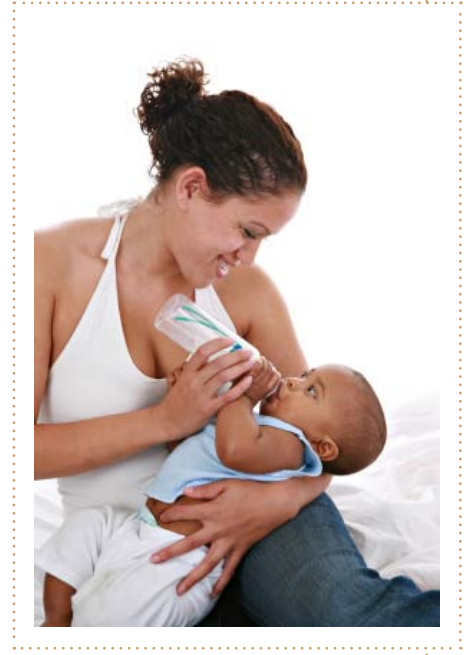


# Attitudes or Income? What Determines Whether Mothers in the WIC Program Dilute or Concentrate Baby Formula?

Research by Katherine Kavanagh and Cary Springer, University of Tennessee

The first few months of life may help cement more than bonding for an infant. These important months may also imprint patterns of eating that can contribute to obesity later in life. Several studies have found that infant feeding practices, particularly breast-fed versus formula-fed options, can contribute to early weight gain, which in turn increases the risk of childhood weight issues. Infants fed formula, for example, tend to take in more energy and grow at a faster rate than breastfed infants in the first year. Formula-fed infants are also more likely to be overfed and may be less able to self-regulate their intake.

What leads to this trend among formula-fed infants is unclear, but some have pointed to a mother's attitudes, abilities, and beliefs about infant feeding as a possible reason for the distinctions. Katherine Kavanagh and Cary Springer, in their recent paper, explore mothers' attitudes toward feeding patterns, and add a new possibility: how the mother prepares the formula—whether she concentrates or dilutes it.



## Study Design

The authors surveyed 40 mothers of healthy, term, formula-fed infants less than six months old. Approximately one-half of the mothers were receiving WIC, the federal program that provides supplemental foods, health care referrals, and nutrition education for low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to infants and children up to age five who are at nutritional risk. The

questions about formula preparation and infant feeding. A subset of 18 of these mothers recorded infant intake for 24

hours and collected a small sample of infant formula from each bottle offered. The mothers' feeding styles were categorized according to a feeding style scale developed by A. L. Thompson and colleagues.

### What is WIC?

Standing for Women, Infants, and Children (WIC) is a program administered by the USDA.

WIC provides Federal grants to states for supplemental foods, health care referrals, and nutrition education for low-income pregnant, breastfeeding, and non-breastfeeding postpartum women, and to infants and children up to age five who are found to be at nutritional risk.

## One-Fourth of Mothers Dilute Formula

Mothers varied little in their views on mixing formula. In responding to statements such as, "I think it is

other half had incomes 185 percent or more above the federal poverty line. The surveys posed a series of

important to be very careful when mixing formula," or "I think formula that is a little thin [thick] is okay for my baby," more

mothers agreed that it was important to mix carefully than agreed it was acceptable to dilute or concentrate the formula. Furthermore, the authors found no substantial differences by income in mothers' attitudes about mixing formula. However, mothers with boys tended to more strongly disagree that it was okay for the formula to be "a little strong." Older mothers were more adamant that thin formula was unacceptable.

That most mothers believed it was important to carefully mix the formula was evident in the results from the 24-hour monitoring. The majority of mothers accurately mixed the



formula so that it delivered the recommended 20 kilocalories per ounce. About one-fourth of the mothers, however, were consistently diluting the formula. Only one mother overconcentrated the formula. On average, infants were getting 18.5 calories per ounce of formula, and babies consumed about 625 calories in 24 hours. This intake falls squarely in the mid-range of recommendations.

Again, there were no differences in practices by income, which suggests that a need to stretch the formula on a tight budget is not the main reason for diluting formula. In addition, the more energy-dense the formula, the fewer ounces the baby consumed, suggesting infants self-regulate to some extent.



Using a well-known measure of infant feeding, the authors categorized the mothers into four feeding styles to determine whether there was an association between attitudes toward feeding and feeding practices. The styles were 1) *laissez-faire* (little interaction with the infant during feeding; quantity and quality of formula are of little concern);

2) *pressuring/controlling* (parent uses food to modify infant behavior and is concerned about too little intake); 3) *restrictive/controlling* (parent controls quality and quantity of intake); and 4) *responsive* (parent is responsive to infant hunger and satiety cues).

Mothers with a more restrictive feeding attitude were significantly more likely than the other mothers to dilute the formula. The more responsive the mother, the fewer ounces her infant consumed, which might indicate the baby was able

to self-regulate intake and mothers were picking up on the cues. Mothers with *laissez-faire* or *pressuring* attitudes tended to prepare more bottles. There is some speculation that *laissez-faire* mothers may be less attentive to infants'

needs and are less regular in feeding practices. *Pressuring* mothers, on the other hand, might overprepare the bottles in hopes the infant will consume just a bit more.

In addition, mothers with a *laissez-faire* attitude who agreed it wasn't important to carefully reconstitute the formula were more likely to dilute the formula. These latter three findings (*responsive* and *laissez-faire* or *pressuring* attitudes) were notable but not statistically significant, although with a larger sample, they might reach significance. In the end, parental attitudes did not significantly influence infant intake, indicating again that very young babies may be able to self-regulate their intake, but it did have more of an effect than income.



In sum, overly diluted formula is a potential risk for about one-fourth of the women, regardless of income, and further research should examine mothers' attitudes toward feeding and their link to babies' intake.

These feeding attitudes might be able to identify mothers at risk for diluting formula. Although the study was too short (24 hours) to assess any long-term effect on future weight, the results do point to the ability of very young babies to self-regulate their consumption. Whether they are "trained" out of this behavior with time would be an interesting future study.

## Policy Implications

The WIC program serves nearly one-half of all infants and about one-fourth of all children ages 1 to 4 in the United States.<sup>1</sup> It purchases more than one-half of all infant formula sold in the United States and is the Department of Agriculture's

<sup>1</sup> Victor Oliveira and Elizabeth Fraz ao, *The WIC Program: Background, Trends, and Economic Issues*, 2009 ed. (Washington, DC: U.S. Department of Agriculture, Economic Research Service, April 2009)

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third-largest food and nutrition assistance program, with outlays of \$6.2 billion in 2008. The program is up for reauthorization, and its effectiveness will be under the microscope. Unlike the food stamps program, WIC is not an entitlement, and policymakers must decide how much funding to dedicate to the program.

The results of this study point to several conclusions that policymakers may want to consider. Foremost is that a significant share (one-fourth) of participants diluted the formula and their children were not receiving the recommended calorie intake. Income of the mother was not a good predictor of who tended to dilute formula. A more accurate predictor of who might be at risk for stretching the formula is a mother's attitudes about feeding practices. Given these findings, broad-based education about feeding practices may be warranted.

Funding for such education is in jeopardy, however, and staff are currently themselves stretched thin. According to a report by the USDA, limited staff and clients with scarce resources both constrain efforts to improve nutrition education.<sup>2</sup> WIC state agencies receive specific funds to cover administration costs and costs associated with providing key services, such as nutrition and breastfeeding education. Many argue that funding for these services should be capped to allow for more funding of actual food benefits. Continued funding seems warranted,

but tighter budgets could be more effectively allocated by directing education to those mothers who are more restrictive in

their feeding habits. A quick survey of mothers could determine feeding styles and guide providers in tailoring their education efforts.

The USDA revised the WIC food packages in October 2009 to reduce the amount of saturated fat, cholesterol, and total fat provided in the supplemental food package and improve eating patterns that promote healthy weight. These revisions are the most significant changes to the program since its inception, according to the USDA. To further increase the incentives to breastfeed, the program has raised the market value of the food packages for mothers who are fully breastfeeding. The unintentional result, however, may be that mothers who prefer formula may begin to dilute it to make it stretch, fearing a decreasing supply. Policymakers should ensure that children of mothers who opt for formula are not inadvertently put at nutritional risk.

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<sup>2</sup> Victor Oliveira and Elizabeth Fraz ao, *The WIC Program: Background, Trends, and Economic Issues*, 2009 ed. (Washington, DC: U.S. Department of Agriculture, Economic Research Service, April 2009)

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