

# Observations and Conversations: Home Preparation of Infant Formula Among a Sample of Low-Income Mothers in the Southeastern US

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## ABSTRACT

**Objective:** Explore infant formula preparation attitudes and beliefs among low-income, formula-feeding, Southeastern US mothers.

**Design:** Cross-sectional study using in-home observations and in-depth interviews.

**Setting:** Participant homes.

**Participants:** Thirteen low-income mothers of normal birth weight, healthy, term infants aged  $\leq 3$  months, who were predominantly feeding powdered or from-concentrate formula.

**Variables Measured:** Reading formula preparation instructions; order of added ingredients; leveling powdered formula scoop(s); adding cereal or other ingredients to bottles.

**Phenomenon of Interest:** Perceptions of formula preparation or manipulation.

**Analysis:** Descriptive statistics described sample characteristics and home observation variables. Thematic analysis of in-depth interviews revealed the following major themes: formula preparation can be intimidating; expressions of complex heuristic perceptions about formula preparation; cost and convenience motivate maternal behaviors; and infant cues override recommendations. Data from qualitative and quantitative activities were triangulated.

**Results:** Behaviors, including improper reconstitution and modifications/additions to prepared formula (eg, infant cereal) were observed during home observations and/or described during in-depth interviews. Inconsistencies were detected between observed behaviors (eg, adding too much water to the bottle) and those reported during in-depth interviews (eg, stating over-dilution could be detrimental to the infant's health).

**Conclusions and Implications:** Targeting knowledge or skills gaps and behavioral motivators in the formula-feeding population could positively affect infant-feeding practices that occur outside of recommendations.

**Key Words:** infant formula, maternal behaviors, infant feeding, motivators, attitudes, WIC (*J Nutr Educ Behav.* 2017;49:579-587.)

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Data presented in the latest Centers for Disease Control and Prevention Breast-feeding Report Card, representing US

births in 2013, indicated that several of the Healthy People (HP) 2020 Breast-feeding Objectives were close to being

met at the national level.<sup>1</sup> For example, 81.1% of US infants were offered the breast at least once, approaching the objective of 81.9%, and exclusivity rates at 3 and 6 months were also approaching the relevant objectives (44.4% vs 46.2% and 22.3% vs 25.5% at 3 and 6 months, respectively). Although encouraging, breastfeeding rates continue to be lower among certain populations, such as among low-income women<sup>2</sup> and women residing in the Southeastern US.<sup>3</sup> Infants who are not breastfed, exclusively or at all, will receive at least some infant formula<sup>4</sup> and many will receive it as the predominant or only form of nutrition for the first few months of life.<sup>1,5</sup> The *Special Supplemental Nutrition Program for Women, Infants, and Children* (WIC), a federal supplemental food

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program, annually serves over half the US infant population.<sup>6</sup> Although it provides important support for breastfeeding mothers,<sup>7</sup> WIC accounts for over half the infant formula purchased in the US annually.<sup>8</sup> Therefore, it is clear that a large proportion of infants will receive at least some infant formula. Despite this large proportion receiving formula, relatively little research has focused on understanding behaviors and attitudes regarding the proper preparation and feeding of infant formula in populations of healthy infants.<sup>4,9-12</sup> In the absence of specific medical conditions, improper reconstitution of powdered infant formula (over- or under-dilution) and the addition of infant cereal to bottles of prepared formula are not recommended.<sup>13</sup> However, previous research indicated that over- and under-dilution of reconstituted infant formula<sup>9,10,14</sup> and the addition of infant cereal to prepared formula<sup>11,12,15</sup> are occurring and may be of specific concern in low-income populations.<sup>14-16</sup> These behaviors may be partially explained by a lack of knowledge or understanding of proper preparation, as Lakshman and colleagues<sup>10</sup> highlighted in a 2009 review of qualitative and quantitative studies conducted with bottle-feeding mothers. In this study, mothers who formula-fed, either by choice or necessity, reported receiving limited education regarding proper preparation. To the best of the authors' knowledge, no work has been completed that combines observations of bottle preparation with in-depth interviews regarding attitudes and beliefs about infant formula preparation. Therefore, the objective was both to observe infant formula preparation and to explore attitudes and beliefs about formula preparation among low-income, formula-feeding mothers of infants aged  $\leq 3$  months.

## METHODS

In this cross-sectional study, the researchers completed home observations of infant formula preparation and one-on-one, in-depth interviews assessing maternal attitudes and beliefs related to infant-feeding practices.

### Recruitment

Mothers of normal birth weight, healthy, term infants aged  $\leq 3$  months, who

were predominantly formula feeding (ie, breastfeeding twice per day or less), using powdered or from-concentrate formula, and who were income-eligible for WIC ( $\leq 185\%$  of the federal poverty level)<sup>17</sup> could participate. Recruitment occurred via community health organizations and social media. Study activities were explained via telephone for those who were determined to be eligible based on an online or phone screen; if respondents were interested in participating, home visits were scheduled. Informed consent was obtained verbally over the phone before home visits and written consent was obtained before commencement of study activities during the visit. This study was approved by the University of Tennessee's Institutional Review Board before implementation. Recruitment occurred in the Southeastern US from August, 2012 to April, 2013.

### Tools and Training

A checklist for the home observation (Figure 1) and a semistructured interview guide (Figure 2) were developed by members of the research team with expertise in food safety (JLB), infant formula preparation (JCN, JLB, and KFK), infant-feeding practices (BPG, KBB, KFK, JCN, and RGE), home observation research techniques (LSG), and qualitative methods (LSG and KFK) and were further informed by pilot work conducted with this population. The infant formula preparation checklist (Figure 1) assessed observed behaviors such as hand washing, use of appropriate measuring techniques, and use of the correct formula-to-water ratios (generally 2 oz of water for every level scoop of powder). The semistructured interview guide (Figure 2) assessed maternal attitudes and beliefs related to infant-feeding practices, incorporating open-ended questions designed to provide scaffolding for conversations about important concepts of interest while allowing for deeper exploration when relevant.<sup>18</sup> Questions targeted the process of formula preparation, timing of solid food introduction, addition of infant cereal to bottles, infant cues, and sources of trusted infant-feeding information. LSG trained research assistants (RAs) in appropriate home observation and interviewing techniques by using these tools to

complete role-playing activities before attending home visits. Training in qualitative methods (KFK) were also provided.

### Data Collection

Observation of bottle preparation was completed first, followed by the interview. Two RAs attended each home visit. During the observation, mothers were asked to prepare at least 2 bottles. The first was prepared using the mother's own formula and equipment (typical bottle) to assess usual preparation. Before the home visit, mothers were asked about the current brand and type of formula they were using, which allowed RAs to bring a different formula for preparation of the second bottle (unfamiliar bottle). The purpose of the unfamiliar bottle was to observe whether mothers reviewed canister information when presented with a novel brand or type of formula and whether preparation differed from the typical bottle. This was important because preparation instructions may differ slightly by formula brand or type. After preparing the unfamiliar bottle, mothers were asked whether they ever prepared a bottle differently from the way in which they prepared their typical bottle. If so, they were asked to prepare a third bottle (alternative bottle) to demonstrate this difference. Using the checklist (Figure 1), RAs independently observed and documented relevant behaviors. Germane observations not captured by the checklist, such as the state of the formula preparation environment, were recorded in the notes section. After each observation, an in-depth, audio-recorded interview was conducted using the semistructured interview guide (Figure 2). Interviewers were encouraged to follow the guide, but to probe further as appropriate. One RA served as interviewer and 1 served as a note taker. At the end of the home visit mothers were provided with information regarding proper preparation of infant formula.

### Data Analysis

Field notes were completed immediately after the home visit. The RAs compared checklists, resolved discrepancies, and created a final master copy of the checklist. This master copy was

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