



# Maternal Behavior and Infant Weight Gain in the First Year

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## ABSTRACT

**Objective:** To examine the relative contributions of maternal characteristics and behaviors in predicting infant weight gain over the first year of postpartum life.

**Design:** Longitudinal study of maternal feeding style throughout infancy.

**Setting:** A Special Supplemental Nutrition Program for Women, Infants, and Children center.

**Participants:** Ninety-six low-income, minority mother-infant dyads.

**Main Outcome Measures:** Infant weight gain at 3, 6, and 12 months.

**Analysis:** Multiple linear and backward regressions.

**Results:** None of the mother-infant perinatal measures predicted infant weight gain from birth to 3 months, nor did measures from birth to 3 months predict weight gain from 3 to 6 months. However, the number of feedings and lessened maternal sensitivity to infant cues predicted weight gain from 6 to 12 months.

**Conclusions and Implications:** These results suggest that feeding plays an important role in promoting rapid weight gain in infants, since the maternal reports of feeding frequency, as well as their lessened sensitivity to the infants' cues, indicate that the infants in this study may have been regularly overfed. Nutrition educators who work with low-income populations should provide guidance to mothers in feeding their infants by helping them to recognize hunger signals and respond to satiety cues.

**Key Words:** maternal behavior, infant weight gain (*J Nutr Educ Behav.* 2009;41:169-175.)

## INTRODUCTION

The risk for overweight for low-income Hispanic children younger than age 5 in the United States (US) is significantly higher than for non-Hispanic blacks, which in turn is higher than for non-Hispanic whites.<sup>1,2</sup> Using the criterion of a body mass index (BMI)  $\geq$  the 95<sup>th</sup> percentile for age and sex for defining overweight, the prevalence among low-income children aged 2-4 years in the US as of the year 2000 was around 19%.<sup>3</sup> Though the sample was not nationally representative, a review of over 20 years of records from a Massachusetts health maintenance organization on over 120,000 children found that the percentage of infants under 6 months of age who were overweight

or at risk for overweight increased from approximately 10% in 1980-1981 to 17% in 2000-2001.<sup>4</sup> In that report, overweight was defined as weight for length  $\geq$  the 95<sup>th</sup> percentile for age and sex; at risk for overweight was defined as weight for length  $\geq$  the 85<sup>th</sup> percentile for age and sex. In that same report, the rate for Hispanic infants was higher than for black infants, whose rate in turn was higher than that of white infants in prevalence as well as in relative increase of overweight. Using National Nutrition and Health Examination Survey (NHANES) data, the National Center for Health Statistics reports that the prevalence of overweight for infants (children < 2 years old) increased from 7.2% over 1976-1980 to 11.5% over 2003-2004.<sup>5</sup> Such trends

speak to the need for examining the factors that may contribute to excess weight gain in infancy, since there is accumulating evidence that the rate of infant growth may bear on childhood or later obesity.<sup>6</sup>

To illustrate, recent work has sought to link patterns of infant growth to child obesity by relating infant characteristics to older weight outcomes, with some reporting a direct association between birth weight and BMI in young adulthood.<sup>7,8</sup> For example, rapid weight gain by formula-fed infants in the first week of life was shown by Stettler et al to relate to adult overweight status,<sup>9</sup> and Dennison et al reported that the rate of weight gain during the first 6 months of life was associated with a significantly increased risk of overweight at 4 years of age.<sup>10</sup> Several studies suggest an association between increased rates of weight gain during the first 4 to 24 months of life and risk of overweight during later childhood or early adulthood.<sup>11-14</sup> The impact of weight gain during infancy on child overweight may therefore be substantial, but the factors that

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contribute to early weight gain are not completely understood.

Some research on weight gain in infancy has taken an energy balance approach. In an oft-cited study, Roberts et al studied 18 infants, two thirds with obese mothers, and tracked the babies from birth to 1 year.<sup>15</sup> The 6 infants who became overweight consumed 42% more energy at 6 months than the 12 infants who remained lean.<sup>16</sup> As these 6 infants also had reduced total energy expenditure at 3 months of age, the authors argued that energy spent on activity played a more important role in infant overweight than energy intake. In contrast, and with a larger sample of infants and mothers, Stunkard et al reported that energy intake at 3 months accounted for 8% of the variability in 5 measures of body size and composition at 12 months, but that neither energy expenditure nor maternal obesity were at all predictive.<sup>17</sup>

Concerning mothers, Baker et al found that maternal prepregnancy BMI was strongly associated with infant birth weight and infant weight gain from birth to 1 year, with women whose BMI exceeded 30 having infants who grew an average of 135 g more over the first year than those of normal-weight mothers.<sup>18</sup> A study by Li et al found that women who are overweight before becoming pregnant are less likely to initiate breastfeeding than are women with a normal BMI, and those who do elect to breastfeed cease doing so 2 weeks sooner on average.<sup>19</sup> Although a literature review completed before 2000 concluded that no consistent pattern could be discerned as to a relationship between infant feeding methods or duration of breastfeeding and later obesity,<sup>20</sup> a more recent meta-analysis of some 60 studies that included odds ratio estimates reported an overall odds ratio of 0.87 that favored breastfeeding as reducing the risk of later obesity,<sup>21</sup> indicating that formula feeding increased the risk.

The question remains, however: if formula feeding increases the likelihood of subsequent obesity, what may account for its effect? To be sure, the composition of breast milk and cow's-milk-based infant formula do differ. For example, Miralles et al have recently reported that in a sample of 28 infants, the amount of the

hormone leptin present in breast milk at 1 month provided moderate protection from an excess of weight gain through 24 months.<sup>22</sup> But in contrast to a human milk hypothesis, the results of many reports suggest that overfeeding may be a more apt explanation, as outlined below.

To start with, a vigorous feeding style, where high energy intake results, has been correlated with greater adiposity in early childhood—even for breast-fed infants.<sup>23</sup> But overfeeding is more likely to occur when infants are formula fed, where the mother may respond to the visual cue of an unfinished bottle and ignore her infant's satiety signals.<sup>24</sup> Gillman et al have proposed that a mother who breastfeeds may be more responsive to her infant's signals for both the frequency and volume of feeding, inferring that a formula-feeding mother may be less sensitive to her infant's cues.<sup>25</sup> The real possibility of overconsumption of calories by formula-fed infants may induce adipose tissue hypercellularity,<sup>26</sup> and they may in turn self-regulate their energy intake at a higher level,<sup>27</sup> with either process resulting in more body fat. Indeed, it has been commonly reported that formula-fed infants begin to surpass breast-fed infants in terms of weight gain by 2-3 months.<sup>28</sup>

In the present study, a cohort of low-income, black, and Hispanic mother-infant dyads who chose to formula feed exclusively were seen on repeated occasions over the first year of the infants' lives. These selection criteria were used because of the aforementioned literature that established low-income,<sup>3</sup> minority status,<sup>1,4</sup> and formula feeding<sup>20,21</sup> as factors that heighten the risk for childhood obesity. Mothers were observed in feeding their infants and also kept a diary of their infants' behavior. Demographic information, as well as information on maternal weight and feeding attitudes, was also collected. The purpose of the study was to examine the relative contributions of maternal characteristics and behaviors in predicting infant weight gain over the first year of postpartum life. It was hypothesized that aside from certain birth characteristics, maternal attitudes and behaviors related to feeding would influence infant weight gain.

## METHODS

All the procedures of the present investigation were approved by the university's Institutional Review Board prior to the start of any subject recruitment or data collection. Permission for subject recruitment was also obtained through a letter of agreement from the cooperating Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) center. Recruiters were bilingual in English and Spanish. Two females conducted each home visit. At least one of these females was black or bilingual, depending on the family to be visited. All materials were available in English and Spanish, and questions were read to Hispanic mothers who could not read Spanish.

### Subjects and Procedures

Mothers were recruited at their initial postpartum visit to a community WIC center, which served a low-income and largely minority population, many of whom were recent immigrants from Latin American countries. The staff receptionist at the center, as part of the intake interview, solicits demographic information from each mother and additionally asks what method of feeding she employs. At this center, it was estimated that 55% of the mothers indicate that they formula feed exclusively, 5% breast feed exclusively, and 40% do both. If a mother indicated she was formula feeding exclusively, the receptionist alerted the research recruiter of her eligibility, and the recruiter approached the mother after the mother's WIC visit was completed. Mothers, as well as WIC staff, were told that the authors were studying maternal feeding practices and infant growth and development. Mothers were informed of the study's longitudinal nature, and if willing to participate, they were given a \$10 gift certificate for use at a local grocery store. After obtaining informed consent, demographic, attitudinal, and contact information was then recorded, as well as the mothers' and infants' height/length and weight measures as just determined by the WIC staff (WIC staff members were trained in anthropometric measurement by personnel from the state

Department of Health and Senior Services).

Home visits were conducted when the infants reached the ages of 3, 6, and 12 months, when the battery of measures described in the following section was implemented. As noted, the home visitors/research assistants were female, with at least one of each pair black or bilingual. As with the mothers, their concept of the investigation was a study of feeding practices by minority mothers and infant growth, with a focus on formula feeders for ease in determining energy intake. For each mother–infant dyad, a time at which the mother anticipated her infant would soon awaken was chosen for Day 1 of the home visit to ensure a feeding could be observed, and the mother was to be interviewed regarding feeding and her infant's temperament in the minutes surrounding or after the feeding. On Day 2, the infant was weighed and measured by one home visitor while the other home visitor checked the diet diary for omissions or to clarify ambiguities. Home visitors were trained in reliability in the assessment procedures of Gibson by a registered dietitian.<sup>29</sup> At the conclusion of the home visit, the mother was paid \$30 in cash.

Through recruiting efforts at the WIC center, 242 mothers initially agreed to participate. Given the low level of education and transitory nature of the population, however, numerous mothers either lost interest or could not be contacted as time passed before home visits were to be scheduled—indeed, 83 mothers were unable to be scheduled for even the first home visit at 3 months. By the 6-month visit, 40 mothers could not be reached, and 23 more subjects were additionally lost by 12 months. Hence, the present sample consists of the 96 mother–infant dyads who were seen at enrollment and for whom all 3 home visits were conducted. A post hoc analysis of the 146 mothers who were lost versus the 96 mothers who completed the study revealed no differences in age, education, or race/ethnicity between groups.

## Measures

### *Maternal Feeding Attitudes (MFA).*<sup>30</sup>

The MFA is a 10-item questionnaire with established reliability that asks

the mother what type of behavior she would exercise with respect to 10 feeding issues. A higher score on the MFA indicates a “pushier” feeding attitude—pushier as in an inclination to feed the infant irrespective of the infant's expressed hunger. As used in its validation study,<sup>31</sup> the MFA was completed at the time of recruitment. The measure has been used with minority mothers of overweight infants.<sup>32</sup>

*Infant diet record.* At the initial home visit, mothers were asked to indicate the method they used to feed their infant (to confirm formula feeding). At this and subsequent visits, the number and length of feeds per day, the number of ounces and brand of formula per day, any other liquid supplements, the time of introduction of any solid food, and the type and amount of such food per day were recorded. Any feeding-related problems or issues (eg, formula intolerance, regurgitation, colic) were also recorded.

### *Maternal sensitivity to infant cues.*<sup>33</sup>

The Nursing Child Assessment Satellite Training (NCAST) Feeding Scale is a 76-item checklist that describes mother–infant behavior and the contingency of their responses on each other, as observed in the context of the mother feeding the infant. Scores are derived for subscales, such as maternal sensitivity to infant cues, cognitive growth fostering, and infant responsiveness to the caregiver. The Feeding Scale has shown good reliability by health professionals in a variety of settings and has demonstrated validity with both minority and food-insecure mother–infant dyads.<sup>34,35</sup> Its use requires trained observers, and the authors adhered to this requirement with home visitors who had achieved certification with the procedures. At the 3- and 6-month home visits, the full Feeding Scale was employed according to the NCAST guidelines. Since the study's purpose was to examine maternal behavior in the context of feeding, only the Maternal Sensitivity to Cues subscale was used for analysis. This subscale consists of 16 items and credits the caregiver with attending while feeding, notably slowing, pausing, or terminating the feeding when the infant disengages or shows satiation cues.

## Statistical analyses

Data were analyzed to determine normality of the variables studied, with linear regression analyses then conducted to determine the relative influence of specific variables, independent of potential confounding factors. An a priori calculation for sample size for multiple regression was computed, and this calculation indicated that a sample of 87 subjects or more would achieve a power level of .80 with an  $\alpha$  level of  $P < .05$ , using as many as 9 predictor variables. The following models were constructed using backward linear regression analysis:

**Model 1.** To identify the antenatal characteristics that predicted infant weight gain from birth to 3 months, birth weight, gender, race/ethnicity, maternal age, education, country of origin, BMI before pregnancy, and weight gain during pregnancy were included as independent variables.

**Model 2.** To identify the antenatal characteristics that predicted infant weight gain from 3 to 6 months, birth weight, maternal BMI, infant weight gain from birth to 3 months, infant length gain from birth to 3 months, the estimated number of feeds per day, the month that solid food was introduced, and the mothers' sensitivity to the infants' signals at 3 months were entered as independent variables.

**Model 3.** To identify the antenatal characteristics that predicted infant weight gained from 6 to 12 months, birth weight, maternal BMI, infant weight gain from 3 to 6 months, infant length gain from 3 to 6 months, maternal sensitivity to infant signals at 6 months, and the estimated number of feeds/day at 6 months were entered as the independent variables.

For all regression analyses, independent variables that were not statistically significant were deleted from the model unless the variables were determined to be highly associated with the dependent variable (eg, maternal BMI). Statistical significance was set at  $P < .05$ . All analyses were conducted using SPSS 16.0 (SPSS, Inc., Chicago, IL, 2007).

**Table 1.** Descriptive Statistics for Low Income, Minority Mothers (n = 96)

	Mean (standard deviation) or frequency (%)
Age (y)	26.43 (5.92)
Race/ethnicity	24% black, 76% Hispanic
Country of origin	27% US; 54% Mexico; 12% Dominican Republic; 7% Puerto Rico, Colombia, Honduras, and Peru
Highest year of schooling	9.35 (3.28)
BMI before pregnancy	25.97 (4.74)
Weight gain during pregnancy (kg)	14.12 (6.38)
Parity	39% firstborn, 31% 2 <sup>nd</sup> , 21% 3 <sup>rd</sup> , 9% 4 <sup>th</sup> or more
Feeding attitude scale (20 maximum)	12.51 (2.93)
<u>3 months</u>	
Maternal sensitivity (16 maximum)	11.82 (2.21)
Number of feeds/day	6.33 (2.05)
<u>6 months</u>	
Maternal sensitivity (16 maximum)	11.43 (2.44)
Number of feeds/day	6.21 (1.69)
Age (mo) solid food introduced	4.23 (1.17)

BMI indicates body mass index.

## RESULTS

Descriptive statistics for the sample appear in Tables 1 and 2. Demographic data indicate that the sample is approximately one fourth black and three fourths Hispanic, and two thirds of this subgroup of mothers

were born in Mexico. The other third, also immigrants, reported they were from Colombia, Peru, Honduras, Nicaragua, and the Dominican Republic. Mothers ranged in age from 15 to 42 years, with an average age of 26 years. Education level also varied widely, from 3 years of elementary schooling

to 2 years of college. Maternal BMI indicated the average mother to be overweight, but BMI ranged from just over 17 to above 41. Table 2 also displays the percentage of infants who were at or above the percentile scores that indicate “at risk for overweight”<sup>35a</sup> at the ages of measurement.

To identify the antenatal characteristics that predicted infant weight gain from birth to 3 months, a regression analysis was run that included the predictor variables listed under Model 1. In addition, the maternal attitude score on the MFA administered when the mothers were recruited was also included. None of these variables served to predict infant weight gain over the first 3 months.

For the second regression, the predictor variables listed under Model 2 were entered to examine their relation to infant weight gain from 3 to 6 months. Similar to Model 1, none of the variables was predictive.

For the final regression, the predictor variables listed under Model 3 were entered to examine their relation to infant weight gain from 6 to 12 months. The results are summarized in Table 3. As seen in Part A of the table, number of feeds per day at 6 months approached significance in predicting weight gain from 6 to 12 months, and maternal sensitivity to the infants’ signals reached predictive significance, but in a negative direction—indicating that mothers who were less sensitive to satiety cues had infants who gained more weight. Part B of the table displays the results of the backward regression analysis and shows that both number of feeds per day at 6 months and maternal sensitivity (inversely) were significantly related to weight gain from 6 to 12 months.

## DISCUSSION

In the present study, a number of maternal and infant characteristics were examined for their possible role in contributing to what may be deemed excessive weight gain in early human development. Obesity in America has rather suddenly, but unmistakably, become a serious problem. The factors that account for the recent increase in

**Table 2.** Descriptive Statistics for Infants of Low Income, Minority Mothers (n = 96)

	Mean (standard deviation) or frequency (%)
<u>Birth</u>	
Sex	49 female, 47 male
Birth weight (kg)	3.29 (.58)
Percentage ≥ 85 <sup>th</sup> percentile weight/length age/sex	19%
<u>3 months</u>	
Weight at 3 months (kg)	6.32 (.84)
Weight gain from birth to 3 months (kg)	3.01 (.73)
Length gain from birth to 3 months (cm)	11.41 (5.30)
Percentage ≥ 85 <sup>th</sup> percentile weight/length age/sex	30%
<u>6 months</u>	
Weight at 6 months (kg)	8.07 (.98)
Weight gain from 3 to 6 months (kg)	1.73 (.69)
Length gain from 3 to 6 months (cm)	6.74 (4.18)
Percentage ≥ 85 <sup>th</sup> percentile weight/length age/sex	30%
<u>12 months</u>	
Weight at 12 months (kg)	10.21 (1.20)
Weight gain from 6 to 12 months (kg)	2.15 (.71)
Percentage ≥ 85 <sup>th</sup> percentile weight/length	40%

**Table 3.** Regression Analyses of Infant Weight Gain from 6 to 12 Months

Variables	$\beta$ Coefficient	Standard Error	P
Change in weight from 6 to 12 months (linear) $R^2 = 0.269$			
(Constant)	1.144	0.883	.20
Maternal BMI before pregnancy	.011	0.018	.56
Infant's birth weight	.256	0.170	.14
Number of feeds per day	.117	0.063	.07
Maternal sensitivity to infant cues	-.127	0.037	.001
Infant weight gain from 3 to 6 months	.142	0.140	.32
Infant length gain from 3 to 6 months	.041	0.027	.13
Change in weight from 6 to 12 months (backward) $R^2 = 0.202$			
(Constant)	2.545	0.526	.000
Number of feeds per day	.152	0.060	.015
Maternal sensitivity to infant cues	-.121	0.037	.002

BMI indicates body mass index.

obesity are numerous, and as shown by rates of children who are already overweight, the problem is only getting worse. As children have an eating history that precedes their reaching an overweight state, the present study was aimed at examining some of the feeding-related factors that may contribute to excess weight gain in infancy. However, the study is not without its limitations. Obviously, it is limited to formula-fed infants of low-income, minority mothers, yet overweight is also seen in middle-class, white children who have been breastfed. Future work must acknowledge that the prevalence of overweight in black and Hispanic children is not the same, and that less acculturated Hispanic subgroups also differ in preference for infant "chubbiness."<sup>36</sup> Furthermore, overweight infants do not necessarily become overweight children—obesity tracks more certainly from adolescence to adulthood, with weaker associations from childhood to adolescence. Nevertheless, recent evidence strongly suggests that being overweight as early as age 2 may predict overweight some 10 years later. Specifically, the National Institute of Child Health and Human Development Early Care Research Network indicated that children who were ever categorized as overweight (defined as BMI  $\geq$  85<sup>th</sup> percentile) just once at 24, 36, or 54 months were more than 5 times as likely to be over-

weight at 12 years than those whose BMIs were below the 85<sup>th</sup> percentile at all 3 measurement points.<sup>37</sup> Two in 5 children whose BMIs were  $\geq$  the 50<sup>th</sup> percentile by age 3 years were overweight at age 12 years. From this perspective, a partial understanding of the myriad factors that relate to early overweight in infancy was considered to be worthy of exploration.

Although the lay public and most mothers have long perceived the "baby fat" of a chubby infant as benign, cute, or even desirable, the prospect of early overweight tracking into toddler or childhood is now viewed as foreshadowing later health problems. Infants of today do appear to be more likely to be overweight, perhaps as much as 70% more than 20 years ago if one can extrapolate from the recent report that estimated the problem at 17%.<sup>4</sup> In contrast to that study, the cohort of infants followed in the present investigation was exclusively black and Hispanic and would thus be predicted to be at the higher end of any averaged percentages. In fact, 19% of the infants of the present cohort were at or above the 85<sup>th</sup> percentile of weight-for-length for sex at birth, increasing to 30% at 3-6 months, and to 40% at 1 year. Although these percentages are quite alarming, they must not be taken as representative of the prevalence of infant overweight in the minority population. Aside from being a conve-

nience sample, families were recruited from a WIC center, so by definition they were additionally low income. Nevertheless, since food insecurity and obesity appear to correlate in low-income minority families,<sup>38</sup> the high percentage of 12-month-old infants in the at-risk-for-overweight category may not be far off from the prevalence for similar subgroups.

Aside from highlighting the overrepresentation of overweight infants among these 12-month-olds, the present study sought to identify which infant, mother, and caregiving factors might relate to the weight gain they exhibited. A number of neonatal and maternal characteristics, including infant birth weight, maternal BMI, and maternal attitudes toward feeding, were entered into a regression analysis to predict the infants' weight gain from birth to 3 months; somewhat surprisingly, not one of the factors was associated with infant weight gain. Measures obtained at 3 months, including diet and mother-infant interaction while feeding, were next regressed onto weight gain from 3 months to 6 months; similar to the previous analysis, none of the factors was associated with infant weight gain. Finally, the 6-month versions of the previous measures were regressed onto weight gained from 6 months to 12 months; in this regression, daily feeds were found to be predictive. More impressive, however, mothers who were less sensitive to their infants' cues had infants who gained more weight by the age of 1 year. These results suggest that feeding played an important role in promoting the higher weight gain of these infants, since the mothers' reporting of feeding frequency, as well as their lessened sensitivity to the infants' cues, were salient in determining that these infants may have been regularly overfed.

More frequent feedings, particularly with formula, are an easy culprit on which to assign blame. But maternal sensitivity to the infant's feeding state, as reflected by the Feeding Scale scores, suggests that an unwillingness to slow the pace of feeding or terminate the feeding when the infant shows satiation cues may be overriding the infant's ability to self-regulate its intake. If such a feeding dynamic characterizes most feedings on most

days, it is understandable that infants will likely ingest more formula than they desire or need, and accelerated weight gain will occur. To be sure, other factors that may contribute to early excess infant weight gain cannot be ruled out, for example, genetic predispositions, differences in metabolism, or the cumulative effect of nutrient-dense table food later in the first year.<sup>39</sup> However, in the present study at least, which included measures of birth weight and maternal BMI, gender, and observed and reported caregiving behavior, it was the mother's actions with respect to the act of feeding that most directly related to weight gain.

## IMPLICATIONS FOR RESEARCH AND PRACTICE

The results of this study strongly suggest that maternal feeding behavior, as displayed through frequency and insensitivity, may influence the rate of infant weight gain. To use this knowledge to better inform low-income/educated mothers, indeed, mothers of any background who have settled on a feeding method, could pose a daunting challenge. Feeding an infant is a primal behavior, and to suggest to a new mother that she is feeding her infant too often, too much, or worse yet, is not very good at reading her infant's signals, would require an extremely skilled nurse or social worker. Giving counsel after watching a mother feed her infant might be seen as threatening, or at the very least meddling, and just pointing it out could be construed as an accusation of "poor mothering." As lactation consultants are not in the business of guiding mothers who formula feed, an alternate approach could be through nutrition education efforts made available in the weeks preceding birth.

Nationwide, WIC currently works to promote breastfeeding as the optimal method of infant feeding, but for those mothers who formula feed, it provides 90% of their infants with iron-fortified formula.<sup>40</sup> At the center where this study's participants were recruited, 95% of the mothers were estimated as exclusively or partially formula feeding their infants. Rose

et al have recently explored the link between WIC's provision of infant formula and child obesity, as the incentive of free formula may discourage breastfeeding.<sup>41</sup> Clearly, efforts to encourage and support breastfeeding should continue at WIC centers. But for those mothers who may inevitably elect to use formula, modest interventions may be tried to demonstrate optimal feeding styles. For example, at the time of their first enrollment at WIC, expectant mothers could view an educational video program that showcases infant behaviors that bear on feeding. If enrolling after the birth of their children, the video could be required as a condition of receiving their vouchers. Alternately or in addition, trained counselors could step up their guidance to mothers in feeding their infants, whether breast or bottle, by helping them to recognize hunger signals and respond to satiety cues. Such efforts will not stop the child obesity crisis, but they may be a first step in slowing the prevalence of overweight that is already so apparent in the youngest Americans.

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