and satiety, and (4) their infants would be more likely to be overweight.

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Methods

Study Design

This is a cross-sectional study comparing a sample of low-income, primarily Hispanic mothers to a sample of high-income, primarily white mothers. To identify modifiable targets of intervention, infant feeding practices, maternal controlling feeding styles, and beliefs about infant hunger and satiety, were compared between the groups. Differences in infant weight status were also compared. The study was approved by the New York University School of Medicine Institutional Review Board (New York, NY) and the Bellevue Hospital Center/Health and Hospital Corporation Institutional Review Board (New York, NY).

Study Sample

Low-risk group. From July 2008 to October 2008, all mothers of young infants receiving pediatric care at an urban private pediatric practice, known to serve high-income, primarily white families, were approached to assess their eligibility. All eligible mothers with infants scheduled for a well-child visit were offered enrollment.

High-risk group. From February 2009 to October 2009 and from January 2010 to August 2010, mothers of infants at a Supplemental Program for Women, Infants and Children (WIC) center located within a large urban public hospital, which serves low-income, primarily Hispanic families, were recruited. All mothers with infants in the waiting room were assessed for eligibility on days reserved by the WIC center for infants.

Inclusion criteria were the same for both samples: English- or Spanish-speaking mothers ≥ 18 years of age with a singleton full-term (≥ 37-week gestational age) infant between 2 weeks and 6 months of age. This reflects a time when infant feeding is most dependent on the primary caregivers, most often the mother. Exclusion criteria were infants with medical problems that influence feeding, such as congenital heart disease or neurological abnormalities. Research assistants obtained informed written consent from all participants.

Assessments

Study assessments included infant feeding practices, maternal controlling feeding styles, beliefs about infant hunger and satiety, and demographic data collected during a face-to-face interviewer-administered survey. Infant measured weights and lengths were obtained either from medical record review or from direct measurements.

Independent Variable

The independent variable was group membership (low-risk vs. high-risk).

Dependent Variables

Infant feeding practices. Infant feeding practices were assessed using questions generated by the study team. Breastfeeding was assessed using the question "What are you feeding this new baby now?" and responses were classified as exclusive breastfeeding, partial breastfeeding (both breast milk and formula), and no breastfeeding (formula only). Mothers provided information about giving juice and adding cereal to the bottle by responding yes or no to the following questions: "In the last 24 hours, did you feed your baby any fruit juice?" and "In the last 24 hours, did you give your baby cereal in a bottle?"

Maternal controlling feeding styles. Two controlling feeding styles (restriction and pressuring) were assessed. Controlling feeding styles, in which parents regulate infant feeding without responding to feeding cues, have been associated with child obesity.[5,6] Styles are often characterized as (1) restrictive, in which the parent tries to limit intake even if the child is hungry, and (2) pressuring, in which the parent encourages intake even if the child is full. Both styles may lead to decreased recognition of internal feeding cues, increased caloric intake, and excessive weight gain. Five items were adapted from the Child Feeding Questionnaire (CFQ)[7] for parents of children between 2 and 11 years of age. Restriction was assessed with two statements ($\alpha = 0.71$): (1) "If I did not guide or regulate my child's eating, he or she would eat much more than he or she should" and (2) "I have to be especially careful to make sure my child does not eat too much." Pressuring was assessed with three statements ($\alpha = 0.47$): (1) "I have to be especially careful to make sure my child eats enough"; (2) "If I did not guide or regulate my child's eating, he or she would eat much less than he or she should"; and (3) "Even when my child seems done, I try to feed him or her a little bit more." Responses were scored 1 (strongly disagree) to 4 (strongly agree), and mean scores for these two scales were generated. Factor analysis, utilizing principal components extraction and varimax rotation, was consistent with two separate factors representing restriction and pressuring, similar to loadings of the CFQ items in older children.

Maternal beliefs about infant hunger and satiety. These beliefs were assessed using all four statements from the "awareness of infant's hunger and satiety cues" factor from the Infant Feeding Questionnaire.[8] The statements were: (1) "You know when the baby is hungry"; (2) "The baby knows when he or she is hungry"; (3) "You know when the baby is full"; and (4) "The baby knows when he or she is full." Responses were scored 1 (strongly disagree) to 4 (strongly agree). Factor analysis of these four items, utilizing principal components extraction and varimax rotation, was consistent with two factors: hunger/satiety (factor 1) beliefs that mothers can recognize infant hunger and fullness (questions 1 and 3; $\alpha = 0.66$) and hunger/satiety (factor 2) beliefs that infants can recognize their own hunger and fullness (questions 2 and 4; $\alpha = 0.66$). Factor scores were calculated by generating mean scores for these two scales.

Infant weight status. Infant weight status was assessed to confirm that disparities are present early in this population, as previously demonstrated.[4] For the low-risk group, all infant weights and lengths were measured by nursing staff on the day of the interview. For the high-risk group, infant weights and lengths were either measured directly by the WIC nutritionist on the day of the interview (28%) or obtained from the medical record from the most recent well-child visit (72%) at an affiliated pediatric clinic (mean [standard deviation; SD] of 4 [34] days). Weight-for-length *z*-scores were determined by using World Health Organization growth standards and examined both as a continuous and categorical variable dichotomized as ≤85th percentile versus >85th percentile.[9]

Covariates

Demographic characteristics. Infant characteristics included age (2 weeks to 3 months or 4–6 months), sex, and birth weight. Maternal characteristics included age (18–21 years or >21 years), self-reported race/ethnicity (white, Asian, Hispanic, or black), country of birth (US born or non-US born), education level (<college or ≥college graduate), marital status (married or single/divorced/widowed), employment status (working or nonworking), number of other children (none or ≥ 1), and diabetes during pregnancy (yes or no). Maternal prepregnancy BMI (kg/m^2)

Table 1. Differences in Maternal and Infant Characteristics Between the Low-Risk Group and the High-Risk Group

Characteristics	Low-risk group *n* (%) or mean (SD) (*n*=208)	High-risk group *n* (%) or mean (SD) (*n*=204)	*p* value
Infant			
Age, months	3.05 (1.95)	3.02 (1.95)	0.89
Male	114 (54.8)	111 (54.4)	0.94
First born	116 (57.7)	93 (46.5)	0.03
Gestational age at birth, weeks	39.1 (1.12)	39.1 (1.29)	0.17
Birth weight, kg[a]	3.37 (0.46)	3.36 (0.46)	0.90
Maternal			
Age, years	34.7 (4.3)	27.7 (5.7)	<0.001
Race/ethnicity			
White	156 (77.2)	10 (5.0)	<0.001
Asian	25 (12.4)	10 (5.0)	
Hispanic	13 (6.4)	169 (83.7)	
Black	3 (1.5)	12 (5.9)	
Other	5 (2.4)	1 (0.5)	
US Born	145 (71.1)	34 (16.9)	<0.001
Education, college graduate	192 (96.0)	33 (16.5)	<0.001
Marital status, married	190 (94.5)	66 (33.2)	<0.001
Working	60 (30.0)	31 (15.5)	0.001
Gestational diabetes	12 (6.0)	15 (7.6)	0.53
Prepregnancy BMI[b]			
BMI, mean (SD)	21.7 (2.9)	25.9 (6.5)	<0.001
Underweight, BMI <18.5	17 (9.3)	8 (5.7)	<0.001
Normal weight, BMI 18.5–24.9	143 (78.1)	70 (49.6)	
Overweight, BMI 25–29.9	21 (11.5)	38 (27.0)	
Obese, BMI ≥30	2 (1.1)	25 (17.7)	

[a]*n*=378 with complete child birth weight data (low-risk group, *n*=205; high-risk group, *n*=173).

[b]*n*=324 with complete maternal BMI data (low-risk group, *n*=183; high-risk group, *n*=141).

SD, standard deviation.

Table 2. Differences in Infant Feeding Practices[a]

Feeding practices	Low-risk group n (%)	High-risk group n (%)	OR	95% CI	AOR[b]	95% CI
Exclusive breastfeeding	97 (46.6)	40 (19.7)	0.52	0.29–0.94	0.43	0.22–0.83
Partial breastfeeding	72 (34.6)	132 (65.0)	2.30	1.33–4.00	2.22	1.22–4.03
Formula only	39 (18.8)	31 (15.3)	Ref	—	Ref	—
Early juice introduction	3 (1.4)	23 (11.3)	8.68	2.57–29.40	12.25	3.44–43.62
Cereal to the bottle[c]	3 (2.7)	19 (11.7)	4.75	1.37–16.46	10.61	2.74–41.00

[a]Total sample, $n=412$ (low-risk group, $n=208$; high-risk group, $n=204$).

[b]Logistic regression analyses controlling for infant age, sex, birth order, and maternal age.

[c]All analyses of adding cereal to the bottle have a sample number of 274 (low-risk group, $n=111$; high-risk group, $n=163$) after removing the exclusively breastfeeding mothers.

OR, odds ratio; CI, confidence interval; AOR, adjusted odds ratio.

was calculated using self-reported maternal weight and height. CDC classifications of adult BMI were used: underweight (< 18.5); normal weight (18.5–24.9); overweight (25.0–29.9); and obese (≥ 30).[10]

Statistical Analysis

Data were analyzed using SPSS statistical software (version 18.0; SPSS, Inc., Chicago, IL). Bivariate relationships between group membership, dependent variables, and covariates were analyzed using independent samples *t*-tests, one-way analysis of variance, and chi-square analyses. Logistic regression was used to examine the relationships between each group and infant feeding practices. Linear regression was used to examine the relationships between each group and maternal controlling feeding styles and beliefs about infant hunger and satiety. Models adjusted for infant age, sex, birth order, and maternal age. These covariates were chosen *a priori* because whereas they do not directly contribute to disparities in early child obesity, they may be related to infant feeding behaviors. Models that included prepregnancy BMI and models run on a restricted sample of only low-risk white mothers and high-risk Hispanic mothers demonstrated similar model estimates (results not shown). For assessing adding cereal to the bottle, exclusively breastfeeding mothers were removed post hoc from the sample, because they may have had difficulty responding to a question about bottles and pumping practices were unknown. However, models including the exclusively breastfeeding mothers demonstrated similar results. Multi-variable linear and logistic regression was used to determine the relationship between each group and infant weight-for-length *z*-score and the categorical weight status, respectively, controlling for infant age, sex, birth order, birth weight, maternal age, and prepregnancy BMI. An interaction term, which multiplies together the dichotomous infant age variable and group membership, was added to determine whether infant age moderated the relationships between each group and the dependent variables. Only one significant interaction was found and is reported below.

Results

Study Sample

A total of 412 mothers (low-risk, $n=208$; high-risk, $n=204$) were analyzed. Table 1 compares the maternal and infant characteristics of the samples. As anticipated, the high-risk group was primarily Hispanic, less educated,

Table 3. Differences in Maternal Controlling Feeding Styles[a]

Feeding style[b]	Low-risk group mean (SD)	High-risk group mean (SD)	Mean unadjusted difference	*p* value	Adjusted B (SE)[c]	β	*p* value
Restrictive	2.03 (0.40)	2.66 (0.54)	0.63	< 0.001	0.63 (0.05)	0.55	< 0.001
Pressuring	2.23 (0.35)	2.61 (0.39)	0.38	< 0.001	0.37 (0.04)	0.45	< 0.001

[a]Total sample, $n=407$ (low-risk group, $n=204$; high-risk group, $n=203$).

[b]Mean scores for restrictive feeding style (mean of the two items) and pressuring feeding style (mean of the three items) are presented here. Scores ranged from 1 (strongly disagree) to 4 (strongly agree).

[c]Using linear regression analyses, models adjusted for infant age, sex, birth order, and maternal age.

SD, standard deviation; SE, standard error.

non-US born, unmarried, nonworking, younger, and more likely to be overweight or obese, compared to the low-risk group.

Differences in Infant Feeding Practices

Mothers in the high-risk group were less likely to exclusively breastfeed (adjusted odds ratio [AOR], 0.43; 95% confidence interval [CI], 0.22–0.83) and more likely to partially breastfeed (AOR, 2.22; 95% CI, 1.22–4.03), compared to feeding only formula, than the low-risk group (Table 2). The high-risk group was more likely to give juice and add cereal to the bottle than the low-risk group.

Differences in Maternal Restrictive and Pressuring Feeding Styles

The high-risk group had higher restrictive and pressuring feeding style mean scores, compared to the low-risk group (Table 3).

Differences in Maternal Beliefs about Infant Hunger and Satiety

High-risk mothers were more likely to believe in their ability to recognize infant hunger and satiety and were less likely to believe in the infant's ability to recognize their own hunger and satiety than low-risk mothers (see Table 4). Though differences in the belief that mothers know when the baby is full existed in both younger and older infants, the difference was greater for mothers with younger infants (interaction term, $p = 0.03$).

Differences in Infant Weight

Infants from the high-risk group were more likely to have higher weight-for-length *z*-scores (B standard error [SE], 0.48 [0.16]; $p = 0.002$) and have weight-for-length percentile greater than the 85th percentile (AOR, 2.66; 95% CI, 1.10–6.45) than the low-risk group (see Table 5).

Discussion

In this study, differences in maternal-infant feeding behaviors between families at high and low risk of child obesity were documented. The high-risk group was primarily Hispanic, non-US born, less educated, and more likely to be overweight or obese, compared to the low-risk group. The high-risk group reported greater obesigenic infant feeding practices, including decreased exclusive breastfeeding, increased early juice, and adding cereal to the bottle than the low-risk group. The high-risk group expressed greater restrictive and pressuring feeding styles. They were more likely to believe that mothers can recognize infant hunger and satiety and less likely to believe that infants can recognize their own hunger and satiety. Despite no significant differences in birth weight, infants from the high-risk group had higher weight-for-length *z*-scores than the low-risk group.

The majority of studies exploring disparities in early obesity have focused on infant feeding practices, specifically breastfeeding[11,12] and the early introduction of solids.[12,13] Consistent with these earlier studies, this study found that despite both groups having high rates of any breastfeeding,

Table 4. Differences in Maternal Beliefs about Infant Hunger and Satiety[a]

Beliefs about infant hunger and satiety[b]	Low-risk mean (SD)	High-risk mean (SD)	Unadjusted B (SE)	β	*p* value	Adjusted B (SE)[c]	β	*p* value
Mom knows when baby is hungry	3.04 (0.54)	3.12 (0.46)	0.08 (0.05)	0.08	0.11	0.10 (0.05)	0.10	0.05
Mom knows when baby is full	2.71 (0.54)	3.10 (0.44)	0.39 (0.05)	0.37	<0.001	0.40 (0.05)	0.38	<0.001
Baby knows when he or she is hungry	3.25 (0.50)	3.07 (0.53)	−0.18 (0.05)	−0.17	<0.001	−0.18 (0.06)	−0.17	0.001
Baby knows when he or she is full	3.07 (0.54)	3.01 (0.51)	−0.06 (0.05)	−0.06	0.26	−0.07 (0.06)	−0.07	0.21
Hunger/satiety factor 1 (mom knows when infant is hungry and full)	2.87 (0.45)	3.11 (0.40)	0.24 (0.04)	0.26	<0.001	0.25 (0.05)	0.28	<0.001
Hunger/satiety factor 2 (baby knows when he or she is hungry and full)	3.16 (0.45)	3.04 (0.45)	−0.12 (0.05)	−0.13	0.007	−0.12 (0.05)	−0.14	0.01

[a]Total sample, $n = 409$ (low-risk group, $n = 205$; high-risk group, $n = 204$).

[b]Each belief about infant hunger and fullness was assessed using responses based on a 4-point Likert scale (strongly disagree, disagree, agree, or strongly agree).

[c]Using linear regression analyses, models adjusted for infant age, sex, birth order, and maternal age.

SD, standard deviation; SE, standard error.

Table 5. Differences in Infant Weight Status During the First 6 Months of Life

Continuous variable	Total sample mean (SD) (*n*=361)	Low-risk group mean (SD) (*n*=205)	High-risk group mean (SD) (*n*=156)	Unadjusted B (SE)	*p* value	Adjusted B (SE)[a]	*p* value
Weight-for-length z-score	−0.15 (1.14)	−0.37 (1.05)	0.14 (1.19)	0.52 (0.12)	<0.001	0.48 (0.16)	0.002
Categorical variable	**Total Sample *n* (%)**	**Low-risk group *n* (%)**	**High-risk group *n* (%)**	**OR**	**95% CI**	**AOR[b]**	**95% CI**
Weight status, %							
≤85th percentile	313 (86.7)	190 (92.7)	123 (78.8)	Ref	—	Ref	—
>85th percentile	48 (13.3)	15 (7.3)	33 (21.2)	3.40	1.73–6.52	2.66	1.10–6.45

[a]Linear regression analyses controlling for infant age, sex, birth order, birth weight, and maternal age and prepregnancy BMI overweight/obese status.

[b]Logistic regression analyses controlling for infant age, sex, birth order, birth weight, and maternal age and prepregnancy BMI overweight/obese status.

SD, standard deviation; SE, standard error; OR, odds ratio; CI, confidence interval; AOR, adjusted odds ratio.

the high-risk group displayed less exclusive breastfeeding. The tendency for low-income, immigrant Hispanic women to exhibit decreased exclusive breastfeeding, despite high initiation rates[14] and increased combination feeding, has been attributed to acculturation and cultural beliefs,[15,16] including the perception that babies prefer formula, feelings that factors outside the mother's control dictate her ability to breastfeed, and concern about milk insufficiency.[17] Overweight or obese prepregnancy BMI may decrease breastfeeding duration in Hispanic women.[14] Given the current debate regarding the protective effect of breastfeeding on obesity,[18] future studies should explore how these early disparities in breastfeeding affect growth.

Differences in adding cereal to the bottle and giving juice were noted. Studies exploring adding cereal to the bottle have primarily focused on African American families, because rates appear high in this subgroup.[19,20] This study is one of the first to document differences in adding cereal to the bottle between low-income Hispanic families and high-income white families. Although the literature on early juice is limited, higher rates of sugar-sweetened beverage consumption in toddlers from low-income ethnic minority families has been documented.[12] Understanding the motivation behind adding cereal to the bottle and giving juice in the first 6 months of life is needed to decrease these behaviors in groups vulnerable to disparities. Though studies are beginning to support the obesigenic nature of these practices,[21,22] more longitudinal studies beginning in early infancy are needed to fully understand their impact on child obesity development.

Differences in maternal feeding styles and beliefs about infant hunger and satiety were detected. Studies of older children have demonstrated that low-income and ethnic minority parents are generally more controlling over child feeding.[23–26] There are fewer studies of feeding styles during infancy, with most focused on high-income, white populations.[5,27–29] Even fewer have explored feeding styles during infancy in low-income, ethnic minority populations.[12,30–34] In this study, the high-risk group exhibited greater restrictive and pressuring feeding styles. Feeding style differences may be related to different concerns about infants becoming overweight[29,34] and psychosocial stresses, including food insecurity and maternal depression, that are more common in high-risk populations.[31,34] Research to better understand controlling feeding styles in low-income Hispanic families with infants is needed to improve maternal feeding responsiveness in this population.

Maternal responsiveness to infant feeding cues has been believed to shape an infant's ability to self-regulate.[5] However, the accurate interpretation of infant cues can be complicated. Few studies have explored differences in maternal beliefs about infant hunger and satiety. Low-income mothers have reported more concern about infant hunger and less concern about overeating than high-income mothers.[8] In a study of low-income Hispanic mothers with infants, obese mothers were less likely to believe that infants can recognize their own fullness than nonobese mothers.[32] The current findings are the first to report that low-income, primarily Hispanic mothers are more likely to believe in their ability to know when the infant is hungry and full and less likely to believe that infants know their own hunger and satiety.

Finally, higher mean weight-for-length *z*-scores and more infants with overweight status were found in the high-risk group. Given that overweight status during infancy has been associated with increased morbidity and is predictive of later obesity,[35–39] it is important to identify the causes of disparities in early child obesity, ascertain links with the aforementioned factors, such as feeding practices and styles, and better understand the underpinnings of these factors and their modifiability.

To date, the dominant approach to studying variations in obesity have focused on comparing samples based on race or ethnicity alone; rarely do methodologies utilize a multifactor approach to facilitate the understanding of disparities.[40] Previous studies of disparities in early child obesity have generally compared ethnic and racial disparities among families with higher income,[3,12,41] limiting their generalizability to low-income communities. These studies generally have small samples of Hispanics, compared to their white and black counterparts.[12,41] This study adds a more in-depth exploration of disparities in Hispanic populations and fills an important gap in the literature by documenting a more comprehensive approach to exploring differences during the first 6 months of life.

There are limitations to this study. Because this study compared two specific groups, the results may not be representative of other subgroups subject to health disparities. Because our samples were intentionally chosen to have differences in a range of sociodemographic characteristics, it was not possible to specifically identify which characteristics could explain the disparities among the two groups. Future studies should utilize larger samples with greater ethnic and socioeconomic diversity. Another potential limitation is that secular trends in child obesity may partially explain differences between the groups, because the high-risk group was interviewed later than the low-risk group. However, given recent reports from the CDC that early child obesity rates have declined between 2008 and 2011 in low-income children, our documented findings are likely not the result of secular trends.[42] Another limitation was the lack of validated surveys assessing feeding style during infancy. The most commonly used survey designed for mothers with older children was adapted, resulting in greater reliability for restriction than pressuring. Although a measure specifically about infants has since been developed,[33] this new measure was also based on the CFQ.[7] Future studies should assess the transactional relationship using direct observation of infant feeding cues and subsequent maternal responses. Future studies of adding cereal to the bottle should include assessments of pumping and bottle use in exclusively breastfeeding mothers to include them in analyses. Other potential limitations are the wide infant age range, given that disparities related to infant feeding may vary depending on the infant's developmental stage, inability to report reasons for ineligibility and refusal rates, and variation in the methodology for obtaining measured infants' weights and lengths. The cross-sectional design of this study precludes causal inferences, particularly with respect to the effect that differences in infant feeding behaviors have on child weight status. Longitudinal studies from birth are needed to understand how early feeding differences contribute to the disparities in childhood obesity.

Conclusions

Understanding the causes of health disparities is essential for improving child outcomes and reducing social inequality. Despite prioritizing the elimination of health disparities on the national agenda, strategies to achieve this goal have not been well developed.[43] Early differences in maternal-infant feeding practices, styles, and beliefs might contribute to the disproportionately high prevalence of obesity among low-income Hispanic children. Building on the findings from this study, longitudinal studies beginning in infancy are needed to determine the effect of these disparities on child obesity. These studies will support the need to develop, implement, and rigorously assess interventions aimed to prevent disparities in child obesity beginning in infancy.

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Author Disclosure Statement

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