

# Breastfeeding Is Associated With Reduced Obesity in Hispanic 2- to 5-Year-Olds Served by WIC

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## ABSTRACT

**Objective:** To examine the relationship between breastfeeding (BF) and odds of childhood obesity in a large, primarily Hispanic *Special Supplemental Nutrition Program for Women, Infants, and Children* (WIC) population.

**Setting:** A large urban WIC program in California.

**Participants:** Infants enrolled in WIC born between 2004 and 2007 and observed to age 5 years (N = 39,801; 88.6% Hispanic).

**Intervention:** Level of BF: fully BF, fully formula feeding, or combination feeding.

**Main Outcome Measure:** Obesity at age 2–5 years, measured by body mass index (BMI)  $\geq$  95th percentile.

**Analysis:** Logistic regression analyses to evaluate the association between initiation, duration, and exclusivity of BF and odds of obesity at age 2–5 years, controlling for ethnicity, preferred language, family size, poverty level, and maternal BMI.

**Results:** Infants exclusively formula fed at birth were significantly more likely than fully breastfed infants to be obese at age 2–5 years ( $\chi^2$  [2, N = 39,801] = 123.31;  $P < .001$ ). For every additional month of any BF, obesity risk at age 2–5 years decreased by 1%. Every additional month of full BF conferred a 3% decrease in obesity risk. Ethnicity, preferred language, family size, poverty level, and maternal BMI were also significantly related to obesity risk.

**Conclusions and Implications:** Breastfeeding may have a role in the attenuation of obesity in early childhood among Hispanic children. The BF promotion and support offered at WIC may have a significant role in reducing rates of early childhood obesity.

**Key Words:** WIC, breastfeeding, obesity, Hispanic (*J Nutr Educ Behav.* 2017;49:S144–S150.)

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Breastfeeding (BF) is well-established as the preferred method of infant feeding.<sup>1,2</sup> National advisory groups and public health researchers encourage BF for a number of maternal and child health benefits, including the prevention of childhood obesity.<sup>3–8</sup> Although many studies found BF to have a protective association with obesity, the validity of these observational studies and meta-analyses were increasingly called into question.<sup>9–18</sup> Several studies did

not find an association between BF and obesity, and others observed only an association before adjustment for confounders.<sup>19–28</sup> In addition, a cluster-randomized trial to promote BF did not find increased duration of exclusive or any BF to affect any measures of adiposity at aged 6.5 or 11.5 years.<sup>29,30</sup> Such findings resulted in claims that the observed association between BF and obesity was due to residual confounding and selection

bias.<sup>12,13,23</sup> The relationship between BF and obesity, however, is unarguably complex and the results of the BF promotion trial were limited by its study population.<sup>31</sup> Most recently, a systematic review and meta-analysis of 105 studies that employed various designs and were conducted in many different countries concluded that BF decreased the odds of overweight/obesity by 13%.<sup>32</sup>

According to the latest national estimates, 22.4% of Hispanic children aged 2–19 years are obese, compared with 14.1% of non-Hispanic white children and 20.2% of non-Hispanic black children.<sup>33</sup> Children whose households have low incomes and education levels may be at an even higher risk of childhood obesity.<sup>34–37</sup> Despite the disproportionate burden of childhood obesity in Hispanic and non-Hispanic black children in low socioeconomic families, most studies on BF and obesity were conducted in predominantly non-Hispanic white children of middle to high socioeconomic levels.<sup>13,38,39</sup> The results of such

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studies may not be applicable to Hispanic children from low-income families because the relationship between infant feeding and child obesity was found to differ by racial/ethnic and socioeconomic groups.<sup>13,40-43</sup>

The association between BF and obesity may be different in low socioeconomic Hispanic families for several reasons. Hispanic mothers are known to exhibit infant feeding behaviors different from those of mothers of other race/ethnicities. Researchers found that Hispanic mothers were more likely than non-Hispanic white mothers to initiate BF, resort to a combination of BF and formula feeding shortly after birth, introduce solid foods at an early age, and practice restrictive feeding.<sup>42,44-48</sup> In Hispanic populations, combination feeding of breast milk and formula was not associated with shortened duration of any BF, unlike in non-Hispanic white populations.<sup>44</sup> In addition, results of several studies suggested that the effect of BF on childhood obesity may differ based on characteristics that vary among demographic groups, such as maternal weight status, genetic profile, and maternal smoking status.<sup>49-58</sup> Understanding early life risk factors for obesity in the Hispanic population is essential because the number of Hispanics in the US continues to increase at the fastest rate of any racial/ethnic group.<sup>59</sup>

As of 2012, over one quarter of children aged <5 years in the US is of Hispanic origin.<sup>60</sup> Each month, the *Special Supplemental Nutrition Program for Women, Infants, and Children* (WIC) serves approximately 7 million infants and children aged <5 years, of whom over 40% are Hispanic.<sup>61</sup> If increased duration and/or exclusivity of BF can prevent childhood obesity in the growing high-risk population of Hispanic families, such evidence would inform the initiatives and policies of WIC and other health programs that serve this population. Limited studies conducted in predominantly Hispanic populations suggested that BF may well provide modest but significant protection against childhood obesity.<sup>62-67</sup>

In this study population of predominantly Hispanic WIC participants, researchers documented that the WIC food packages issued to infants and postpartum mothers were a valid measure of whether an infant was being fed breast milk exclusively,

formula exclusively, or a combination of breast milk and formula.<sup>68</sup> In addition, information on potential confounders of the BF-obesity association is collected at enrollment into WIC and children's heights and weights are measured every 6-12 months. The aim of this study was to use the information available in a large, primarily Hispanic WIC population in Southern California to assess the relationship between BF duration and weight status at age 2-5 years in this understudied and growing population.

## METHODS

### Dataset Description and Sample Selection

Public Health Foundation Enterprises (PHFE) WIC is the largest local agency WIC program in the country, serving over 250,000 participants monthly in 53 sites in Los Angeles, Orange, and San Bernardino counties. All WIC administrative data in California are entered by WIC staff into the California WIC Administrative Database. This database captures participant demographic data as well as WIC food package information and height and weight measurements for each participant. The Ethical and Independent Review Services Institutional Review Board reviewed this study and determined it to be exempt owing to use of existing administrative data with no confidential client information.

All data used in this study were captured from the monthly download of all PHFE WIC participants born between 2004 and 2007. Of the 205,283 infants born in the selected years, 75,451 had at least 1 anthropometric measurement at age 2-5 years. Of those 75,451, infants with missing maternal BMI ( $n = 22,890$ ), those who were enrolled in WIC after they were aged 2 months ( $n = 9,685$ ), twins ( $n = 1,816$ ), infants with no age data ( $n = 961$ ), infants with no infant feeding package data ( $n = 291$ ), and low-birth weight and preterm infants ( $n = 7$ ) were excluded from analysis. The final analytical sample was composed of 39,801 records.

Compared with the 39,801 eligible infants, the 164,521 ineligible infants were less likely to be Hispanic (88.61% vs 80.08%;  $\chi^2 [1, N = 204,322] = 1559.94; P < .001$ ) and more likely to have mothers who reported English

as the preferred language (38.88% vs 53.45%;  $\chi^2 [1, N = 204,322] = 2720.84; P < .001$ ); the mothers also reported a smaller family size (mean [SD], 4.35 [1.34] vs 3.74 [1.33];  $t[59,956] = 81.37; P < .001$ ).

### Variable Selection

**BF.** A recent study validated the use of the 3 WIC postpartum woman-infant food packages as a proxy for BF behavior.<sup>68</sup> The current study included the rate of issuance by infant age in months of these 3 WIC food packages for postpartum women-infants: (1) the fully BF package (receiving no infant formula from WIC, an indicator of full BF without the use of infant formula); (2) the combination BF package (receiving some infant formula from WIC, an indicator of partial BF); and (3) the formula-only package (receiving the maximum allowable amount of formula from WIC, an indicator of no or limited BF). In the previous validation study, agreement between postpartum women-infant food packages and research study measurements for fully BF, combination feeding, and formula-only feeding packages was 0.89, 0.76, and 0.90, respectively.<sup>68</sup>

Issuance of these food packages to the 39,801 infants in the sample was examined from birth through age 11 months, when WIC food packages change to support the nutritional needs of children aged 1-4 years. Rates of issuance of each package type at infant enrollment into WIC were used as a proxy for BF initiation: issuance of the fully BF or combination BF indicated that BF was initiated; issuance of the formula-only package indicated that BF was not initiated. Duration of issuance of the combination BF package was examined as an indicator of duration of any BF, meaning that infants were fed some breast milk and some infant formula. Duration of issuance of the fully BF package was examined as an indicator of duration of full BF, meaning that infants were fed only breast milk.

**Child height/weight.** The PHFE WIC clinic staff were trained to follow a standardized height-weight measurement protocol upon hire, and then were audited annually to confirm protocol adherence. The protocol for obtaining height and weight measurements

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