PERSPECTIVES ON INFANT FEEDING BELIEFS, ATTITUDES, AND PRACTICES OF HISPANIC MOTHERS ENROLLED IN WIC: IMPLICATIONS FOR BREASTFEEDING PEER COUNSELING

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ABSTRACT

Rachelle Johnsson Chiang: Perspectives on Infant Feeding Beliefs, Attitudes, and Practices of Hispanic Mothers Enrolled in WIC: Implications for Breastfeeding Peer Counseling
(Under the direction of Asheley Skinner)

Hispanic children have the highest rate of overweight and obesity for children and youth ages 2-19 in the U.S. amongst all major racial and ethnic groups. Recent research has highlighted the important role that infancy and early childhood may have in the development of obesity, particularly for Hispanic children. Mixed feeding (breastfeeding and formula) and early introduction of solid food has been shown to increase weight gain in infancy and early childhood BMI.

The practice of mixed feeding or "*las dos*" is common in Hispanic mothers, both new immigrant and U.S. born. Although a few recent studies have explored *"las dos"* and early introduction of solid food among low-income Hispanic mothers and their infants, the literature is sparse. There are significant insights into these practices that can be gained both from the perspectives of Hispanic mothers enrolled in WIC, and the experiences of WIC breastfeeding peer counselors that regularly work with Hispanic mothers and their infants in the community.

This dissertation aimed to expand the level of knowledge and understanding of the beliefs, motivations, and behaviors of Hispanic mothers enrolled in WIC regarding mixed feeding ("*las dos*") and the early introduction of solid foods, along with perceived effective communication strategies to address both of these practices. Using a mixed-methods approach, the research examined the experiences of bilingual (Spanish-speaking) WIC breastfeeding peer

counselors in North Carolina and feeding practices and beliefs of WIC enrollees in Texas that were majority Hispanic.

In this study, the results demonstrated that there are demographic differences in the reasons mothers introduce formula to breastfed infants, and that demographic and socioeconomic factors, acculturation, cultural context and social environment play a role in "*las dos.*" It also produced valuable findings around overfeeding and communication strategies to address "*las dos.*" The results for early introduction of solid foods indicated that Hispanic mothers in WIC are less likely to introduce solid food early and add cereal to a baby's bottle. The *Plan for Change* uses the results to create a multi-pronged strategy to improve communication about "*las dos,*" to reduce the risk of early childhood obesity in low-income Hispanic children.

To my husband Luis, for walking this path beside me.
To my children Adrian, Elise and Andres.

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LIST OF ABBREVIATIONS

BMI	Body Mass Index
CDC	Centers for Disease Control and Prevention
FNS	Food and Nutrition Service
IRB	Institutional Review Board
ITOT	Indian Tribal Organizations and Territories
NC-DHHS	North Carolina Department of Health and Human Services
PI	Principal Investigator
PRAMS	North Carolina Pregnancy Risk Assessment Monitoring System
TX-DSHS	Texas Department of State Health Services
TX-WIFPS	Texas WIC Infant Feeding Practices Survey
UNC	University of North Carolina
WIC	Women, Infants and Children

CHAPTER 1: INTRODUCTION

Statement of the Issue

Hispanic children have the highest rate of overweight and obesity for children and youth ages 2-19 in the U.S. amongst all major racial and ethnic groups. Recent data indicates that 32% of all U.S. children and youth 2-19 years old are overweight or obese (defined as ≥85th percentile in the growth charts provided by the Centers for Disease Control and Prevention (CDC). However, among Hispanics, 39% of children and youth 2-19 are overweight or obese, compared to 29% of Whites, 35% of Blacks, and 20% of Asians. The racial and ethnic disparities are already apparent in early childhood, in which 30% of Hispanic children ages 2-5 are overweight or obese, compared to 21% of Whites, 22% of Blacks, and 9% of Asians. From birth to two years of age, Hispanic and Mexican American infants and toddlers are more likely to have high weight-for-recumbent length than Whites or Blacks (≥95% in the CDC growth charts).[1] And despite the recently touted declines in overweight and obesity in children ages 2-5, these declines have not been equitable across all groups. Young Hispanic children are now five times more likely to be obese compared to White children.[2]

These statistics are concerning for any population, but particularly one that is rapidly growing. Hispanics now make up 17% of the U.S. population, surpassing Blacks as the largest minority.[3] Currently, approximately one in four babies born in the U.S. has a Hispanic mother.[4] Census projections estimate that the Hispanic population will double by 2060, at which time one in three U.S. residents will be Hispanic.[5]

Recent research has highlighted the important role that infancy and early childhood may have in the development of obesity, particularly for Hispanic children.[6-9] Rendall et al. found that obesity begins and is sustained earlier in Hispanic children than White or Black children, as 44% of the of disparity between Hispanic and White children in eighth grade is already generated by kindergarten. In the case of the disparity between Black and White eighth graders, only 15% was generated by kindergarten.[10] Taveras et al. found that among Hispanic children, nonexclusive breastfeeding, early introduction of solid foods, sugar sweetened beverage intake, television viewing, shortened sleep, and other modifiable behaviors all contribute to increased disparities in rates of obesity in mid-childhood (age 7).[7] Research also indicates that rapid weight gain during the first two years of life is associated with higher body mass index (BMI) in childhood and adulthood.[11-13] A recent systematic review emphasized the consistency of this association across many research studies, with 45 of 46 identified studies demonstrating an association between high infant weight gain with later childhood overweight.[14] In addition, the early introduction of solid food (prior to 4 months) has been shown to be associated with increased weight gain in infancy and preschool age children, although this relationship appears to be significantly stronger among formula-fed infants.[15-18]

While the protective effect of breastfeeding on childhood obesity is not as clear as once thought,[19] a meta-analysis found a strong dose-dependent association between longer duration of breastfeeding and decreased risk of overweight.[20] In infants that are formula-fed and mixed-fed (breastfed and formula) at four months, higher intakes of formula and other energy sources has been shown to increase weight gain in infancy and early childhood BMI.[21] In addition, research has shown that infants that are mixed-fed for the first six months are more likely to be obese at 24 months of age relative to those who are breastfed exclusively.[22] Research has also shown that

breastfeeding is associated with the timing of solid food introduction, with a higher percentage of mothers introducing solid foods early to formula-fed infants.[23] Furthermore, breastfeeding has a confounding effect on the impact of the early introduction of solid foods on increased infant weight gain. This effect is demonstrated by the presence of an association between infant weight gain and early introduction of solid foods in in formula-fed infants and those breastfed for shorter durations, but the association is not present in infants breastfed for longer periods of time.[17] Because of the intertwined nature of breastfeeding/formula feeding and early introduction of solid foods, interventions seeking to reduce the risk of early childhood obesity need to address both topics simultaneously.

It is notable that the majority of studies on breastfeeding and obesity have not separated exclusive breastfeeding from mixed breast and formula feeding, and have also largely focused on Whites in developed countries. Mixed feeding, as will be discussed below, is particularly common among Hispanic mothers and one that merits an increased focus for research because of the potential implications for early childhood obesity prevention. A recent study by Zhou et al. found that even after adjusting for various confounding variables, among low-income Hispanic families with children ages 2–4 the mixed feeding and exclusive formula feeding groups had children with significantly higher BMI percentiles than those who exclusively breastfed. These associations were not found among Blacks and Whites. Although the study's small sample size and survey methodology limit its generalizability, the findings merit further research.[24]

For Hispanic infants in the U.S., the aforementioned risks are of particular importance and may help to partially explain why the rate of obesity is higher in young Hispanic children. While Hispanic mothers have high breastfeeding initiation rates, they are less likely to practice exclusive breastfeeding than Whites or Blacks.[25,26] They also have higher rates of supplementing

breastfeeding with formula, with a high percentage of mothers practicing mixed feeding beginning from birth.[24,26-31] The practice of mixed feeding is generally considered both desirable and beneficial by Hispanic mothers, both new immigrant and U.S. born, and possible negative consequences are not commonly understood.[8,32-34] Mixed feeding is so common within the U.S. Hispanic community that it has a commonly understood Spanish term, "*las dos,*" or "both." The reasons behind "*las dos*" are not clear, although a few qualitative research studies have found that common reasons for mixed feeding include: (1) wanting to ensure that babies get both the healthy aspect of breastfeeding and the necessary "vitamins" in formula; (2) treatment for insufficient milk; (3) fear of infant hunger; (4) to keep a baby fuller longer; (5) planning to return to work, and; (6) family and cultural beliefs about supplementation as a remedy for babies who are crying or not chubby enough.[8,32,33,35,36] Research has also shown a higher tendency among low-income Hispanic mothers to view both breastfeeding and formula as equally beneficial and not mutually exclusive.[37] In addition, research has highlighted the increased practice of pressure feeding among low-socioeconomic status Hispanics, particularly those who are foreign-born and less acculturated. This includes a higher likelihood to believe that the infant should always finish a bottle and to act accordingly, to interpret crying as a sign of hunger, and a lower likelihood to believe that infants can recognize their own satiety.[38-41]

Research also indicates that Hispanic mothers may be more likely to introduce solid food to infants at an age earlier than the recommended 6 months,[23,39] although studies have also demonstrated the opposite.[41,42] A national longitudinal study found that 40.4% of mothers (all races and ethnicities) introduced solid foods before 4 months of age. Among women who fed formula to their infants when solids were introduced, 52.7% reported starting solids before 5 months of age, compared with 50.2% among mixed-fed and 24.3% among breastfed infants.

Although this study did not analyze differences for race or ethnicity, it found that mothers who introduced solid foods were more likely to have a lower level of educational attainment and income, and to be participating in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC).[43]

Although a few recent studies have begun to explore the common practice of mixed-feeding (*"las dos"*) and early introduction of solid food among Hispanic mothers and their infants, with particular emphasis on preventing overweight and obesity, the literature is sparse. One of the significant gaps is a better understanding of the reasons why low-income Hispanic women quickly introduce formula to breastfed infants and introduce solid foods before the recommended time. There are significant insights that could be gained both from the perspectives of Hispanic mothers enrolled in WIC, and the experiences of WIC breastfeeding peer counselors that regularly work with Hispanic mothers and their infants in the community to provide breastfeeding information and encouragement. As paraprofessionals, WIC breastfeeding peer counselors play a key role in WIC's breastfeeding promotion, and have a unique position as both peers and educators.

The purpose of this dissertation was to gain a better understanding of the beliefs, motivations, and behaviors of Hispanic mothers enrolled in WIC in terms of *las dos* and the early introduction of solid foods, along with perceived effective communication strategies to address both of these practices. I leveraged an existing secondary data set on breastfeeding practices of WIC enrollees in Texas which has a high proportion of Hispanic participants, as well as the accumulated experiences of WIC breastfeeding peer counselors in North Carolina. The goal is to use these results to shape future WIC breastfeeding peer counselor training in North Carolina, by

incorporating specific communication messages concerning mixed feeding and the introduction of solid foods to enable Hispanic mothers to lower the risk of obesity in their young children.

Background

WIC provides benefits to low-income pregnant and postpartum women, as well as their infants and children who are at nutritional risk. It serves over nine million participants across the U.S. every month, half of which are children ages 1–5 and one quarter of which are infants. Through federal grants to states, WIC provides supplemental foods, health care referrals, and nutrition education to women and young children at risk. According to the National Survey of WIC Participants II, just under half (45%) of WIC participants are Hispanic and 31% of WIC households use Spanish as their primary language.[44]

Historically, WIC's breastfeeding rates have been below national levels.[45] One of WIC's priorities is the promotion of breastfeeding as the optimal infant feeding choice. This is done through various efforts, including providing breastfeeding information and education, extended WIC eligibility, enhanced food packages for breastfeeding mothers, and the availability of breastfeeding equipment. Since 2004, one of WIC's primary strategies for increasing breastfeeding rates has been the utilization of peer counselors. The United States Department of Agriculture (USDA) Food and Nutrition Services (FNS) allocates non-competitive grants to states and Indian Tribal Organizations and Territories (ITOTs) to support peer counseling based on FNS's *Loving Support* model. States are eligible for the funds upon submission and approval of an operational plan. The guidelines for implementing peer support are broad and allow states and ITOTs flexibility in determining how to implement the program to best meet local needs. Federal funding for peer counseling has increased significantly in recent years, from $15 million in FY2004 to $60 million in FY2015. While some states and ITOTs only utilize federal funding to support their program, many other states supplement the peer counseling program with other

sources of funding, including state and local governments and grants.[46] In FY2014, North Carolina received $1.75 million in federal funds to support breastfeeding peer counseling in local WIC programs.

One of the reasons that funding for peer counseling has increased within the WIC program is that it has been found to be effective. A systematic review found an overwhelming amount of evidence from randomized controlled trials indicating that peer counselors effectively improve rates of breastfeeding initiation, duration, and exclusivity.[47] Research also supports its effectiveness with Hispanic mothers,[48,49] and with WIC participants specifically, particularly when participants enrolled in WIC during early pregnancy.[50-52] Beyond breastfeeding, there is evidence that peer educators, or lay health educators, can have a positive impact on health behaviors and outcomes among Hispanics, including diabetes self-management, general nutrition knowledge, and dietary behaviors.[53,54]

A WIC breastfeeding peer counselor is a "paraprofessional support person who gives basic breastfeeding information and encouragement to WIC pregnant and breastfeeding mothers."[55] Peer counselors must have breastfed at least one child and have completed training as determined by the state, ITOT, or local WIC office. They often work part-time, meeting with mothers either in WIC clinics or at home. Because many have been a WIC participant themselves, they often have a dual role as a peer and community member, as well as educator. Their role is distinct from other WIC staff such as nutritionists and certified lactation consultants, in that they are more in the role of a trained lay health or community health worker. Like community health workers, WIC breastfeeding peer counselors often have an in-depth understanding of the community and the cultural beliefs and norms, and communicate in a language that is familiar to their clients. Because of the high percentage of WIC participants that

are Hispanic, many breastfeeding peer counselors are Hispanic and bilingual themselves. For this reason, it is probable that they may have dual perspectives on the norms, facilitators and barriers to mixed feeding and early introduction of solid foods, and therefore could provide valuable experience in effective and ineffective communication strategies concerning both of these topics.

In North Carolina, the WIC program serves an average of 270,000 participants each month. Twenty-nine percent of enrollees are Hispanic.[56] Data from the North Carolina Nutrition and Physical Activity Surveillance System, which is primarily based on children seen in local WIC health clinics in North Carolina, indicates that Hispanic children ages 2–4 have the highest rates of overweight and obesity of all racial and ethnic groups (34.9%). In terms of breastfeeding, 58.6% of WIC enrollees in North Carolina initiate breastfeeding, 36.1% are breastfeeding at six weeks of age, and 20% are breastfeeding at six months of age.[57] Overall, 11.8% of infants enrolled in WIC in North Carolina are fully breastfed, 17.3% are partially breastfed, and 70.9% are fully formula fed.[58] Data on specific rates by race and ethnicity are not available for WIC enrollees in North Carolina, although data from the North Carolina Pregnancy Risk Assessment Monitoring System (PRAMS) indicate that 88% of Hispanics initiate breastfeeding (versus 79% of Whites, 60% of Blacks) and 54% are exclusively breastfeeding at 8 weeks (versus 47% of Whites, 38% of Blacks). However, PRAMS may not be reflective of the WIC population, and does not include questions about mixed feeding. Recent research conducted with low-income mothers and their infants in North Carolina has found much higher rates of mixed feeding in Hispanics compared to Whites and Blacks.[41] In terms of early introduction of solid foods, there is not any statewide data available. The same study mentioned above (Perrin et al.) found low rates of early introduction of solids with Hispanic participants, however this contrasts from studies mentioned previously that have found the opposite.

North Carolina is considered a new settlement state for Hispanics, with most of the growth occurring during the last two decades. In 1990, 1.2% of the state's population identified as Hispanic. By 2015, this number increased to 9%. Fifty-three percent are native-born, and 47% are foreign born.[59] Although other traditional settlement states have much larger populations, North Carolina has the sixth fastest growing Hispanic population in the country. The largest percentage live in urban areas, although there are many small towns throughout the state where the percentage of Hispanics exceeds 30%. Census data from 2010 indicate that 60% of the Hispanic population is of Mexican origin, followed by 13% Central American, 9% Puerto Rican and 5.7% South American.[60]

This research described in this dissertation utilized a convergent mixed methods design, as described by Creswell.[61] As a part of this design, I conducted key informant interviews with WIC breastfeeding peer counselors in North Carolina and analyzed the 2013 Texas WIC Infant Feeding Practices Survey (TX-WIFPS), a survey of over 11,000 WIC participants, 71% of whom were Hispanic and 35% of whom were born in Mexico. Texas averages almost 900,000 enrollees in WIC per year, 72% of which identify as Hispanic. TX-WIFPS is unique in that it collects certain types of data from WIC participants that are unavailable in North Carolina or in any other state. It is the only statewide survey of its kind that includes specific questions around reasons for introducing formula to breastfeeding infants and the age at which formula and complementary foods were introduced. The survey provides valuable data regarding the practices and beliefs of a large number of low-income Hispanic mothers at varying levels of acculturation and education, and therefore the responses are directly relevant to the research topic of this dissertation.

Texas' Hispanic population differs slightly from North Carolina in that it has significant Hispanic populations that are both recent immigrants (similar to North Carolina), along with second, third, and subsequent generations. Texas also has a higher percentage that is native-born (70% vs. North Carolina's 53%). However, the Hispanic populations in both states also share similarities. In Texas and North Carolina, the majority of Hispanics are of Mexican origin. In addition, both have similar rates of Hispanics who speak a language other than English at home (76% in Texas, 81% in North Carolina),[59,62] which is a variable that is commonly associated with the level of acculturation.[63] Both states also have a strong WIC peer counseling program, with Texas' program dating back to 1991, prior to the USDA's formal support of peer counseling for breastfeeding support. My plan in this dissertation is to build upon these similarities in order to leverage the valuable insights from WIC breastfeeding peer counselors in North Carolina and with the information determined by the from TX-WIFPS survey to gain a more complete understanding of the research topic.

Importance and Rationale

The prevention of early childhood obesity is important because of evidence linking it to childhood, adolescent, and adult obesity. Infant feeding practices have been shown to play an important role in the development of early obesity. Childhood obesity is a concern because of its long-term impact on health outcomes. It is also strong predictor of adult obesity which is associated with increased risk of coronary heart disease, hypertension, stroke, Type II diabetes, metabolic syndrome, and sleep apnea.[64-66] In addition, youth with obesity are more likely to have risk factors for cardiovascular disease, such as high cholesterol or blood pressure. They are also more likely to have prediabetes, and are at greater risk for obstructive sleep apnea, depression, and stigmatization by their peers.[67-69] These increased risks are a concern not only for the children whose lives they affect, but also the healthcare systems that will face an increased

burden of disease amongst overweight and obese children. Since over half of Hispanic children are insured by Medicaid/Children's Health Insurance Program, the system that could bear the greatest healthcare costs is a public one.[70]

As mentioned previously, early life risk factors appear to play an important role in the development of childhood obesity. Interventions that effectively modify risk factors, such as overfeeding or early introduction of solid foods, are essential for reducing the rate of overweight and obesity among Hispanic children in the future. The WIC program reaches some of the most at risk populations, and has a strong infrastructure at the federal, state, and local levels. Peer counseling for breastfeeding is a core component of many WIC programs. While peer education has been demonstrated to be effective for breastfeeding and initiation, there are many questions regarding how breastfeeding peer counselors can effectively address common behaviors in Hispanic populations, such as mixed and supplemental feeding, as well as the early introduction of solid foods that are associated with the development of obesity. Research is needed to further understand the factors associated with Hispanic mothers' infant feeding beliefs and practices within the WIC population. A quantitative analysis of the TX-WIFPS data should provide valuable insights into these topics.

In addition, research is needed to create culturally appropriate messages and interventions to address infant feeding practices and beliefs known to be associated with the development of early childhood obesity. As front line paraprofessionals with a dual perspective, WIC breastfeeding peer counselors can both inform this research, and benefit from the information gained through the study, through the creation of a plan for change to improve communication about behaviors that can reduce the risk of early childhood obesity in low-income Hispanic families. This plan for change is likely to include recommendations for culture-specific training

that would better equip peer counselors to address concerns around "*las dos*" and early introduction of solids among mothers enrolled in WIC. Ultimately, the importance of the research is related to reducing the future risk of obesity of Hispanic children enrolled in WIC.

Research Question and Aims

Research Question: How can communication from peer counselors about infant feeding enable low-income Hispanic mothers enrolled in WIC to lower the risk of early childhood obesity in their infants?

Aim 1: Determine why low-income Hispanic mothers who initiate breastfeeding begin to supplement with formula from birth ("*las dos*") and/or introduce solids early. (Methods: Analysis of TX-WIFPS, key informant interviews of WIC peer educators and regional peer education coordinators in North Carolina)

Sub-Aim 1.1: Determine how demographic and socioeconomic factors influence the practice of mixed breast and bottle feeding and early introduction of solids among low-income Hispanic mothers.

Sub-Aim 1.2: Identify other factors influencing the practice of mixed breast and bottle feeding and early introduction of solids among low-income Hispanic mothers.

Aim 2: Determine perceived effective communication approaches of WIC peer educators to encourage behaviors in Hispanic mothers that reduce the risk of early childhood obesity in low-income Hispanic children. (Methods: Key informant interviews of WIC breastfeeding peer counselors and regional breastfeeding coordinators in North Carolina)

Sub-Aim 2.1: Determine the messages that low-income Hispanic mothers find most persuasive regarding: (1) exclusive breastfeeding in lieu of mixed feeding; (2) not overfeeding (i.e., pressuring to finish a bottle); and (3) delaying the

introduction of solid foods to the recommended 5–6 months.

Sub-Aim 2.2: Determine what motivates low-income Hispanic mothers to exclusively breastfeed rather than mixed feed ("*las dos*").

Aim 3: Develop a plan for change for the North Carolina WIC Breastfeeding Peer Counselor program that improves approaches to communication about behaviors that can reduce the risk of early childhood obesity in low-income Hispanic children.

(Methods: Key informant interviews of WIC regional breastfeeding coordinators)

CHAPTER 2: REVIEW OF THE LITERATURE

The primary purpose of the literature review was to identify peer-reviewed research that examined the reasons for mixed feeding or "*las dos*" and early introduction of solid foods by Hispanic mothers to their infants. The secondary purpose was to identify any peer-reviewed articles that had examined the perceptions, perspectives and experiences of peer counselors promoting breastfeeding in Hispanic women.

Sources

I conducted a systematic search using the following databases: PubMed, CINAHL Full Text and Web of Science. Additional studies were identified via backwards searches (i.e., snowballing) from references in relevant articles. Key words and search terms are listed in Table 1.

Table 1. Search Terms - Primary Search

Concept	Key Words and Search Terms
Search #1	
Mixed feeding (breast and bottle-feeding)	"infant feeding" OR "mixed feeding" OR "combined feeding" OR "exclusive breastfeeding" OR "supplementary feeding" OR "breast feeding/ethnology" (MeSH term)
	AND
Hispanic	Hispanic OR Latino OR Latina OR Mexican
Search #2	
Early introduction of solid foods	"complementary feeding" OR "solid food*"
	AND
Hispanic	Hispanic OR Latino OR Latina OR Mexican

In addition to the primary search, I conducted a secondary search (Table 2) for peer-reviewed articles on peer counselors for breastfeeding support with Hispanic mothers using the following databases: PubMed, CINAHL Full Text and Web of Science. The purpose of this secondary search was not to identify studies that demonstrated effectiveness of peer education for breastfeeding in the Hispanic community, which have already been documented in the introduction and background, but rather to identify whether any articles had been published around the perception, perspectives and experience of breastfeeding peer educators in Hispanic WIC populations.

Table 2. Search Terms – Secondary Search

Concept	Key Words and Search Terms
Peer counselor	"peer counselor" OR "peer counseling" OR "peer education" OR "peer educator"
	AND
Breastfeeding	Breastfeed*
	AND
Hispanic	Hispanic OR Latino OR Latina OR Mexican

*Indicates wildcard symbol for search term truncation.

Inclusion and Exclusion Criteria

For both the primary and secondary searches, I applied a date restriction of 1995-present as well as the following inclusion criteria:

- Qualitative and quantitative studies
- Published in peer-reviewed journals
- Descriptive and analytical
- Published in English or Spanish
- Research conducted in the United States

- Hispanics were 50% or more of the study population for studies related to mixed feeding, with exceptions if a large study population was based on a national data set
- Hispanics were 17% or more of the study population for those studies related to early introduction of solid foods
- Adults (age 18+)
- Study addressed the practice of "*las dos*," (non-exclusive breastfeeding, mixed feeding, combined breast and bottle feeding) or early introduction of solid foods

Exclusion criteria were as follows:

- Studies that focused on breastfeeding intention, initiation or duration only, or did not discuss mixed feeding.
- Adolescent mothers (age 18 or under)
- Focused on peer support for fathers
- Study population focused on toddlers rather than infants
- Dissertations

Results

The primary search strategy yielded 175 articles. Title review excluded 117 articles. Abstract review excluded an additional 31. Therefore, I examined 27 articles for full review. I eliminated 12 of those articles based on the exclusion criteria. The remaining 15 articles were included in the literature review. I also searched bibliographies of these 15 articles to identify additional relevant studies (i.e., snowballing). First, I reviewed the abstracts of the potential articles, then the full articles, if I perceived them to be relevant. This resulted in the inclusion of four additional articles, for a total of 19 peer-reviewed papers.

The literature review highlighted the small number of studies that have been published in this research area. Of those that did fit the inclusion criteria, there were nine cross-sectional studies, seven qualitative, one longitudinal, one prospective cohort, one retrospective chart review and one systematic review.

A summary of the findings from the primary search strategy are in Table 3 below. A full summary of the studies reviewed can be found in Appendix A.

Table 3. Factors, Attitudes, Practices and Beliefs Associated with Exclusive Feeding, Mixed Feeding and Early Introduction of Solid Foods in Hispanic Mothers and Infants

General	• Mothers have a high tendency to equate crying as a sign of hunger.[29,41,71] • Hispanic mothers are more likely than White and Black mothers to exhibit greater restrictive and pressuring feeding styles[39,41] • Maternal education and infant age are significant predictors of healthier feeding practices. For example, mothers are less inclined to pressure feed to finish a bottle as infant progresses through the developmental stages.[72] • There is a cultural value of chubby (i.e., *gordito*) babies, with a tendency to not recognize infants as overweight.[72] • Mothers worry that their children are not healthy if weight gain is not excessive.[73] • There is little social support for breastfeeding from health care providers.[30] • Breastfeeding role models are important.[30] • Social support from family is important for breastfeeding.[30] • Parents with lower acculturation are more likely than those with higher acculturation to endorse feeding styles that are associated with child obesity.[40] • There is a belief that early life weight gain is unrelated to later life obesity and therefore inconsequential.[8] • Mothers are proud of babies doubling their birth weight by 3 months.[73] • There is uncertainty about "reading" infant's nutritional needs.[71] • Low-income Hispanic mothers are less likely than high-income White mothers to believe that infants can recognize their own satiety, and are more likely to believe that mothers can recognize infant's satiety.[39]
Exclusive Breastfeeding	• Breastfeeding self-efficacy is associated with exclusive breastfeeding at one month, and between one and four months.[74] • Exclusive breastfeeding at one month postpartum is associated with the partner being the most important person in mother's life.[74] • Exclusive breastfeeding is positively associated with maternal age of less than 25 years and presence of a Birth Sister (i.e., doula).[75]

	• Exclusive breastfeeding in a hospital is positively associated with maternal age of less than 25 years, mother being U.S.-born, and the involvement of a Birth Sister.[75] • Exclusive breastfeeding is positively associated with attending college, enlisting a female relative's breastfeeding help, deciding to breastfeed during pregnancy and breastfeeding another child.[76]
Mixed Feeding (“*las dos*”)	• There is a belief in and preference for combination of breastmilk and formula as the best thing for the health of infant.[29,35,71,72] • Introduction of formula is viewed as a treatment for the perception of insufficient milk production.[30,32,74,77] • Mothers perceive that the baby is not satisfied with breastmilk only.[30,71,78] • Mothers desire to make sure the infant is full/fear of the infant experiencing hunger.[8,29,71] • Planning for the mother's return to work/working outside of the home.[30,32,74] • Family and cultural beliefs and traditions: there are messages about supplementation being necessary for babies who are crying or not chubby.[33,36,77] • A lack of understanding of the potential risks of introducing formula on the establishment of breastfeeding, particularly on milk supply.[32,79] • Infant fullness: formula is introduced to keep the baby fuller longer[30,32] and because of family members concern about infant fullness.[36] • Mothers believe supplementing with formula promotes infant sleep.[36] • Mothers' desire to ensure their babies get both healthy aspects of breast milk and “vitamins” in formula.[33,71] • Belief that infant behavior can be positively modified by giving formula.[36] • Mothers fail to understand a negative dose-response of formula on health and milk production.[32] • Mothers' lack of familiarity with medical recommendations on breastfeeding duration or exclusivity.[32] • Breastfeeding can be a struggle: It is natural but it can be painful, embarrassing, and associated with breast changes, diet restrictions, and is inconvenient.[33,30] • Breastfeeding is not in mother's control: mothers want to breastfeed, but things happen that cause them to discontinue.[33] • Mothers had previous negative experiences with a baby that did not want to take a bottle.[29] • Maternal depression is not a risk factor for formula supplementation.[34] • Among those who mix-fed beginning immediately after birth, often no reason was noted.[75] • Mothers view the provision of free formula from programs such as WIC as a paradox since they also promote exclusive breastfeeding. Mothers

	will ask for formula from these programs to and provide it to their breastfeeding infants because of its perceived economic value.[73] • Complementary feeding fulfills values of good mothering.[71] • Mothers express a sense of powerlessness to be able to breastfeed exclusively after initial introduction of formula by someone other than the mother.[36]
Early Introduction of Solid Foods	• Mothers believe that introducing solid foods can help infants to sleep better at night.[71,78] • The fear of infant hunger drives early introduction of solid foods.[8] • A high value for having a "full" child in contrast to negative emotions associated with a child perceived as not "properly nourished."[36] • The introduction of solid foods and sugary beverages are promoted by the beliefs in the importance of early exposure to a variety of foods and beverages to develop infant taste preferences.[8] • The belief that infant behavior can be positively modified by giving solid food.[36] • The belief that infants communicate their readiness for solid foods by facial expressions, and waking or reaching for food, even if they are less than four months of age.[36] • Hispanic female caregivers who breastfeed are less likely than African American female caregivers to introduce cereal to infants who are less than four months of age.[78] • The belief that the infant is not satisfied with formula or breastmilk alone.[78] • Consumption of multiple foods in the early months is considered a sign of advanced infant development.[71] • Among those who introduced solids before four months of age, a majority were aware of feeding guidelines from the American Academy of Pediatrics.[78] • Common reasons cited for adding rice cereal to bottles by two months of age were that it was quicker, easier, and the mother was in a hurry.[73] • Pureed vegetables, carrots and sweet potatoes were often added by four months.[73] • Complementary feeding (such as adding cereal to a bottle) has a perceived economic and social benefit. By adding cereal to bottles of formula, the formula stretches to last over a longer period of time, and infants may sleep through the night.[71] • High rates of solid food introduction occur in the 4-6 month timeframe.[42] • Having only one adult in the household, never breastfeeding for any period, breastfeeding for a shorter duration and participation in WIC was associated with introducing solids early.[42] • Mothers introduce solid foods early at the advice of a family member or friend.[78]

The secondary search yielded 15 articles. Because of the small number of articles, I reviewed all the abstracts. I was unable to identify any studies that examined the perceptions, perspectives and experience of breastfeeding peer educators in Hispanic WIC populations.

Discussion

The primary purpose of this review was to characterize the literature regarding the reasons for mixed feeding or "*las dos*" and the early introduction of solid foods in Hispanic mothers and their infants. The primary review demonstrated the limited amount of research that has been conducted in this area to date, with many studies having significant limitations that limit their generalizability. The secondary review demonstrated that to date, no one has sought to capture the insight and perspectives of WIC breastfeeding peer counselors regarding mixed feeding and early introduction of solid foods by Hispanic mothers to their infants. The 19 studies that were synthesized from the primary review provide a valuable foundation for future research on attitudes, beliefs and practices around mixed feeding and the early introduction of solid foods in Hispanic mothers enrolled in WIC. They also highlight the need for additional high-quality research in this area.

The primary review highlighted the wide variety of reasons that Hispanic mothers who initiate breastfeeding begin to supplement with formula and introduce solids to their infants at an early age. For mixed feeding, there were 24 reasons identified among the studies I reviewed, and 16 reasons identified for early introduction of solid foods. Across all of the studies, distinct themes emerged. One of the most common themes related to the belief that infants need both formula and breastmilk for optimal health. Specifically, multiple studies described a common belief in and preference for the combination of breastmilk and formula as the best thing for the health of the infant, and the desire of Hispanic mothers to ensure their babies receive both healthy aspects of breast milk and the "vitamins" in formula.[29,33,35,71,72] Interestingly, three of the

five studies that identified this theme were qualitative in nature, indicating the value of qualitative research in uncovering underlying reasons for behavior.

The second finding that was identified for mixed feeding relates to the fear or perception of inadequate milk supply and the potential consequences for the infant. In a systematic review, Cartagena et al. identified this as the most common reason for nonexclusive breastfeeding in Hispanic women.[35] Various studies found that mixed feeding is commonly used as a treatment for the perception of insufficient milk production. In addition, studies identified the strong desire of Hispanic mothers to make sure the infant is full and satisfied, with an underlying fear of the infant experiencing any hunger. Supplementing breastmilk with formula is seen as one way to ensure the infant does not experience hunger, and remains satisfied and full.[8,29,30,32,36,71] As will be discussed later, this theme of fear of infant hunger also appeared as a reason for the early introduction of solid foods.

The third finding that was identified was family and cultural beliefs and values that play an important role in the decision of Hispanic mothers to combination feed both formula and breastmilk. This includes a high value placed on heavier babies, the belief that mixed feeding fulfills values of "good mothering," the belief that heavy, and even excessively heavy, equals healthy, along with messages from family that formula supplementation is necessary to ensure this.[33,35,36,71-73] These beliefs and values, when combined with an increased propensity of Hispanic mothers to pressure-feed,[38,39,41,73] a decreased tendency to perceive overweight young children as such,[80,81] a belief that early-life weight gain is unrelated to obesity later in life,[8] create a challenging scenario when it comes to decreasing the risk of the development of early childhood obesity in Hispanic children.

Additional findings that emerged during the review related to the lack of understanding of the potential risks of introducing formula while breastfeeding, including its effect on the establishment and continuation of breastmilk supply. Bartick and Reyes found a lack of understanding among Hispanic mothers of the negative dose-response relationship of formula on milk production.[32] In their systematic review, Cartagena et al. found that while Hispanic mothers often understand the health benefits of breastfeeding, they may lack knowledge of why early supplementation with formula may in turn interfere with establishing an adequate breastmilk supply.[35] In addition, infant behavior may play a role in the decisions of Hispanic mothers to use combined breast- and bottle-feeding. Three studies noted that Hispanic mothers often interpret crying as a sign of hunger[29,41,71] and believe that infant behavior can be positively modified by supplementing breastmilk with formula, including sleep.[36,78] The belief that a mother, rather than an infant, can best recognize infant satiety, may also play a role in the use of supplemental formula with breastmilk, to ensure that the infant is full.[36,39] Finally, four studies noted the need to return to work as a reason for utilizing combined breast- and formula-feeding, but in no case was this the primary reason cited by Hispanic mothers.[29,30,32,36]

Regarding solid foods, many of the reasons for early introduction were similar to the reasons for introducing formula to breastfed infants or utilizing a mixed approach to breast- and formula-feeding, including fear of infant hunger, positive modification of infant behavior, breastmilk not being sufficient, and the high value of a full, well-fed child. However, additional findings that related specifically to early introduction of solid foods included the belief of mothers and other relatives that infants should experience a variety of foods at an early age to develop taste preferences,[8] the belief that infants visibly communicate their readiness for solid foods even at a very young age,[36] and the association of consumption of solid foods in early

months as a sign of advanced infant development.[71] In the case of solid foods, both Crocetti et al. and Kuo et al. found that Hispanic mothers were largely aware of recommendations for introduction of solid foods, despite introducing them earlier.[42,78] The finding of Crocetti et al. that the advice of a family member or friend played an important role in the early introduction of solid foods may be one explanation for the disconnect between knowledge and behavior.

The literature review also provided insight into some of the demographic characteristics that are associated with infant feeding and mixed feeding ("*las dos*") specifically. Dancel et al. found that Latino parents with lower acculturation were more likely than those with higher acculturation to endorse feeding styles associated with child obesity.[40] Kuo et al. found that maternal education level did not have an association with early introduction of solids for English-speaking or Spanish-speaking Latinos. The authors also found that participation in WIC was associated with the early introduction of solid foods.[42] In contrast, Cartagena et al. found that maternal education was a significant predictor of healthier feeding practices, while acculturation did not play a significant role.[72]

Quality, Generalizability and Limitations of Studies

All of the articles included in this review were from peer-reviewed journals. However most of them had significant limitations that inhibit the generalizability of the review. This includes small sample size, the possibility of selection bias, sampling bias, social desirability bias, and recall bias. If the research topic were more developed, it is likely that some of the studies may not have been included because of the lower quality. In addition, a few of the studies focused on a single Hispanic sub-group, such as Dominicans and Puerto Ricans. Studies focusing on single sub-groups are important because cultural views of breastfeeding, breastfeeding practices and perceptions of infant feeding vary between different Hispanic populations. However, these studies are not generalizable to other large Hispanic sub-groups such as

Mexicans. In addition, six of the studies involved a qualitative research approach. While the findings of these studies are valuable for the insights they provide, particularly those related to cultural beliefs and practices, they cannot be considered generalizable.

Three of the strongest studies methodologically were Perrin et al., Dancel et al. and Kuo et al.[82-84] The first two studies came from the Greenlight study. The Greenlight study is a multi-center, cluster randomized controlled trial evaluating the effectiveness of health communication training and the use of a low-literacy/low-numeracy educational toolkit to prevent obesity in infants and children.[85] The study population is 50% Hispanic and 86% are enrolled in Medicaid. To date, the Greenlight study has provided strong evidence of combined breast- and formula-feeding, as well as pressure-feeding as being more common among Hispanic parents than other races/ethnicities. Similarly, the results of Kuo et al., based on an analysis of the National Survey of Early Childhood Health, a nationally representative telephone survey, has provided important insight into the factors that influence early introduction of solid foods among the population as a whole, and Hispanics specifically.[82]

Gaps in the Current Literature

As has been noted previously, the prevention of obesity starting at the beginning of the lifecourse (prenatal and infancy) is an emerging area of research that has only recently gained increased attention. Recent research has confirmed the importance of the early childhood period for obesity prevention in Hispanics, and emphasized the multiple opportunities that exist in the first 1000 days of a child's life to improve a Hispanic mother's understanding of childhood obesity risk factors.[8,86] Research supports the important connection between infant feeding practices such as "*las dos*," and early introduction of solid foods, and overfeeding, with the development of early childhood obesity. It is believed that these common practices are putting low-income Hispanic infants more at risk for developing obesity. Where research is still lacking,

however, is a more complete understanding of the factors, beliefs and attitudes that influence these practices, and the effective communication strategies that are needed to address them.

The literature review highlighted many gaps in the current research. While the review produced a lengthy list of factors, attitudes, practices, and beliefs associated with exclusive feeding, combination breast- and formula- feeding and the early introduction of solid foods by Hispanic mothers for their infants, it was not conclusive in determining which factors could be considered the most important, or how demographic characteristics such as primary language spoken or origin influence those factors. In addition, although three of the studies focused on WIC enrollees, all three included very small sample sizes of under 100. For the quantitative studies with a large sample size, only one looked at reasons for introducing formula, but no in-depth analysis was performed on the results. For early introduction of solid foods, the quantitative study was well-done but it did not look specifically at a WIC population, and it did not include origin (U.S. or foreign-born) in the analysis.[82] None of the studies explored the perspectives and insights of WIC breastfeeding peer counselors that work with Hispanic mothers and their infants on a regular basis. WIC breastfeeding educators are trained to promote exclusive breastfeeding and have considerable experience navigating the challenges of mixed feeding, as previously described. To date, this experience and accumulated knowledge has not been examined. Finally, the review did not provide insight into effective communication strategies to move Hispanic mothers away from the culturally accepted practices of "*las dos*" and early introduction of solid foods, to exclusive breastfeeding.

Limitations of the Review

This literature review had a number of limitations. First, the primary search strategy used six common synonyms for "mixed feeding." However, this phrase is not exhaustive, and therefore I may have missed studies that utilized other less-common terms. In addition, the search strategy specifically focused on studies targeting Hispanic populations, including the terms "Hispanic," "Latino," "Latina" and "Mexican." The narrowness of the search may have missed studies where Hispanics made up a significant portion, but not majority, of the study participants, and therefore were not specifically identified in the keywords, title or abstract. Similarly, for the secondary search strategy, I used four terms for "peer counselor" and limited it to studies where Hispanics (i.e., Latino/Latina/Mexican) were a keyword. The search strategy may have missed studies that used peer educators in integrated family-based interventions addressing multiple areas of family life. In addition, the narrowness of the search may have missed studies where Hispanics were a significant proportion of the study population.

Although the search was not limited to English-only journals, no relevant Spanish-language studies were found either through the initial search or by snowballing. The exclusion criteria also eliminated studies published in journals outside of the United States. It is possible that there has been research in Latin American countries regarding *promotoras* (community health workers) that might provide valuable insights. However, since this proposed research focuses on WIC Hispanic mothers in the U.S., the decision was made to limit the criteria. Finally, the search strategy did not include grey literature or articles not indexed by PubMed, CINAHL, or Web of Science.

CHAPTER 3: RESEARCH DESIGN AND METHODLOGY

Conceptual Framework

This study utilized two guiding frameworks. The first is an adaptation of the Social Ecological Model, based on the conceptual work of Bronfenbrenner's Ecological Framework for Human Development. The Social Ecological Model has been widely used to guide obesity prevention efforts over the last few decades. The model proposes that lifestyle choices that individuals make are the result of the complex interrelationship among highly interconnected systems. These systems are embedded within each other, similar to a set of Russian dolls. [87]

Perez-Escamilla and Kac have adopted the traditional Social Ecological Model to incorporate a lifecourse framework for understanding change in environments and exposures across the lifespan and the parent-child "transmission" of obesity risk (Figure 1).[88] This adaptation of the model reflects the theory that chronic disease prevention begins in the prenatal period and extends through infancy, childhood and into adulthood. Various factors interact with each other over a lifecourse. When risk factors have significantly more influence at a particular stage, it is considered a sensitive period. In recent years, research has increasingly supported the prenatal, infant, and early childhood periods as sensitive periods key to the development and prevention of obesity. Thus, while the Social Ecological Model emphasizes the role that each level of system plays in shaping behaviors, Perez-Escamilla and Kac's expanded model incorporates the dimension of time over the lifespan, taking into consideration the fact that environments and exposures may have different impacts at different periods of time.[89,90] This dissertation centers on the infancy period of the Perez-Escamilla and Kac model, focusing on the

individual and microsystem levels and the influence that WIC breastfeeding peer counselors can have to positively influence individual behavior. However, because the WIC breastfeeding peer counseling program is embedded in WIC, a federal program that has broad reach and impact throughout North Carolina and the entire country, the results of the study have the potential (if disseminated and implemented) to positively impact the macro system level.

The second model that guided this study was the Conceptual Model for Breastfeeding Behavior, introduced by Lee et al. in their research on racial and ethnic differences in breastfeeding initiation and duration among low-income inner-city mothers (Figure 2).[91] The model draws from Pescosolido's Social Network Theory,[92] Brofenbrenner's Social Ecological Theory,[87] and a conceptual model for studying infant feeding practices developed by Bentley et al.[93] The model incorporates the socio-cultural environments that are hypothesized to influence breastfeeding behavior, including social networks that transmit information about breastfeeding behaviors and beliefs. It also incorporates the mother's social context, including social support and interactions, and institutional sources of information and support. Lee et al. specifically identify WIC as an example of a program that provides support for the social environment, which is particularly relevant for low-income mothers. However, their study had mixed results regarding the influence of the social environment on a mother's breastfeeding decisions. For example, interaction with a nurse/lactation consultant immediately after childbirth was shown to positively influence breastfeeding initiation, but the continued use of WIC services during the postpartum period negatively influenced breastfeeding duration. However, the social environment aspect of the conceptual framework was partly supported in the study by Lee et al, with need for additional exploration.[94]

Figure 1. Social Ecological with Lifecourse framework by Perez-Escamilla et al. [88]

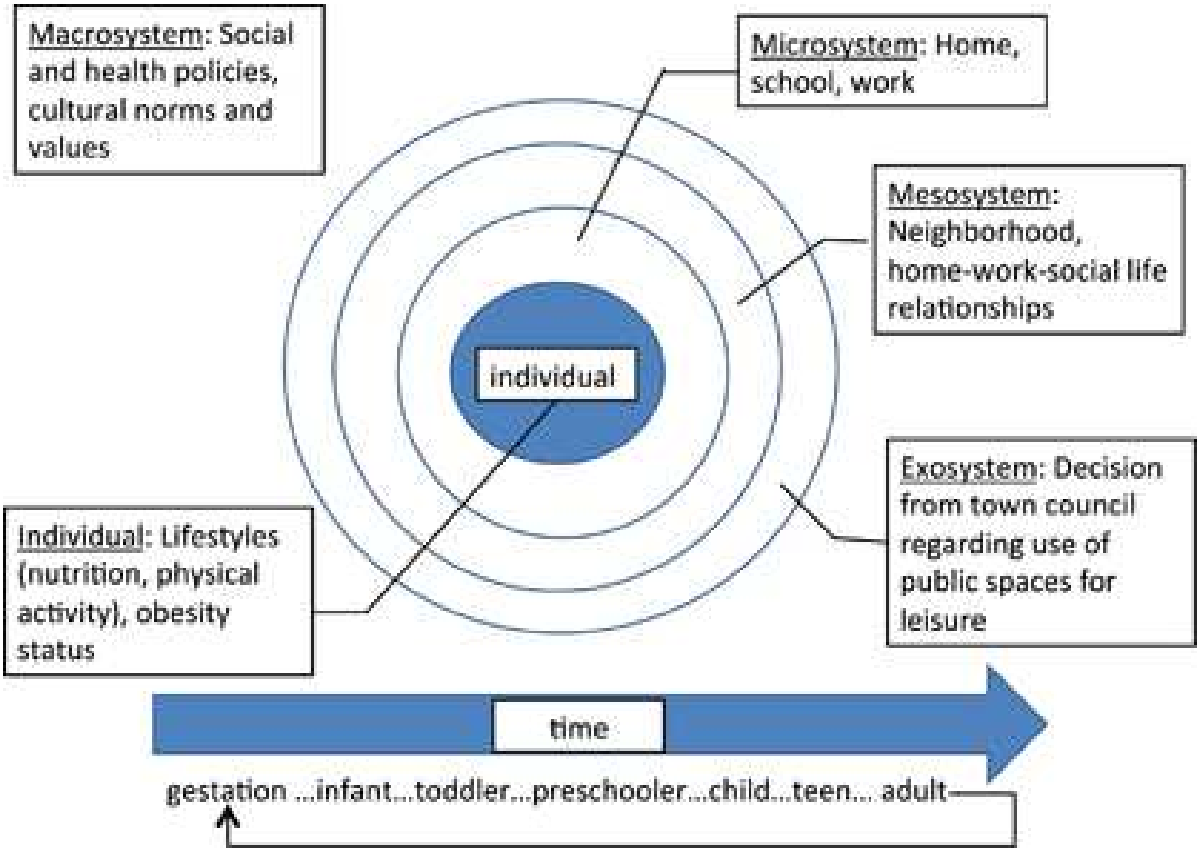
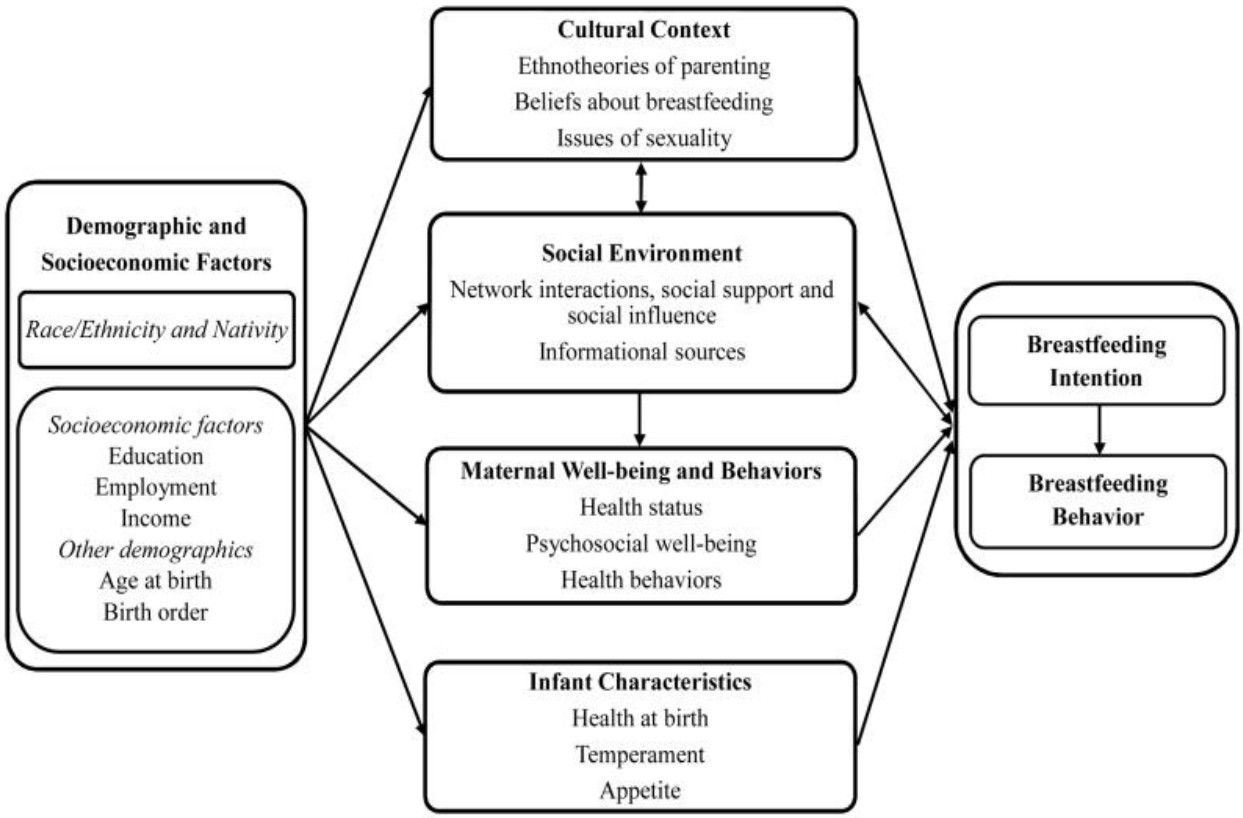


Figure 2. Conceptual Model for Breastfeeding Behavior by Lee et al.[94]



Study Overview

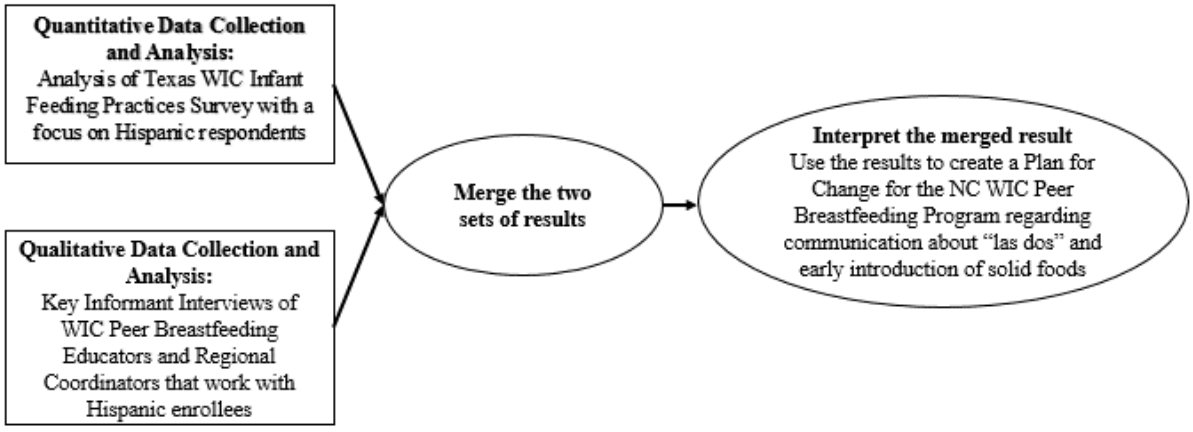
The study design was a convergent mixed methods study, as described by Creswell.[61] In this type of study, both qualitative and quantitative data are collected and analyzed concurrently – one does not depend on the results of the other. However, both types of research are equally important to address the research question. After data collection, each data set is analyzed separately and independently using qualitative and quantitative procedures. The researcher then works to merge the two sets of results, identifying content areas represented in both data sets to compare, contrast, and/or synthesize. Finally, the researcher summarizes and interprets the separate results, and discusses how the two sets of results converge, diverge, relate and/or combine to create a more complete understanding in response to the study's overall purpose.[61]

The intent of this study was to learn how communication about infant feeding can be improved to enable low-income Hispanic mothers enrolled in WIC to lower the risk of early childhood obesity in their infants. The study focused on better understanding the: (1) practices, attitudes and beliefs around mixed feeding or "*las dos*," and the early introduction of solid foods and overfeeding; and (2) the demographic factors associated with these practices and beliefs. The ultimate purpose was to use the research to develop recommendations for WIC breastfeeding peer counselors in North Carolina to more effectively communicate with enrollees about these topics. The study used mixed methods research to converge the quantitative and qualitative data to answer the research question and address the research aims. With this approach, I used survey data from TX-WIFPS to measure the relationship between factors (e.g., race/ethnicity, place of birth, primary language spoken at home, age, and level of education) and practices and beliefs of Hispanic mothers enrolled in WIC. At the same time, I explored the perceived practices, attitudes and beliefs of Hispanic mothers on this topic, along with communication strategies to address them, using key informant interviews with WIC breastfeeding peer counselors.

A convergent parallel mixed methods design, as shown in Figure 3, was most compatible with the aims of this dissertation research for a few reasons. First, there is very limited research on the topic of "*las dos*" and the early introduction of solid foods in Hispanic mothers enrolled in WIC. The TX-WIFPS data set provided an important source of information that had not previously been explored in-depth, particularly in relation to survey questions about reasons for introducing formula to breastfed infants and the early introduction of solid foods. However, the dataset was limited, and while the quantitative analysis provided insight into research Aim 1: (*Determine why low-income Hispanic mothers who initiate breastfeeding begin to supplement with formula from birth ("las dos") and/or introduce solids early),* it was not sufficient to

answer the overall research question by itself, potentially providing an incomplete picture. It would also not have been sufficient to provide recommendations to WIC breastfeeding peer counselors regarding communication strategies to lower the risk of early childhood obesity in Hispanic infants. The qualitative research method allows for triangulation, and increases the completeness of the research. It also provides contextual understanding, and a diversity of views, as described by Bryman.[95] This qualitative approach allowed for in-depth exploration of the role of breastfeeding peer counselors working with Hispanic mothers enrolled in WIC, focusing on their perceptions and experiences. Since the majority of WIC breastfeeding peer counselors have breastfed their own infants and been WIC recipients themselves at some point in time, and many of those who are bilingual Spanish speakers and/or are Hispanic themselves, the qualitative approach also provided a unique opportunity to explore multiple perspectives that reflected both their current professional role and that of a WIC enrollee.

Figure 3. Convergent Parallel Mixed Methods Design



Part One: Key Informant Interviews

Part one of this study focused on qualitative research with WIC breastfeeding peer counselors and regional breastfeeding coordinators in North Carolina. The primary data source was semi-structured key informant interviews with WIC peer educators who were bilingual Spanish speakers and regularly worked with Hispanic mothers enrolled in WIC in North Carolina. In addition, I conducted key informant interviews with two regional breastfeeding coordinators in order to gain a supervisory perspective and gather additional information about training for WIC breastfeeding peer education. Key informant interviews are in-depth, semi-structured interviews with select people who are knowledgeable regarding a specific topic and can articulate that knowledge.[96] They are valuable for exploring a topic in depth, and in this case allowed me to discover information that was not revealed in the TX-WIFPS survey. In my study, key informant interviews allowed for exploration to gain further insight from peer educators into Hispanic mothers' practices, attitudes, and beliefs about mixed feeding and the early introduction of solid foods, including cultural nuances that might otherwise go uncaptured.

In 2016, there were 132 breastfeeding peer educators working in local WIC offices throughout North Carolina, which is divided up into six perinatal regions. Each of the peer counselors was employed by the local WIC agency and each region had a coordinator. The North Carolina Department of Health and Human Services (NC-DHHS) provides oversight over breastfeeding peer counseling throughout the state, including training and professional development. This includes training for managers/regional coordinators of the WIC breastfeeding peer counselor program, a core five- or six-day training session for all new breastfeeding peer counselors and continuing education. I developed the interview guide for the key informant interviews and reviewed it with peer counselors who fit the criteria but were not involved in the research project. It was also reviewed by the Breastfeeding Coordinator at NC-

DHHS. The interview guide for breastfeeding peer counselors is included in Appendix B. Supplemental questions for regional breastfeeding coordinators can be found at the end of the guide.

Data collection. I completed data collection for this study by conducting key informant interviews with 15 WIC breastfeeding peer counselors and two regional breastfeeding coordinators (for a total of 17 interviews) between August and November 2016. Beginning in June 2016, I identified key informants with the assistance of the WIC Breastfeeding Coordinator at NC-DHHS and the Breastfeeding Peer Counselor Coordinator who oversee the six regional breastfeeding coordinators and the training they provide at the local level. As the principal investigator, I worked work with the Breastfeeding Coordinator and Breastfeeding Peer Counselor Coordinator to identify regional breastfeeding coordinators who had experience working with Hispanic mothers and their infants around breastfeeding. I then worked with both Coordinators at NC-DHHS and the regional coordinators to identify breastfeeding peer counselors who had at least one year of direct experience working with Hispanic women in their role and were bilingual Spanish speakers themselves. The subjects for key the informant interviews were recruited via email from the Principal Investigator between August and October 2016, with support from the Breastfeeding Coordinator at NC-DHHS and the Breastfeeding Peer Counselor Coordinator. The invitational email provided the participants with an overview of the study, the purpose of data collection, and the expected length of time for the interview (Appendix C). While the peer counselors were not required in any way by the local WIC agency or NC-DHHS, the support of the state WIC program was important in improving the likelihood of participation. When necessary, I also secured permission from the local WIC agency director to conduct the key informant interview with the respective breastfeeding peer counselor.

I conducted sixteen key informant interviews in-person and one via Skype. The interviews took place in WIC offices or via Skype with key informants that worked in the following NC counties: Wake, Mecklenburg, Harnett, Orange, Cabarrus, Guilford, Forsyth and New Hanover. I conducted all interviews in English, although many of the key informants used Spanish phrases throughout the interviews as I let each participant know in the beginning that I was fully bilingual. I obtained and recorded verbal informed consent at the beginning of each interview, after reading the consent form (Appendix D) and the beginning of the Key Informant Interview Guide (Appendix B). I recorded each interview and took simultaneous notes. Each participant was given a numeric identifier so their specific comments could not be linked to the data.

Limitations of the semi-structured interviews include the following: (1) varying levels of articulation and perception from the interviewees; (2) my presence as a researcher may have biased the responses; and (3) indirect information about the beliefs, attitudes and practices of Hispanic mothers that were filtered through the views of the interviewee (breastfeeding peer counselors).[97] I addressed these limitations by using the same interview guide for all the interviews and by spending time establishing rapport with the peer counselors and regional coordinators prior to the interview so that a relationship was established and candid conversation encouraged.

Data analysis. The recorded interviews were transcribed verbatim and verified against the audio recording to ensure that the transcriptions were complete. I transcribed seven transcripts and used bilingual (English and Spanish) transcriptionists for the remaining 10, as in all cases, although the interviews were conducted in English, interviewees frequently used Spanish phrases to describe beliefs and practices. I verified the quality of the transcriptions

against the recordings and translated Spanish phrases to English. In addition, I took field notes during the interview. However, I analyzed the contents of interview transcripts and my field notes separately. The notes were analyzed by hand, identifying overall themes. I analyzed the transcripts using NVivo 11 software. In order to extract themes, categories, and concepts from the data, I used the steps for qualitative data analysis as outlined by Miles and Huberman to guide the process:

1. Data reduction – a process of selecting, focusing, simplifying, abstracting, and transforming the data from field notes or transcription.
2. Data display – organizing the data and displaying it logically to facilitate drawing conclusions.
3. Conclusion drawing and verification – stepping back to consider what the analyzed data mean, identifying patterns, themes, explanations, and causal relationships, testing for plausibility and validity.[98]

Building on these steps, and incorporating recommendations from others including Bradley et al.[99] and Miles et al.,[100] I followed an iterative, multi-step analysis process outlined below:

1. Became familiar with the data by reading the transcripts and notes, and then re-reading for overall understanding.
2. I took note of patterns and themes, while using skepticism to challenge perceptions and plausibility.
3. I took note of metaphors and identified for further exploration and testing. I also considered possible overarching metaphors.
4. I categorized data through coding using NVivo 11. To inform my approach, I consulted with Paul Mihas, an expert in qualitative research at the University of North Carolina –

Chapel Hill, for guidance on coding methodology in NVivo. First, I used clustering to help identify themes or patterns. Then, I developed an initial code book based on priori codes and code definitions in the existing literature and conceptual models, along with additional themes that emerged in the initial data analysis. I assigned codes to the data for all transcripts using NVivo nodes, and organized them into defined categories and sub-categories, and adding additional codes that emerged in the initial coding process in NVivo. Based on this initial coding, I revised the draft code book to include additional emergent code. I provided three transcripts, draft code set, dissertation proposal and conceptual models to two external coders who have experience in in qualitative research methods and familiar with breastfeeding research. Each coder reviewed and coded independently. I reviewed three transcripts with the external coders to determine reliability, discrepancies, coding overlaps, and identify any omissions in coding themes and sub-themes. I then revised draft code book based on additional and combined sub-themes and revised/expanded code definitions identified by the external coders. I used the revised code book to recode all key informant interview transcripts in NVivo. I then used coding to identify themes, sub-themes, patterns, and concepts. Finally, I used factoring to move to tighter and smaller number of nodes in NVivo, to ensure that the categories and sub-categories were meaningfully different.

5. I generated coding reports for each of the codes (nodes in NVivo) in order to systematically analyze and report on the information received during the interviews. I took note of connections, relationships, and divergent views that became apparent within single cases and across the data. I also searched for rival explanations to enhance credibility. I utilized NVivo to produce a coding matrix as described by Bazeley to

organize and display the data in a way that provided both the frequency and the detailed content of the responses.[101] This allowed me to assess both the patterns of association and the nature of the associations

6. Finally, I integrated, interpreted and presented the findings from the research. This included identifying significant themes and sub-themes, critical insights and discoveries, explaining relationships, and lessons learned. I identified remaining gaps in knowledge, alternative interpretations, and recommendations for how the findings might be used.

The results of the key informant interviews are presented in the aggregate and the names of the individuals were kept confidential. Descriptors of key informants are included, but in order to maintain confidentiality of the participants, their names were not included. Because of the small number of regional breastfeeding coordinators and concerns about confidentiality, no distinction is made in the demographic information about interviewees or the presentation of qualitative data between breastfeeding peer counselors and regional breastfeeding coordinators.

Part Two: Analysis of the Texas WIC Infant Feeding Practices Survey

Data source. Part two of this study focused on the quantitative analysis of a secondary data set of WIC enrollees: the 2013 Texas WIC Infant Feeding Practices Survey (TX-WIFPS). TX-WIFPS is a survey regularly conducted by the Texas Department of State Health Services (TX-DSHS). The survey focuses on breastfeeding beliefs, attitudes, and practices among women who receive WIC services in Texas. The survey questions are based off of the Infant Feeding Practices Study II (IFPS II) conducted by the CDC and U.S. Food and Drug Administration. IFPS II was a longitudinal study focusing on infant feeding practices throughout the first year of life, as well as the diets of women in their 3rd trimester and at four months postpartum. The Institutional Review Board at TX-DSHS approved the release of the 2013 TX-WIFPS data set for purposes of analysis for this research project.

The purpose of the TX-WIFPS survey was to provide data to local WIC agencies to aid in planning and activity development. TX-DSHS noted that the data may also provide valuable information to coalitions, public health partners, policy makers and others interested in supporting breastfeeding. The 2013 survey questionnaire included 54 questions and allowed primarily multiple choice responses (i.e., closed ended). Surveys were assigned to clinics in all 67 local WIC agencies throughout Texas operating at the time of the survey. Each clinic that served 49 or more pregnant women and infants from May–June 2013 was assigned a specified number of surveys that was proportionate to the number of clients served in the clinic. WIC agency directors provided an equal number of surveys in English and Spanish proportionate to the client load, survey assignments, administration instructions, and informed consent script to the WIC clinics. WIC clinic supervisors were instructed to offer the survey to each eligible participant presenting at the clinic for services during the survey administration period, and obtain informed consent prior to survey administration. Participants in the survey needed to fulfill certain eligibility criteria. They needed to be biological mothers, aged 18 and older, who presented at the local WIC clinics for services, and had a single baby (i.e., no multiples such as twins or triplets) aged 3 months to 18 months at the time of the survey. Eligible participants who voluntarily agreed to participate in the survey completed the survey booklet and supplemental survey form in the language of choice (i.e., English or Spanish). Surveys were to be administered in each participant's preferred language until all surveys in one of the two languages had been completed or until the survey period ended, whichever came first. The surveys were completed as Scantron paper surveys.[102] The survey was approved by the Institutional Review Board at the TX-DSHS, and written consent was obtained.

A total of 13,276 surveys were completed from October 15 to December 13, 2013 and returned for scoring. Of the 67 local WIC agencies, 62 of them returned surveys (93%). After eliminating ineligible responses, the final sample size as reported by TX-DSHS was 11,094. Thirty-seven percent of the surveys were completed in Spanish and 71% of the participants identified as Hispanic. Thirty-seven percent usually spoke Spanish at home and 20% spoke both Spanish and English at home. Out of all the participants, 35% were born in Mexico.[102] The age of participants' children ranged from 1 to 30 months. It is notable that the actual age of participants' children differed from the inclusion criteria set at the beginning (3 to 18 months), as TX-DSHS revised the original age criteria. Twenty-nine percent of children were 1–3 months, 43% were 4–6 months, 39% were 7–9 months, 36% were 10–12 months and 9% were 13–15 months. Fewer than 8% of the participants had children aged 16–30 months. The average child's age was 8 months, while 5 months was the most frequently reported age.

It is important to note that the dataset provided by TX-DSHS for the purpose of my dissertation research included a sample size of 9,762 mothers, which differs from the sample size used when TX-DSHS completed an initial analysis of the survey results.[102] The demographic profile of the data set I analyzed differed slightly from what was reported by TX-DSHS. Nearly 70% of the participants identified as Hispanic, 32% usually spoke Spanish at home, 22% spoke both Spanish and English at home, and 34% were born in Mexico.

In response to my request for data, staff at TX-DSHS went back to the original 2013 TX-WIFPS data file in order to verify eligibility criteria. As a result, the dataset that was given to me fit the following parameters:

1) The respondent was the biological mother, who provided at least one valid answer.
2) The baby's age was between 1-30 months old.

3) If the baby's age was reported, the answer was probable based on the elapsed time between the reported date that the survey was completed and the reported date that the baby was born, within a range of one month more or less.
4) The respondent provided one valid answer to age (How many years old are you?) and the answer was 18 years or older. Respondents who were 17 years or younger were not eligible.

Data management. The quantitative study required the storage of confidential data in Excel and StataIC 14. The original data file provided by TX-DSHS was password protected and kept in a locked cabinet in my office. The electronic files of the dataset were also password protected and kept on a password protected computer in my office. I was the only one that had access to these materials.

Data analysis. After receipt of the data file, I cleaned the dataset in Excel. This included identifying non-numeric response errors (i.e., "?" and "??") and querying for values that were out of range. It also included using Excel to create variables for the age of introduction of formula and solid foods, as the TX-WIFPS dataset included values from which these variables could be calculated, but not the variables themselves. It should be noted that although the total dataset included 9,762 records, there was considerable missing data (blank responses), which have been noted in the results. When values were missing, they were excluded from the analysis.

I conducted all of the data analysis using StataIC 14 software, with guidance from Dr. Asheley Skinner, my dissertation advisor, and Dr. Catherine Zimmer, a statistical consultant at the University of North Carolina (UNC) - Chapel Hill. A list of the relevant questions from TX-WIFPS can be found in Appendix E. A list of the dependent and independent variables that I explored are shown in Table 4. Although the majority of the categorical dependent variables

were dichotomous (yes/no), in the case of breastfeeding intention, I used the categorical data to create a dichotomous (0/1) variable for intention to both breastfeed and formula feed (i.e., mixed feeding). Similarly, I created dichotomous variables for the two continuous variables in the dataset: (1) the age of formula introduction to breastfed infants which was converted into three variables at 1 day, 1 week and 1 month; and (2) one variable for the introduction of solid foods prior to four months.

The aim of the analysis of the TX-WIFPS dataset was to (1) use descriptive statistics to examine the reasons that Hispanic mothers enrolled in WIC introduce formula to breastfed infants, and (2) to use bivariate and multivariate logistic regression with odds ratios to determine if there was an association between changes in one set of independent variables and changes in a second set of dependent variables. I used Pearson's chi-square test to determine the relationship between two categorical variables (ordinal or nominal), and ANOVA and pairwise comparisons to determine the relationship between the continuous independent and categorical dependent variables. The analysis focused on the independent variables of race/ethnicity, language spoken at home, education, age and country of origin. In considering logistic regression models, I took the following steps: 1) considered which independent variables could be thought of as causal or explanatory, 2) checked for collinearity and 3) checked for normality.[103] Statistical significance was established at $p \leq 0.05$ for all analyses.

I used the following questions to guide the data analysis plan:

- What are the most common reasons that Hispanic mothers introduce formula to breastfed infants? How do these reasons compare to the responses of White and Black mothers enrolled in WIC?
- How do differences in origin (e.g., the U.S., Mexico or another country) and language spoken at home (English, Spanish or both Spanish and English) affect the reasons that Hispanic mothers cite for introducing formula to breastfed infants?
- How do demographic and socioeconomic factors of race, origin, language spoken at home, age and education predict the intention to use mixed feeding ("*las dos*"), the age of formula introduction to breastfed babies, and the age of introduction of solid foods?

Table 4. Types of Variables and Coding

Variables	Code	Variable Type
Independent Variables		
Race/Ethnicity	RACE	Categorical (Nominal)
Language spoken at home	LANGUAGE	Categorical (Nominal)
Education	EDUCATION	Categorical (Ordinal)
Age group	AGE	Categorical (Ordinal)
Origin	ORIGIN	Categorical (Nominal)
Dependent Variables		
Age of baby when first fed formula	AGEFORMULA	Continuous (Interval)
Age of baby when they first had foods or liquids other than breastmilk/formula	AGESF	Continuous (Interval)
How did you plan to feed your baby during his/her first few weeks of life?	BFINTENTION	Categorical (Nominal)
Was the child ever breastfed or fed breastmilk, even if only once?	EVERBREASTFED	Categorical (Nominal)
Was the child ever given formula?	EVERFORMULA	Categorical (Nominal)
Belief that breastfed babies are less likely to become obese children and adults (True/False)	BFOBESITY	Categorical (Nominal)
Have you ever added cereal or solids to your baby's bottle?	CEREALTOBOTTLE	Categorical (Nominal)
Reasons for introducing formula to breastfed baby:		
My baby became sick and could not breastfeed.	REASONSICK	Categorical (Nominal)
My baby began to bite.	REASONBITE	Categorical (Nominal)
My baby lost interest in nursing or began to wean him or herself.	REASONLOSTINTEREST	Categorical (Nominal)
I felt that I breastfed long enough for my baby to get the benefits of breastfeeding.	REASONBREASTFEDENOUGH	Categorical (Nominal)
I didn't think I had enough milk.	REASONLACKOFMILK	Categorical (Nominal)
I could not tell how much the baby ate.	REASONSEEBABYEAT	Categorical (Nominal)
I didn't like breastfeeding.	REASONDISLIKEBF	Categorical (Nominal)
A health professional said I should feed my baby formula.	REASONHPSAIDTO	Categorical (Nominal)
Breastfeeding was too painful.	REASONBFPAINFUL	Categorical (Nominal)
I was going back to work or school outside of the home.	REASONBACKTOWORK	Categorical (Nominal)
I wasn't able to make enough milk after I went back to work.	REASONSUPPLYWORK	Categorical (Nominal)
Pumping milk was too hard or inconvenient.	REASONPUMPINGHARD	Categorical (Nominal)
Pumping milk was too painful.	REASONPUMPINGPAINFUL	Categorical (Nominal)
I didn't want to breastfeed in public.	REASONBFPUBLIC	Categorical (Nominal)
Another reason not listed here.	REASONANOTHER	Categorical (Nominal)

A list of the relevant questions from TX-WIFPS can be found in Appendix E

IRB and Confidentiality Issues

Human subjects involvement and characteristics. Since this study involved key informant interviews with 15 breastfeeding peer counselors and two regional breastfeeding coordinators, the proposal was reviewed and approved (exempt) by the UNC Institutional Review Board (IRB). I began collecting data and conducting analyses for the key informant interviews upon approval of the proposal. In addition, the TX-DSHS IRB also reviewed and approved the proposal following approval from the UNC IRB (i.e., UNC IRB was primary, TX-DSHS IRB was secondary). The TX-DSHS IRB review was required to secure access to the TX-WIFPS dataset.

Sources of material. Primary data for this study was obtained through individual key informant interviews. Secondary data (de-identified) was obtained through the TX-WIFPS data set.

Potential risks. The primary risk to key informant interview participants was breach of confidentiality. Protection against this risk is discussed below.

Informed consent. With each key informant interview, I read the consent form aloud and received verbal approval of consent from the interviewee at the beginning of the recording. Assurances of confidentiality were maintained throughout the study. The consent form that was read can be found in Appendix D.

Protection against risk. The primary risk to subjects participating in this study was a breach of confidentiality. The risk of such a breach was minimized by using my training in human subject protection. I did not divulge, publish or otherwise make known to unauthorized persons or to the public any information obtained in the course of the study that could identify the persons who participated in this research. I also took the following protections: (1) I used identification numbers, rather than names, on all research materials to identify participants; (2) I

stored the master list linking names and identification numbers separately from the project data, with password protection; and (3) I stored hard copies of data and collateral materials separately in a locked cabinet in my office. I stored all interview data in password protected files on a computer in my office. Once the data is completely analyzed and the study completed, I will destroy all recordings to ensure that no responses can be linked to an individual. I have presented the results in aggregate form and have kept individuals confidential. While I included descriptors of key informants, I have not included participants' names in order to maintain confidentiality.

Potential benefits of the proposed study to subjects and others. As a result of participating in this study, participants benefited from the knowledge gained and opportunity to share their experiences and perspectives. The North Carolina WIC breastfeeding peer counseling program will benefit from this research to the extent that the knowledge gained will provide specific recommendations for the WIC program. These recommendations may also benefit other breastfeeding peer counseling programs in the state.

Importance of the knowledge to be gained. As noted in Chapter 1, early life risk factors appear to play an important role in the development of childhood obesity. Interventions that effectively modify risk factors such as overfeeding or early introduction of solid foods are essential to reducing the rate of overweight and obesity among Hispanic children in the future. The findings of this study have generated knowledge about the Hispanic mothers enrolled in WIC infant feeding beliefs and practices, and knowledge about more culturally appropriate messages and interventions to address them. Based on these findings, I have proposed a plan for change that has the potential to positively impact the North Carolina WIC program and other breastfeeding peer counseling programs in the state that work with Hispanic mothers and infants.

In addition, the findings may also be beneficial to WIC programs nationwide, providing insights useful for promoting exclusive breastfeeding in lieu of "*las dos*" among Hispanic mothers.

Women and minority inclusion in clinical research. Hispanic women who are currently working as WIC breastfeeding peer counselors with Hispanic mothers enrolled in WIC were included in a list of potential key informant interviews in the qualitative part of the study.

CHAPTER 4: QUALITATIVE RESULTS

Key Informant Interviews

This section reports the results of the semi-structured interviews conducted with 15 WIC breastfeeding peer counselors and two regional breastfeeding coordinators in seven counties in North Carolina. The interviews lasted between 29 and 55 minutes (averaging 40 minutes). With the exception of one, all the key informants were Hispanic and had native level fluency in Spanish. Most (15) had been born outside of the U.S. in various Spanish-speaking countries, including Mexico, Guatemala, Ecuador, Cuba, Nicaragua, El Salvador, Spain, Costa Rica, Puerto Rico and Peru. All those born outside of the U.S. had resided in the U.S. for many years, ranging from 17-40. Twelve had been WIC recipients themselves at some point in time. The breastfeeding peer counselor caseload varied between 60-95% Hispanic clients, according to self-reported estimates. Both regional breastfeeding coordinators also worked in clinical roles as lactation consultants. The breastfeeding peer counselors and regional breastfeeding coordinators had an average of 7.4 years of experience in their role (range 3–22, mean 8.04, median 7). All were mothers who had breastfed their own child/children, albeit with various levels of success in terms of exclusivity. Because of the small number of regional breastfeeding coordinators and concerns about confidentiality, I made no distinction in the presentation of the qualitative data between breastfeeding peer counselors and regional breastfeeding coordinators.

General perspectives on the practice of "las dos," breastfeeding peer counseling, and communication about obesity prevention. Nearly all the key informants (n = 16) felt that the practice of "*las dos*" or mixed breast and formula feeding beginning at an early age was extremely common and a frequent practice among Hispanic mothers enrolled in WIC. They also felt that it presented a significant challenge for breastfeeding peer counselors to address when it comes to promoting exclusive breastfeeding.[1] Several participants estimated that between 75% and 100% of the Hispanic mothers they worked with used "*las dos*."

> It's pretty much a hundred percent across the board [for Hispanic moms in WIC], maybe ninety five. It's pretty entrenched. And, I'm sure you're going to ask me this. It's multi-factorial, and every mom….you know, because I've asked them. "So tell me how you came to doing it this way?" and they all have a different answer. It's not like a one size fits all reason and it's also, you know people tag it is cultural. And it's only cultural in the sense that it's very common to the immigrant experience.

One participant did not feel that "*las dos*" was a common practice among the Hispanic mothers that she worked with, estimating that only 10% of her Hispanic clients that were breastfeeding also formula-fed. Further probing revealed that the majority of her clients were recent immigrants from Mexico that worked in a local factory. Many exclusively breastfed for the time that they were home on a brief maternity leave, and began formula when returning to work.

The majority of participants (n=13) felt that the practice of "*las dos*" was more common with Hispanic mothers than other groups such as African American, Caucasian or Asian mothers, while four felt that it was similar.

> As a whole, I don't know percentage-wise. I would say maybe about 70% at some point want to do some formula. With the Hispanic moms, it's a higher percentage. I want to say like 90, 95 want to do both, and that's straight off. They start talking about the formula. We're not supposed to mention any type of supplemental feeding unless the doctor prescribes it, because they do prescribe it sometimes…But a lot of them really trust that

[1] Participants used both "*las dos*" and "*los dos*" during the interviews. For purposes of consistency, "*las dos*" is the term used to describe the results.

> formula is necessary even if they have a full supply where they can feed two or three children at once.

Among the four interviewees that believed breastfeeding practices were similar among all their WIC clients, two noted that while mixed feeding was common to all WIC clients, Hispanic mothers tended to introduce formula earlier. In addition, some participants noted that not only was the practice of "*las dos*" more common among Hispanic mothers, but that it was increasing.

> I'm seeing more of an increase of ["*las dos*"], whereas before was more of fully breast-feeding. But I am seeing a lot more of-- they think-- I don't know if it's their perception of when they come to United States or family members with-- back then in the day, formula was used by wealthier people, families, so they, I believe, have this perception of formula being just as good, and they want to give both. And I also have the moms that don't believe, that formula is just not good, and they know breast milk is the best. But I do see an increase of them wanting to do both.

A few participants noted the significant challenge they faced as WIC breastfeeding peer counselors when it came to achieving exclusive breastfeeding among Hispanic mothers. All but one of the participants were Hispanic, and their perspectives reflected the complexity of their role as a Hispanic breastfeeding peer counselor to other Hispanic mothers within WIC.

> The truth is, it's sad, in my program, Hispanic moms are the ones I have the most trouble getting to participate. They have the lowest breastfeeding rates, or at least exclusive breastfeeding. They often start, but as we talked about, quickly give formula. My goal, and it continues to be my goal, is to reach out to them and hopefully at one point, make them my majority of mothers who are breastfeeding. Or at least equal to my other mothers…I don't even think I can recall a can of formula back in the days when I was with my grandmother. Because not many people used formula. And recently, it's becoming a bigger and bigger norm. It's like the norm to use formula. Why sit there and try to breastfeed and try to pump, when you can just open up a can of formula, and you can get it free through WIC?

One of the questions that was important to consider in this research was how the peer counselors and regional coordinators felt about addressing the practice of "*las dos*" and encouraging Hispanic mothers to exclusively breastfeed and not supplement with formula early, given the fact that most of them were Hispanic themselves and possibly had used "*las dos*" when breastfeeding their own children. For the Hispanic participants (n = 16), 11 had formerly been

enrolled in WIC. All had breastfed their children, noting different types of barriers (e.g., premature baby, trouble latching, infant and mother health problems, lack of sufficient milk supply, lack of support) and levels of success with exclusivity. During these interviews, three distinct themes emerged: (1) Hispanic participants noted that while they had used "*las dos*" with one or more of their babies to supplement, this was largely due to their own lack of knowledge at the time and now they had a much better understanding; (2) The positive impact that WIC's breastfeeding education had made on their own practice (for those that had infants both within and outside of WIC enrollment); and (3) Regardless of their own experience and often because of their own experience with formula feeding or "*las dos*," all of them felt comfortable, even passionate about encouraging mothers to not use "*las dos*" and to exclusively breastfeed. In all cases, it was clear that a history of using "*las dos*" with their own infants did not seem to impede their ability or desire to advise their clients their clients to not use "*las dos.*"

> Yes. Yes. Not supplement with formula. I'm a big, "You can do it, but you have to make that choice." It is hard when there's formula around and you want to give up because you're, "Well, why do I have to work hard for this when I could just make a bottle?" I talk to moms and say, "You know what? You can make up excuses and I will support you, whatever your decision. But you've got to be truthful to yourself and say, "I've done everything I could to fully breastfeed." And if it doesn't happen, then you're going to be okay with yourself.

> With my son, I did [use "*los dos*" or combined formula and breastfeeding during the first few months] and that was because of lack of support, because of lack of knowledge. I did, and he had all kinds of issues. He had a short frenulum, and he had colic, and he had the reflux, and you name it. Everything, he had, and I had no support so I had to switch him over, even though I was taking the pain, but I also went and got him formula. And I had to go to work, and I didn't have a pump. I didn't know about the pumps. But with my daughter, I did do 100% breastfeeding until the age of one. At that point, I didn't have to work. So then I went ahead and I just took care of her, and I was more educated in part because of the breastfeeding support that I got from the nutritionist at WIC.

Finally, another issue that was important to consider given the overarching research question was whether or not breastfeeding peer counselors and regional coordinators were communicating with Hispanic mothers about the obesity risk for their children, as it relates to

"*las dos*" and associated overfeeding. A question was added to the initial proposed key informant interview guide after the second interview with a breastfeeding peer counselor (approved by the UNC-IRB) to address this. Of the 13 breastfeeding peer counselors who were asked this question, the majority (n = 10) reported that they did talk with their Hispanic clients about the health risks of obesity that are associated with overfeeding in infants. There was a varying level of comfort with the topic, varying levels of perceived success, and some felt that this was out of the scope of their role and more an area for the WIC nutritionist to address.

> We try to talk about it [obesity], especially with that said, when it comes to overfeeding. We try to tell them there's more cons than pros when you overfeed, and try to tell them that down the road too, it can be worse for them too when it comes to obesity and things like that. Sometimes it is [effective], but I think sometimes it quite doesn't. Because I think sometimes with some of my moms, if they don't see it right now, they just can't picture it down the road. And of course, I shouldn't talk because I'm big too, but sometimes obesity doesn't seem to bother them. They don't think as somebody being heavy-set as being a problem. I think that sometimes when you see Hispanic kids and the babies, they're chunky. They're like, "Oh, that's okay, they're so chunky." And that's a normal thing to them and so they don't see anything bad with it.

Key Findings in Response to the Research Question and Aims

The content of each transcript was coded using NVivo. A priori codes were created based on the Conceptual Model for Breastfeeding Behavior (Figure 2)[94] and emergent codes were created during the coding process, as previously described in Chapter 3. A concept table was used (Table 5) to outline the relationship between the conceptual model, research question and aims, with primary themes emerging from the key informant interviews.

Table 5. Summary of Emerging Primary Themes Based on the Conceptual Model for Breastfeeding Behavior, Research Question and Aims

Research Question: How can communication from peer counselors about infant feeding enable low-income Hispanic mothers enrolled in WIC to lower the risk of early childhood obesity in their infants?	
Aim 1: Determine why low-income Hispanic mothers who initiate breastfeeding begin to supplement with formula from birth ("*las dos*") and/or introduce solids early.	
Framework Concept: Demographic and Socioeconomic Factors	
Emerging Themes:	• Nativity • Generational differences • Education/lack of knowledge • Work as a facilitator of "*las dos*"
Framework Concept: Cultural Context	
Emerging Themes:	• Beliefs about breastfeeding and "*las dos*" • Beliefs about solid food introduction • Ethnotheories of parenting
Framework Concept: Social Environment	
Emerging Theme:	• Network influence
Framework Concept: Breastfeeding Intention	
Emerging Theme:	• Intention
Framework Concept: Breastfeeding Behavior	
Emerging Theme:	• Feeding practices • Motivational factors for exclusive breastfeeding
Aim 2: Determine perceived effective communication approaches of WIC peer educators to encourage behaviors that reduce the risk of early childhood obesity low-income Hispanic children.	
Emerging Theme:	• Approaches for effective communication about "*las dos*" and overfeeding

Twelve major themes emerged, and the participants' responses were analyzed in NVivo under each theme and sub-theme using nodes. Table 6 summarizes the themes and sub-themes identified in the analysis of the key informant interview data, including frequency of references and number of sources cited.

Table 6. Emerging Themes and Sub-Themes†

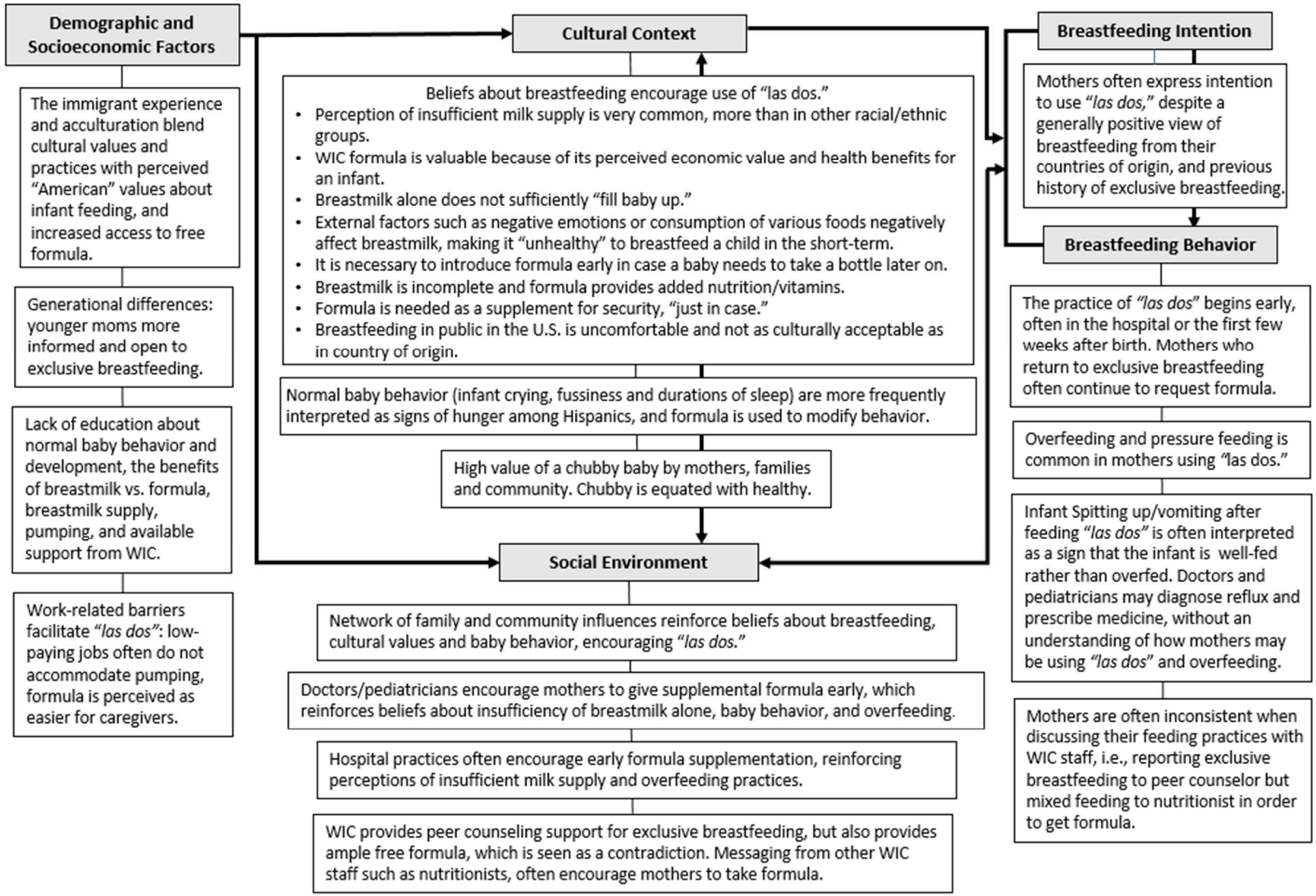
Emerging Themes	Sub-Themes	# of Sources Cited	# of References
	Demographic and Socioeconomic Factors		
Result 1: Nativity	Acculturation and the immigrant experience	13	26
	Country of origin cultural values and practices	14	33
Result 2: Generational differences		**7**	17
Result 3: Education/Lack of Knowledge		7	10
Result 4: Work as a barrier to exclusive breastfeeding/ facilitator of "*las dos*"		15	36
	Cultural Context		
Result 5: Beliefs about Breastfeeding and "*las dos*"	Breastfeeding in public	3	3
	Breastmilk is incomplete	4	11
	Breastmilk alone doesn't satisfy, fill baby	12	22
	External factors negatively affect milk quality, requiring formula use	5	15
	Formula is needed as a supplement to breastfeeding for security, unexpected events	5	9
	It is necessary to introduce formula early in case baby needs to take a bottle	7	13
	Formula is necessary because milk supply is perceived as insufficient	13	27
	WIC formula is a valuable benefit	12	22
Result 6: Beliefs about solid food introduction		12	14
Result 7: Ethnotheories of parenting	Value of chubby baby	16	61
	Baby behavior	17	67
	Social Environment		
Result 8: Network Influence	Community influence	14	30
	Doctor influence	12	37
	Family influence	16	55
	Hospital influence	7	9
	WIC influence	11	23

Emerging Themes	Sub-Themes	# of Sources Cited	# of References
Breastfeeding Intention and Behavior			
Result 9: Breastfeeding intention		14	24
Result 10: Motivational factors for exclusive breastfeeding		15	16
Result 11: Feeding Practices	Overfeeding	14	33
	Mixed breastmilk and formula feeding practices	17	56
	Spiting up/Vomiting	13	19
	Mothers say one thing and do another	7	11
	Solid food introduction	15	32
Result 12: Approaches for effective communication about "*las dos*" and overfeeding	Affirming healthy growth of baby	4	5
	Challenging practices and cultural beliefs	16	65
	Education	17	71
	Focusing on continued breastfeeding	12	16
	Focusing on health benefits of exclusive breastfeeding/not using "*las dos*"	8	20
	Focusing on pumping as a solution	8	11
	Referring to an authority figure	9	13
	Strategies that do not work	7	10
	Utilizing visual strategies and tools	9	22

†This table displays the results of themes identified using NVivo. These should not be interpreted as frequencies. No statistical tests were performed.

Figure 4 provides a visual model of the qualitative results for Aim 1, aligned with five of seven categories of the Conceptual Model for Breastfeeding Behavior. There were no results from the qualitative study that were relevant to the two other areas of the Model.[94]

Figure 4. Factors Influencing the Practice of "Las Dos" in Hispanic Mothers in WIC – Results of Qualitative Research



Demographic and socioeconomic factors. Participants talked frequently about the influence of demographic and socioeconomic factors on the practice of "*las dos*" among Hispanic mothers enrolled in WIC. Four major themes were identified in this area, including (1) nativity, (2) generational differences, (3) education/lack of knowledge, and (4) work as a barrier to exclusive breastfeeding/facilitator of "*las dos.*" Table 7 provides a summary of the results for this area, followed by a more detailed discussion. A complete summary of all of the results from Aim 1, aligned with the Conceptual Model for Breastfeeding Behavior, are included in Appendix G.

Table 7. Demographic and Socioeconomic Factors - Emerging Primary Themes, Sub-Themes, Summaries and Example Quotations

Demographic and Socioeconomic Factors			
Emerging Themes	**Sub-Themes**	**Summary**	**Example Quote**
Result 1: **Nativity**	Acculturation and the immigrant experience	"*Las dos*" is not a common practice in countries of origin but viewed as a better, more "American way" to feed.	**"**They come to the U.S. and they know that breastmilk is the best, but somehow they think that formula is like a privilege…they think it's the American way."
	Country of origin cultural values and practices	Breastfeeding is the norm in countries of origin, often because of economic constraints. This leads to a high willingness to breastfeed, but also high value of formula.	"They still have that sense of wherever they come from, that breastmilk is the norm…. And that motivates them to start breastfeeding." "They couldn't bottle feed in their countries because it was too expensive."
Result 2: **Generational differences**		Younger mothers are more receptive and informed about benefits of exclusive breastfeeding, but also face school-related barriers.	"Younger [Hispanic] women are easier…because they're more receptive of the newer information."
Result 3: **Education/Lack of Knowledge**		Lack of education about breastfeeding, normal baby development and baby behavior.	"What I find mostly is the lack of knowledge in the benefits and the power that they have in the milk production for the babies."
Result 4: **Work as a barrier to exclusive breastfeeding/ facilitator of "*las dos*"**		Low-paying jobs do not have supportive infrastructure for breastfeeding. Immigration status creates additional barriers. Formula viewed as easier for caregivers.	"They have to go back to work, but they're scared of asking for a pumping break. Because they feel like, 'If I ask, I may get fired.'"

Result 1: Nativity. Two distinct sub-themes emerged related to the influence of nativity on the practice of "*las dos*": (1) effect of acculturation and the immigrant experience and (2) the cultural values and practices of the country of origin. Many participants talked about the effect of acculturation on the practice of "*las dos*" among their Hispanic clients, specifically, that "*las dos*" was not perceived to be a common practice in their countries of origin, but rather something that became more common as an immigrant in the U.S. Multiple participants specifically noted

that their Hispanic clients, many born outside of the U.S., often viewed it as the "American way" of doing things, and that breastfeeding and giving formula was a way to ensure a better, healthier outcome for the baby.

> Another one is that they come to the United States and they know that breast milk is the best, but somehow they think that formula is like a privilege, "Oh, we get to give formula. We get to give formula. I wouldn't have been able to afford it where I'm from, but here it's given to us…" The last one is that, the third one-- it might not be the last one, but the third one is that they just want it. They just want both. They think it's the American way, they just want to do both.

> Well, I wouldn't say beliefs. Because those beliefs don't come from where they come from. I think it's a copycat thing. Because they see, "Oh, Americans use it. And they're big and they have all this, and their culture is better from everybody else's." But they don't understand, if we really look like that, it's really, if we really look at it, it's very few middle class or high class Caucasian women that will use formula…So they have the wrong information. Hispanic people have the wrong information about how it really works.

Participants noted that one puzzling nuance of this process of acculturation was that the perceived superiority of "*las dos*" was not only common in first-time Hispanic mothers but also among multiparous mothers who had exclusively breastfed previous children in their country of origin. They noted that in the U.S., formula is viewed as a valuable option that was not accessible in their home country.

> With Hispanics, I'm seeing a lot of moms who straight from the beginning want to do both. It's their mindset. And the way I go about it is I tell them do you have any other children? And if they say, "Yes." I tell them, "Did you fully breast fed them or did you..." and then if they tell me they fully breast fed I say to them, "Were they born here or were they born in your country?" Because for some reason in the United States it's more Los Dos, but in the countries, they fall back at, "Oh, we're going to 100% breast feed." That's a lot of the feedback I get from these moms.

> You know I always talk to moms, especially moms who are having their first baby in the United States after having one or two babies in Guatemala or Mexico, wherever their country of origin is. And I'll ask them, "So what did you do in, you know [country of origin]? You breastfed two babies? Yes "*Puro pecho* [only breastfed]." Yes, just breastfed, yes. So then, what's different now? Well they'll say just say different things but one of the things that they say typically is, "Well, you know I didn't have an option down there."

A second sub-theme related to the cultural values and practices of the country of origin. This sub-theme related both to the practice of "*las dos*" and to early introduction of solid foods. For "*las dos*," participants noted that many of their Hispanic clients are from countries where exclusive breastfeeding is the norm and often the only option, particularly for low-income mothers. On the positive side, this fact can be used to help mothers make the connection as to how exclusive breastfeeding is a core value of their culture.

> Usually, the moms that I work with, they don't have too long in the United States. So they still have that sense of wherever they come from, that the breastmilk is the norm over there. It's the normal thing to breastfeed in their country. Because "My grandmother, my neighbor, because my mom from over there." So they feel the need to at least give it a try. Willing to try to breastfeed. And that motivates them to start breastfeeding. But the thing is, you know, for how long. Why do they stop? They start introducing formula. Even the moms that come here and start breastfeeding, they still introduce formula early.

On the negative side, this can also be a challenge because Hispanic mothers may view formula as a product accessible only to higher income families in their country of origin—a product to which they now have access.

> I may say, for some moms, they are here in this country…they couldn't bottle feed in their countries because it was too expensive. They were not in that position probably to buy the formula and give it to the baby. Because here you have formula, you have free…it's like "I'm giving extra food for my baby." More nutrition or something. They just want to bottle feed. It's like that way of thinking. It's very hard, because trying to clarify. Ok, you want to do the best for your baby, but guess what. You're exactly doing the opposite.

Regarding early introduction of solid foods, participants noted that cultural values and practices of the countries of origin impacted the decision of their Hispanic clients to introduce solid foods early.

> The Hispanic community, a lot of it think-- a lot of the community…feel that curing or making a baby or a person healthy is through the mouth. In other words, by eating…back in their country, they offer their babies a lot of foods ahead of time, like solids and stuff - maybe putting cereal in the milk and stuff like that. So it's really, basically, I think it's just

> the fact that over there, they're introduced to all this stuff, it's something like novice and from the U.S., or maybe from something so then they start introducing it a little bit earlier. Right off the bat, they feel like maybe, "Oh, there's other things that I could feed my baby," and maybe that's why a lot of times they introduce that early.

Result 2: Generational differences. Participants noted that there were generational differences in their clients that impacted the way they can effectively communicate with them and their openness to exclusive breastfeeding. Younger Hispanic mothers are often heavily engaged with the internet, social media and texting communication. Some participants noted that they found many young Hispanic clients who were born and grew up in the U.S. were more educated on the health benefits of exclusive breastfeeding and more open to not supplementing with formula.

> Younger [Hispanic] women are easier I'm going to say, to teach. Because they're more receptive of the newer information. They're like "Oh, ok, that makes sense. Let me do this."

> Sometimes when it comes to education, a lot of my other clients, especially younger clients, they're so much into - nowadays, thanks to the technology - they're looking at things online. They're printing it. They're bringing things. They're watching videos and things like that

At the same time participants noted that young Hispanic clients often faced barriers related to returning to school and concerns about the physical impact of breastfeeding on their body which resulted in them introducing formula early, using "*las dos*" or solely formula feeding, even if they had initiated breastfeeding.

> Others, I have mom that they do it [pumping breastmilk in school]. I have like six moms - Hispanic - that they are pumping. One is in tenth grade, eleventh grade - high school - and they are pumping when they are in school. But I have others - especially when you have junior high - they don't want to do it because they want to be like everybody else. So that's another mom that will request formula, and then maybe will give formula during the day, and mommy will breastfeed when she gets home if she doesn't have a tons of homework.

Result 3: Education/lack of knowledge. Participants noted that education or lack of knowledge was one of the factors influencing the practice of "*las dos*" among their Hispanic clients. This included a lack of knowledge about baby behavior, the benefits of breastmilk, milk supply, pumping, normal baby development and available support from WIC. These factors made the early use of supplementary formula more likely.

> I've noticed that those moms lack the knowledge. They did not have a lot of information on the benefits [of breastfeeding]. They did not know there is a support program available for them. They did not know that they can call me if they're having a concern.

> A lot of them, after working with them for the first week or the second week, depending on when I am able to have that contact with them, most of the time I noticed that they're lacking that knowledge, you know if you just continue to breastfeeding on demand, every hour, every two hours, basically when your baby shows hunger cues, if you can just do that around the clock, yes, the first few days are the hardest for mom and baby, because it's the adjustment phase or period. That's going to help improve your production.

Result 4: Work as a barrier to exclusive breastfeeding/facilitator of "las dos." Nearly all the participants in the study (n = 15) noted that work was a significant barrier to exclusive breastfeeding and a facilitator of the practice of "las dos" for their Hispanic clients. Participants found that work was often mentioned as one of the primary reasons for introducing formula to an exclusively breastfed infant. Three themes emerged around the topic of work. For those Hispanic WIC clients who were already employed and had returned to work, their jobs tended to be at low-paying worksites that did not have a supportive infrastructure for breastfeeding, such as a private room, allocated time to pump, etc. This leads to mothers feeling that they have to introduce formula early because breastfeeding will not be possible in the long-run.

> So those moms, that's what I hear. That's why I said, "Why?" And all of this, "Oh, no, because I'm going back to work. I work for McDonald's, and they don't provide a place for me to pump with privacy." Because we educate moms about pumping choices, "You can do this. You can do that." Said, "No, [name omitted]. I work in a McDonald's," or, "I work in Bojangles," or, "I work in a nursing home." That's very minimum. "And they don't have a room for me to pump." So because they are not able to pump at work, they

> know that they're going to need formula. So when they come for their first appointment, they request formula.
>
> So, another one is fear of their employers. They have to go back to work, but they're scared of asking for a pumping break. Because they feel like, "If I ask, I may get fired." So they prefer to supplement with formula while they're working.

Some participants also mentioned very challenging circumstances that many of their Hispanic clients faced, particularly as it related to their documentation status and work, and that this creates an additional barrier to pumping for exclusive breastfeeding, causing mothers to introduce formula very quickly while continuing to breastfeed.

Second, at times work is mentioned as a reason for introducing formula early to an exclusively breastfed infant even when the mother does not have a job she will be returning to.

> I'm going back to work, but not yet." She [the mom] hasn't find even a job, but she wants to do both because she wants to introduce [formula]…I don't know. They say, as I said, they don't know…"Yes, I'm going back to work." When are you going back to work? "I haven't find a job yet. Probably after 6 months." So "Ok, you still have time to fully breastfeed your baby. You see? You don't have a job yet." But they want to put that as an excuse. They probably…probably they hear from the family, friends, that they do… "Don't exclusively breastfeeding because then you cannot go to work."

Third, participants noted that some mothers introduce formula because a future return to work will require someone else to care for the baby and formula is easier to use in that situation.

> Yes, a lot of them will tell us at pregnancy that they want to give both, and that's when we ask them, "Why do you want to give both?" The thesis is, "I'm going back to work. My mother's going to watch my baby, so it's easier for my mom, instead of me pumping." And then that's when we come in and say they don't really need to. And a few of them will say, "Oh, okay, okay. I'll try not to. I'll get in touch with you," But it's a very, very low percentage.

Cultural context. Three themes were identified in the area of cultural context: (1) beliefs about breastfeeding and "*las dos,*" (2) beliefs about the introduction of solid foods and (3) ethnotheories of parenting. Table 8 provides a summary of the results for this area, followed by a more detailed discussion.

Table 8. Cultural Context - Emerging Primary Themes, Sub-Themes, Summaries and Example Quotations

Cultural Context			
Emerging Themes	**Sub-Themes**	**Summary**	**Example Quotation**
Result 5: **Beliefs about Breastfeeding and "*las dos*"**	Formula is necessary because milk supply is perceived as insufficient.	Mothers supplement with formula because they believe their milk supply is not adequate. Beliefs about infant behavior of crying and fussiness due to perceived hunger reinforce belief.	"Most of them, they say that they have to supplement because they feel that they are not making enough milk for the baby."
	WIC formula is a valuable benefit.	Mothers value the formula provided by WIC because of its perceived economic value and health value for the infant. Mixed messages from WIC reinforce this belief.	"They say *las dos cosas* [both things] because they're afraid that if they don't say that, then they might not be able to change their package and get formula later on."
	Breastmilk alone doesn't satisfy, fill baby.	Mothers state "*No lo lleno*" [I can't fill him/her] and supplemental formula is necessary in addition to breastmilk.	"They'll say 'You know, I just don't feel like I'm filling him up so I'm starting to give formula."
	External factors negatively affect milk quality, requiring formula use.	Negative emotions and certain foods affect the quality of milk, making it unhealthy for infant in the short-term.	"They say that if you are upset, if you're sad, if you get mad, you're not supposed to feed the baby."
	It is necessary to introduce formula early in case baby needs to take a bottle.	Mothers believe that early introduction of formula is necessary to prepare for future situations such as insufficient milk supply, returning to work and being away from the baby.	"They feel that babies won't get the bottle, so they should start teaching them right away. So they introduce formula."
	Breastmilk is incomplete.	Mothers believe that formula provides necessary nutrition and/or vitamins that breastmilk lacks.	"They still feel that they need to give at least one bottle feeding of formula a day for vitamins. Nutritional vitamins."
	Formula is needed as a supplement to breastfeeding for security, unexpected events.	Mothers believe that formula is necessary "just in case" and therefore they request it, even though they may not be using it.	"Some Hispanic women, they do take formula and they don't use it. It's just like a comforting kind of thing, security."
	Breastfeeding in public	Breastfeeding in public is perceived as uncomfortable and not as culturally acceptable as in countries of origin.	"For them [mothers], they perceive that in order to blend in, they have to bottle feed while they're away."

Cultural Context			
Emerging Themes	**Sub-Themes**	**Summary**	**Example Quotation**
Result 6: **Beliefs about solid food introduction**		Mothers believe introducing solid foods will help modify behavior, and respond to perceived interest of infant.	So they say, "You know what, if I take cereal, mix it with breastmilk or formula, give it in the bottle, feed the baby at night, baby will let me sleep."
Result 7: **Ethnotheories of parenting**	Value of chubby baby	Mothers, family members and community value chubby infants, viewing them as healthier, more attractive and well-fed. Using "*las dos*" is seen as one way to ensure a healthy, chubby baby.	They are in competition to have a chubby baby because that's what translates to having a healthy baby. With their neighbors or whoever else has a baby."
	Baby behavior	Mother and family members often interpret normal baby behavior as hunger cues, introducing formula to modify behavior.	"They tend to use formula as a way of soothing the baby…they think the baby is hungry, and it's just a way of calming them."

Result 5: Beliefs about breastfeeding and "las dos." There were 123 references to beliefs about breastfeeding and "*las dos*" identified in the transcripts, with eight sub-themes. They are presented below in order of most common to least common in terms of number of references.

Belief 1: Formula is necessary because milk supply is perceived as insufficient

The majority (n = 13) of participants noted that one of the primary beliefs that encourages their Hispanic clients to quickly introduce formula to breastfed infants is that their milk supply is insufficient. Participants noted that this usually was the perception of insufficient milk supply, rather than an actual insufficiency, and that this perception was significantly more common among their Hispanic clients.

> A majority of them that I've noticed who are breastfeeding and using supplement as well, most of them, they say that they have to supplement because they feel that they are not making enough milk for the baby. This usually happens around the first and second week postpartum. Very common. The reason for that. Yeah and I think it's just a misbelief that

they don't make enough.

> The one thing that I see the most with them is just this belief that they're not going to make enough milk, that they just cannot satisfy the baby. And I see that a lot, especially with new moms. And sometimes if a family member like grandmother or aunt or sister had a hard time producing milk, then they tell them, "You're not going to make enough milk."

In addition, this belief is also related to the sub-theme of expectations of baby behavior, which was confirmed by the co-occurrence of the two sub-themes noted in the matrix coding. As will be discussed later, participants noted that Hispanic mothers often interpreted crying as a sign of distress most frequently related to insufficient milk supply.

> Yeah [the belief] that babies should sleep. Babies should sleep and babies should eat and sleep. Like that's the way they expect, the baby to eat and sleep. So if the baby's waking and crying, that means that you're not, that you don't have enough milk, and therefore…. And they'll say, "I had to supplement." It's not like I wanted to supplement, or I felt like this might help. It's like, I had to. They feel they had no choice.

Belief 2: WIC Formula is a valuable benefit

A majority of participants (n = 12) noted that one of the challenging aspects of promoting exclusive breastfeeding in lieu of "*las dos*" among Hispanic clients is the belief that the formula provided by WIC is valuable, primarily because of its perceived economic value and the health benefits for the infant. This causes mothers that might otherwise exclusively breastfeed to introduce formula.

> And one woman, we were using the language line, and she had breastfed four children. We were trying to help this woman who was exclusively breastfeeding but is requesting formula. We asked, "Why do you need formula? You are doing fine. You have plenty of milk. You just have to trust your baby, keep putting your baby to your breast." "No, milk is plentiful in this country." Milk meaning formula. Formula is plentiful in this country. Those were her words. Milk is plentiful in this country. So they see it as something that is available and free.

Participants also discussed how this belief is related to the conflicting messages and practices that exist within WIC, as the agency both promotes exclusive breastfeeding but also supplies free formula.

> Well, it's a contradiction. Well, I can see their point of view. Their point of view is, "Why are you pushing me for me to be exclusively breastfeeding if you are also providing formula?" So even though the WIC programs are pushing breastfeeding exclusively, but it is a contradiction. Because it's like you having two different organizations in one. One is pro-breastfeeding. And the other one is not against breastfeeding, but it's promoting a lot more formula. Even though they're not directly doing it, but they're providing it for free. So when you are a low-income person, and you know that you can get free something from somewhere, you're going to go for that. I think that in the case of these Hispanic women, they're seeing, "Well, they would not offer the formula if it was that bad. You wanted me to be exclusively breastfeeding, but then again you also give formula."

In addition, a few participants found that the belief that WIC formula is valuable leads some Hispanic clients to request it out of fear that if they indicate they are fully breastfeeding they may not be able to request it later on. While this is a misconception and breastfeeding peer counselors attempt to correct the belief and reassure mothers that they can change their WIC package at any time, it impacts "*las dos*" and the early introduction of formula.

> Most of the time we try to reassure moms that they have enough milk, that they could fully breastfeed. But at times, like what I've seen, it's more of my Hispanic moms. Like I said, sometimes outside pressure gets them to get-- when they come to WIC, they'll say *las dos*, because they feel like they have to get that formula that time that they come in…. Even though I have same moms that are 100% breastfeeding, but when they do come to WIC, they say *las dos cosas* [both things] because they're afraid that if they don't say that, then they might not be able to change their package and get formula later on….But I have gone into homes where I've seen 12, 15 cans of formula on the kitchen counter, and I'll ask the mom, "Why you have them?" "Well, I just get it. I just kind of *las dos cosas* [both things] so, you know, I get it just in case.

Belief 3: Breastmilk alone does not satisfy, fill baby

The majority of participants (n = 12) noted a common belief among their Hispanic clients that breastmilk alone does not satisfy their infants. This sub-theme was distinct from a perceived insufficient milk supply, in that participants indicated that Hispanic mothers will often state *"No*

lo lleno" [I can't fill him/her], in other words, they feel cannot fill their baby up with breastmilk alone and that formula will help. This leads mothers to supplement with formula even after their baby has just fully breastfed. Interestingly, one participant felt that the concept of not filling a baby up had a distinct meaning for their Hispanic clients.

> So sometimes they'll come in here and they have like a ten day old baby or three week old baby or sometimes even a you know, a baby younger than that and they'll say "You know I just don't feel like I feel I'm filling him up so I'm starting to give formula."…So a Hispanic mom is typically going to say, "*Es que no lo lleno*." "I don't fill him up." Whereas an African-American mom is more likely to say, "Well he's just greedy, he wants to eat all the time." It's the same thing. But it's viewed…my Hispanic moms blame themselves ("I don't fill him up", "*No lo lleno*."). Whereas my African-Americans moms say "It's the baby's fault, he's greedy, he wants to eat all the time." It's very interesting, the worldview.

> The main reason that I get is the baby doesn't get full…Like, I'll say this for example, I'm working with the mom and we're working through any challenges, and mom has no challenges. Breastfeeding is going good. I've seen baby at the breast-- baby eats good. I've seen mommy, her supply is really good. There hasn't been any issues. Baby is three weeks now. Baby comes in to see the nutritionist and says, "She doesn't get full. I need formula. I need formula."

Belief 4: External Factors Negatively Affect Milk Quality, Requiring Formula Use

Another belief that emerged is that Hispanic mothers often believe that external factors can negatively affect the quality of breastmilk, making it unhealthy to breastfeed a child until that situation is resolved. Factors noted included the negative effect of emotions and food on breastmilk quality. Participants indicated that many of their Hispanic clients speak of how *el susto* (fright), being sad, angry or upset, or recently arguing with a spouse causes breastmilk to go dry or spoil and is unhealthy for the baby. Participants noted that Hispanic mothers will often stop breastfeeding and feed formula during and after experiencing the emotion, and this negatively affects their milk supply, reinforcing the need for formula. In addition, the mothers often mention not being able to breastfeed due to the potential negative effects of different foods on their breastmilk. A wide variety of foods were listed, including soda, broccoli, beans, eggs,

avocado, cucumber, chile, milk, cheese, sausage, green vegetables or cold foods such as watermelon. Participants indicated that many of the beliefs about food and emotions were reinforced by friends, family and community members.

> Like I said, they say that if you are upset, if you're sad, if you get mad, you're not supposed to feed the baby. And I still don't get an answer to "For how long?" Is it just that very moment that you're upset? Is it for days? So people do whatever they think is best in their mind. Some moms, they tell me, "I stopped breastfeeding a week ago because I got mad." And I'm thinking, "Yeah, a week later?" So it is very hard because they don't they don't really get…all they hear is "Oh, if you're mad don't breastfeed."

Belief 5: It is necessary to introduce formula early in case baby needs to take a bottle

Another belief that was noted by several participants (n = 7) was the importance of introducing formula early in case a baby needs to take a bottle later on. This was related to the concepts of returning to work, to having freedom to leave the baby, and the potential of insufficient milk supply.

> They feel that babies are going to get used to the flavor of breast milk, and they won't want formula. Or they feel that babies won't get the bottle, so they should start teaching them right away. So they introduce the formula.

Belief 6: Breastmilk is incomplete

A few participants (n = 4) indicated that some of their Hispanic clients introduce formula because they believe that breastmilk is incomplete and babies need vitamins and/or the nutrition provided by formula supplementation.

> But a lot of them really trust that formula is necessary even if they have a full supply where they can feed two or three children at once, they still feel that they need to give at least one bottle feeding of formula a day for vitamins. Nutritional vitamins. I don't know where that kind of theory came from, and we're trying to kind of educate, but it's pretty set. It's really engraved in their brains that it's important. So I do see, unfortunately with the Hispanics, most of them want to do both.

Belief 7: Formula is needed as a supplement to breastfeeding for security, unexpected events

Several participants (n = 5) indicated that their Hispanic clients often mention requesting formula or intending to use "*las dos*" because of their concern of the unexpected events. A common phrase used by mothers was "just in case." Participants noted that this was frustrating for them, as Hispanic mothers in particular were often fully breastfeeding but still requesting formula for security. They also noted that this tendency negatively affects WIC's rates of exclusivity, and for this reason, the reported statistics are likely not an accurate reflection of exclusive breastfeeding rates among Hispanic mothers.

> Some Hispanic women, I'll tell you, they do take formula and they don't use it. It's just like a comforting kind of thing, security. I have commonly seen that. They call me for breastfeeding support, or when I reach out to them because I make my calls on the women I'm helping, and I ask them and then I always ask, "Well, are you supplementing? How are you doing with breastfeeding?" "No, I'm not." And then I said, "But I see that you got formula." "Yeah, I just want to keep it there just in case…"

Belief 8: Breastfeeding in public

A few participants (n = 3) indicated that some Hispanic mothers opt to use "*las dos*" because they believe that breastfeeding in public in the U.S. is uncomfortable and not as culturally acceptable as it was in their country of origin.

> The other thing is, you know, in many of their countries of origin, they saw breastfeeding in the market, and breastfeeding in the streets and breastfeeding in the bus. And here they don't see it. So, there's this cultural push for, you know you can breastfeed, just not in public. So a lot of them will tell me, well you know, they really do not want to stand out in a crowd. So they will do what it takes to blend in. And for them, they perceive that in order to blend in, they have to bottle feed while they're away.

Result 6: Beliefs about introduction of solid foods. Participants indicated that their Hispanic clients held particular beliefs about the introduction of solid foods that could facilitate the early introduction to infants. For example, their Hispanic clients express the belief that babies

are ready to eat when they demonstrate interest in food, even if this is before the recommended timeframe.

> But bananas, yeah, *caldo de pollo* [chicken broth]. "Why you giving the baby that?" *Porque hace así, cuando estamos comiendo hace así.* [Because the baby goes like this (sticking tongue out) when we are eating he goes like this] The baby shows interest in the food. It's like, okay. That's what I hear.

Participants also mentioned that Hispanic mothers sometimes believe that introducing solid foods will help to modify baby behavior such as sleeping through the night and colic.

> Baby's going to wake up in the middle of the night three or four or five times. So they say, "You know what, if I take cereal, mix it with breast milk or formula, give it in the bottle, feed the baby at night, baby will let me sleep. And baby's content and I know baby's fed. And I can get my sleep. Everybody else in the house gets to sleep. Surprisingly, I've seen moms do it at the second week, a newborn.

Result 7: Ethnotheories of parenting. Two of the three most common sub-themes that emerged during the coding process related to ethnotheories of parenting, specifically 1) the value of a chubby baby and 2) baby behavior.

Value of a Chubby Baby

"Value of a chubby baby" was mentioned by 16 of 17 participants and referenced 61 times during the interviews. Participants had many insights into the high value that their Hispanic clients and their families place on having a chubby baby and the way that this potentially impacts the practice of "*las dos*." *Gordito* (chubby) is the commonly used term, paired sometimes with *rosadito,* or "having a pinkish coloring." The majority of participants (n = 16) noted that the desire for a chubby baby was very common among the Hispanic mothers that they worked with. Phrases that commonly came up during the interviews in regard to having a very chubby baby included "top priority," "it's everything," and "very important." One participant felt that having a chubby baby was not just important to Hispanic mothers, but that all mothers, regardless of race, want their babies to be chubby. The majority (n = 13) felt that the

desire for a very chubby baby was more common among their Hispanic clients than other groups, and some indicated that it was significantly more common, although a few mentioned similarities with African American mothers.

> I know that with Caucasian moms they never want that [a very chubby baby], not purposely. I know they're very mindful on how frequently they feed their baby. And no one has ever expressed to me, "I want my baby to be chubby," versus Hispanics, they have openly expressed that because they really think it's cute and it's healthy. With African Americans, I see that they're not verbal about it, but I also sense that they're not interested in being careful on how much they feed their baby.

A few topics that emerged within this sub-theme included the following the tendency for Hispanic mothers to desire chubby babies because they, their community, and family influencers feel that a chubby baby is a visual representation of a healthy baby that is well-fed.

> But we mentioned this before, mom, their mom, baby's grandmother, or their mom's grandmother sometimes they are not very helpful. Yeah, they will be like "Well, your baby needs to be chubbier." And that's part of the culture. If you have a fat baby, it's a healthy baby. So they – if they see like an average size, what we would consider, "That's normal, healthy, that's good." They think it's a skinny baby. And something must be wrong with the baby. So they need to fatten up the baby.

> It's like, they are in competition to have a chubby baby because that's what translates to having a healthy baby. With their neighbors or whoever else has a baby. They think it's cute. And then, what they believe is that this is only temporary. It's not that he's going to be fat or obese or anything… They are stuck on that mentality and that belief that the fatter the baby is, the cuter, more attractive in comparison to other babies.

> The belief is, the more larger, bigger the baby is, the family is more fruitful, more rich, more…I don't know. Looking in a way that you're living the life….That's the concept that they bring here. That if baby looks very skinny, very small, it means that they're doing something wrong. That they're not living the life. Rich that supposedly they came to live. It's the concept, the reason why they came to the United States.

A second topic that emerged related to the relationship between the value of a chubby baby and "*las dos*." The majority of participants (n = 13) felt that that a desire for a chubby baby influences the practice of "*las dos*," leading to supplementation with formula.

> Because they can't really measure how much milk they are feeding, the breast milk. So they think, "Maybe it wasn't enough. Let me give you a little bit more." So they bottle

> feed. I think that's where the supplementation comes from, the insecurity of maybe not feeding that baby enough. And it's not at 100%, but the moms that really want to have a chubby baby, it's important. They want the cuteness of the chubby baby, to see that the baby is healthy. But in my opinion, to get this, the Hispanic moms, they often overfeed, breastfeeding and then giving a bottle on top, because it's one way they can ensure that the baby is chubby.

Baby Behavior

The second sub-theme that emerged under the larger theme of ethnotheories of parenting was baby behavior. Baby behavior had 67 references and was mentioned by all 17 participants. Baby behavior was most often cited as one of the primary reasons that Hispanic mothers enrolled in WIC use "*las dos*." Baby behavior encompassed infant crying, fussiness and sleep. Participants observed that Hispanic mothers in particular tend to interpret crying as a sign of hunger, as opposed to wanting to be held or being overtired, for example. As a result, mothers will often give breastfed babies additional formula in order to calm them. Participants noted an unrealistic expectation for babies that did not fuss or disturb but slept peacefully, a factor complicated by the fact that many of their Hispanic clients live with a large number of family and friends in small quarters.

> So they tend to use the formula as a way of soothing the baby. Sometimes I see this of some moms overfeeding the baby just because they think the baby is hungry, and it's just the way of calming them, so they can just stick that bottle on their mouth. I think sometimes too, they get pressure from the outside with either there's family members or just other people. Sometimes they feel that pressure that they have to give that formula, that they have to maintain the baby happy 24 hours in a day….So sometimes it's like, "I have to give him some formula," and I'm like, "No you don't." So I've seen this over and over, where if the baby starts to fuss because the baby is gassy, they stick a bottle in their mouth. If the baby is crying because he's got a dirt there, they stick a bottle in their mouth. It's like the baby could be totally satisfied, but it's just teaching these moms those other cues. Those other signs said it's not necessarily that the baby is hungry.

> They [pediatricians] don't know that moms, especially Hispanic moms, will breastfeed, babies will be fully breastfed and then mom will give the bottle on top and then the baby will throw up. It is common because a lot of it is because when the baby cries you want to feed the baby. They think automatically it's hunger. It's like they don't really differentiate the cues, they don't-- if it's a hunger cue, or they just want to be held, or a dirty diaper.

The subtheme of "baby behavior" co-occurred with several other sub-themes, including education, challenging practices and cultural beliefs, mixed breastmilk and formula feeding practices, spitting up and family influence. For the first two, the participants noted that one of the important factors for effective communication related to providing education about normal baby behavior, and that challenging practices and cultural beliefs often meant challenging beliefs about baby behavior. For the last three, baby behavior influenced mixed breastmilk and formula feeding practices and resulting spitting up (to be discussed later), and family influence often played a role in expectations and beliefs about appropriate baby behavior.

Social environment. Participants talked frequently about the influence of the social environment on the practice of "*las dos*" among Hispanic mothers enrolled in WIC. Table 9 provides a summary of the results for this area, followed by a more detailed discussion.

Table 9. Social Environment - Emerging Primary Themes, Sub-Themes, Summaries and Example Quotations

Social Environment			
Emerging Themes	**Sub-Themes**	**Summary**	**Example Quote**
Result 8: **Network Influence**	Community influence	Community (friends, neighbors) often encourage the use of "*las dos*" based on commonly held beliefs and values. Influence can also be positive from those who have exclusively breastfed, but is less common.	"They take a lot of what they [other people] tell them very seriously. And when you have somebody telling you, 'You probably don't have enough milk'…then you're already initiating doubts in the person's mind."
	Doctor influence	Doctors/pediatricians encourage mothers to give supplemental formula early, which reinforces beliefs about insufficiency of breastmilk alone, baby behavior, and overfeeding. Mothers' high sense of *respeto* [respect] for physicians leads to continued use of "*las dos*."	If the doctor tells them, 'You should give your baby formula because your baby is an ounce underweight,' they're going to do it….To them it's like saying 'Give it to your baby.'"
	Family influence	Family members, particularly female members, encourage mothers to introduce formula to breastfed infants based on commonly held beliefs and values. Influence can also be positive for exclusive breastfeeding, although this is less common.	"It has to do with people who influence the mom. It's like a ladder. You have the mom, and then you have her mother, you know, it's a great influence on what decision she makes."
	Hospital influence	Hospital practices often encourage early formula supplementation, reinforcing perceptions of insufficient milk supply and overfeeding practices.	"If they're [mothers] thinking 'I'm going to be breastfeeding, but I'm at the hospital and I feel like I don't have milk.' And the nurse shows up with a bottle of formula, then I'll say 'My salvation, I'm going to use it.'"
	WIC influence	WIC provides support for exclusive breastfeeding, but also provides ample free formula, which is seen as a contradiction. Messaging from other WIC staff such as nutritionists, often encourage mothers to take formula.	"Their point of view is, 'Why are you pushing for me to be exclusively breastfeeding if you are also providing formula?'"

Result 8: Network Influence. Participants frequently referenced the important role that a Hispanic mother's network played in her decision to supplement breastfeeding with formula, (i.e., using "*las dos*"). This included network interactions, social support and informational sources. Five sub-themes were identified including: (1) community influence, (2) doctor influence, (3) family influence, (4) hospital influence, and 5) WIC influence.

Community Influence

Participants mentioned that the community plays an important role in influencing Hispanic mothers' decisions to quickly introduce formula after initiating breastfeeding. The community includes close peers (e.g., other WIC mothers), friends and neighbors, and had quite a few co-occurrences with "family" in the NVivo node structure (i.e., family and community often mentioned together). Most participants who discussed the community influence (n = 12), with the exception of one, felt that it largely had a negative influence when it came to the topic of "*las dos*" and introducing formula at an early stage. For the positive influence, the participant noted that in peer support groups, Hispanic mothers who have successfully breastfed exclusively can be a strong positive influence on others. Participants noted several negative influences of the community on the rates of exclusive breastfeeding. For instance, community members encouraged mothers to give their infants formula based on some of the commonly held beliefs about breastfeeding and baby behavior, particularly the perception of insufficient milk production and the negative effects of emotions and food on milk quality and baby behavior. Community members were also thought to disapprove of exclusive breastfeeding, based on the belief that it was not in the best interest of either the baby or mother because of discomfort or the baby not being chubby enough. Finally, comparisons and competition are common between mothers, peers, and family members regarding the chubbiness of the baby.

> They also let other people influence them. When I say other people, people that are from their own place, family members, neighbors, close friends. They listen, they take a lot of what they tell them very seriously. And when you have somebody telling you, "You probably don't have enough milk. I don't see your boobs that full. Mine did this, mine did that. And maybe your baby is hungry, that's why he's crying." Then you're already initiating doubts in the person's mind. So that's grown a lot on a lot around the Hispanic population.
>
> One, I think, is just the pressure or they feel like they-- sometimes other people tell them, "You're not going to make enough. You don't have enough. The baby is crying, you got to feed him something else," so they will go ahead and offer formula.

Doctor Influence

One of the most interesting findings that emerged from the interviews was the perceived influence of doctors/pediatricians on the decision of Hispanic mothers to introduce formula at an early stage to breastfed infants, leading to a long-term practice of "*las dos*." This was not something that emerged as a topic in the literature review. A majority (n = 12) of the participants noted challenges in this area (37 references). Participants stated that when they inquired as to why mothers had started giving formula to breastfed infants, Hispanic mothers often said it was because their doctor had told them to do so. The breastfeeding peer counselors expressed their frustration with this practice, noting a lack of understanding of and support for exclusive breastfeeding by the doctors that serve their WIC clients. Breastfeeding peer counselors are often unable to meet with new moms until a week or two after birth, and by this time, the mothers have often already been advised by doctors to supplement with formula. They noted that this was a problem for Hispanic mothers, in particular, because of the high degree of respect and authority that the Hispanic culture places on the role of physician, viewing it as an authority that should not be questioned.

> One of the biggest struggles is with the pediatricians, especially with Hispanic moms. The doctor said - but this is mom saying that the doctor says, her mom, "*Hay, el doctor dijo* [Oh, the doctor said] on one breast 20 minutes, then the other breast 20 minutes. If the baby's still hungry to give them one ounce of formula." The doctor says this. And

> they leave the pediatrician with samples of formula. Some pediatric offices give the mommies samples. The hospital doesn't do that, but they leave the pediatric office with samples. So, *para nuestros hispanos,* [for our Hispanics], remember a doctor knows it all. He is the guru of my health. So if the doctor tells me that I need to supplement, I need to obey. Maybe another mom could be more defiant and say, "*Pero porque?* [But why?] I want to do this." My mommies *hispanas* [Hispanics] don't feel they have a voice or they have control. You know what I'm saying? They are *muy obedientes, muy lindas.* [very obedient, very sweet] *"El doctor dijo."* [The doctor said so]....They will not negotiate with a doctor. First of all, because of the language barrier. Second of all, you [doctor] know best. "You're the doctor, you know best, so whatever you say, for the sake of my baby."
>
> Now doctors are one of the biggest controversies for us. Doctors are pushing formula every day. So in Hispanics, especially Hispanic people, well every race, but in Hispanic people really respect doctors. When they see a doctor, to them it's like "Oh, they're Gods. They should know better than you." So if the doctor tells them, "You should give your baby formula because your baby is an ounce underweight." They're going to do it. If the pediatrician says "It's ok, you can give your baby formula, nothing wrong with that." They're going to do it. To them it's like saying "Give it to your baby." Yes, medical stuff is a big influence on Hispanics using formula, or any other race. We see it every day.

Family Influence

All but one of the participants (n = 16) noted the importance of family member influence on the practice of "*las dos*" among their Hispanic clients. As noted previously, this sub-theme frequently co-occurred with "community" in the NVivo coding structure. Participants noted that the influence of family can be both positive and negative when it comes to exclusive breastfeeding and "*las dos*." However, within the coded references, negative influence (i.e., pressure to introduce formula to a breastfed infant) from mothers, grandmothers and mothers-in-law was more frequently mentioned. In addition, participants noted that the strength of the matriarchal influence on mothers' decisions around feeding practices was significant.

> I would say, if I had to choose from the two [Hispanic clients' mother/baby's grandmother or father], it would probably be mom – the mom's mom. They're very…As a matter of fact, when they come here, and if the mom, the *abuelita* [grandmother] comes in the consultation, I can see that the mom [client] will stay quiet depending on what the mom responds. And that also it works both ways because there are moms who strongly believe in breastfeeding and here they are with a younger daughter who doesn't want to

> breastfeed because they think it's inconvenient. And then there's the mom there, "No, you have to breastfeed. I breastfed all ten of you. You can do it too." So it's a good influence, but it can also be a bad one.

Fathers were mentioned less frequently (n = 6) regarding their influence on the practice of *"las dos."* Participants noted that fathers of Hispanic clients were generally supportive of breastfeeding and interested in understanding how they could help their partners who want to breastfeed exclusively, but they also could be quick to support the introduction of formula when breastfeeding challenges arise or a baby is fussy. Overall, participants noted that female family members played a more significant role in influencing the introduction of formula, with one participant describing it as a "ladder."

> It [introduction of formula to a breastfed baby] has to do with people who influence the mom. It's like a ladder. You have the mom, and then you have her mother, you know, it's a great influence on what decision she makes. The mother's grandmother is influencing everybody in that household. The husband is there for support, like "We can do this." They can try to work it out. But someone is already influencing what they're going to be doing.

The influence of the family encompassed a few topics. Overall, participants observed that family, particularly mothers, grandmothers and mothers-in-law, encouraged mothers to introduce formula for the following reasons: (1) based on some of the commonly held beliefs about breastfeeding and baby behavior as outlined previously, particularly perception of insufficient milk production and concerns about infant hunger, (2) in order to increase infant weight, and (3) the fact that formula is viewed as a superior option that was not available in their country of origin.

> I see an increase of *las dos*, for the reason that I-- for mostly, when they go and the doctor says, "You need to supplement," or because the grandma who-- I see it mostly when it's for the Hispanic. Let's say, mom is from Mexico and dad is from the US, or mom is from Mexico and he's from Argentina. I see more influence from the mother-in-law to say, "The baby's hungry. You have to give him the formula," From the grandmother, usually from the paternal side, but yes.

> If they're not seeing that baby gain weight, especially the mothers - and most of them have their mothers here - they're like, your milk is not nourishing baby enough. The mothers. Or in this case, the grandmothers. The grandmothers, yes. Some mothers think that way too. Mother can be in Mexico giving advice to the daughter here. The mother here, telling her same thing. Near or far, that's the message, "*Hija*,[daughter], take care of the baby. Baby looks a little puny." I remember my son, they were like, "He's wrinkly. He looks like a little old man. You should feed him formula!"

Hospital Influence

Another sub-theme that emerged was the influence of hospitals on the early introduction of formula. This sub-theme was far less frequent than the influence of doctor (9 references vs. 37 for doctor), though it was mentioned by nearly half of the participants (n = 7). In all cases, the hospital influence was seen as negative. Participants observed that Hispanic mothers often said that they were told to give their baby formula by hospital staff. They also observed that the bottles that hospitals often provide at discharge are too large, leading mothers to believe that they need to give an amount that is too much for the infant.

> With Hispanic moms, most of them want to breastfeed. But what I see is they are very easily influenced by others. If they're thinking "I'm going to be breastfeeding, but I'm at the hospital and I feel like I don't have milk." And the nurse shows up with a bottle of formula, then then I'll say, "My salvation, I'm going to use it." And even if they decided that "I'm going to be breastfeeding," if they perceive that they don't have breastmilk, they're going to introduce formula.

> And one thing too that I see, and I will say within the Hispanics, it's quite a bit-- moms feel like even an infant at newborn, they make a bottle of formula, four ounces, and they think the baby's got to take all that. It's like, "Uh-uh." Because if the hospital gave them bottles and they gave them a certain sized bottles, they think that's what the baby needs to feed and they need to finish all that.

WIC Influence

The fifth sub-theme that emerged related to network influence on "*las dos*" practices was the WIC program. A majority of participants (n = 11) observed that WIC both positively and negatively influenced their Hispanic clients. On the positive side, participants noted the

difference that WIC breastfeeding peer counseling had made in their own lives and their abilities to exclusively breastfeed and not use "*las dos*." This experience then enabled them to extend the same type of support to their clients. On the negative side, they mentioned that while WIC promotes breastfeeding, it also clearly promotes formula by offering it for free and this contradiction often leads moms to introduce formula when they might not have done so otherwise. In addition, at times while breastfeeding peer counselors work to promote exclusive breastfeeding, WIC nutritionists do not always encourage mothers towards exclusivity to the same degree during the recertification process, quickly offering formula which mothers often take, because it is free.

> So there's all sorts of different things that are coming into play with WIC, that even though WIC is working on becoming a more breastfeeding friendly program, it makes it very challenging to promote exclusive breastfeeding. Even in my agency, you know, I can have a mom in here, if I get her prenatally, I can nine times out of ten convince her that her body is enough that she can breastfeed exclusively, that her baby needs, and nothing else. But then they come in for recertification and depending on which nutritionist they get, the nutritionist may ask "Are you sure you don't want some formula?" So that question right there, you know, starts planting seeds of doubt and, it's like, "well maybe I do need formula."

> Their [mothers'] point of view is, "Why are you pushing me for me to be exclusively breastfeeding if you are also providing formula?" So even though the WIC programs are pushing breastfeeding exclusively, but it is a contradiction. Because it's like you having two different organizations in one. One is pro-breastfeeding. And the other one is not against breastfeeding, but it's promoting a lot more formula.

Breastfeeding intention and behavior. Participants talked frequently about Hispanic mothers' breastfeeding intentions and behavior. Three themes were identified in this area, including: (1) feeding intentions as it relates to "*las dos*"; (2) factors that seem to motivate Hispanic mothers to exclusively breastfeed; and (3) and feeding practices. Table 10 provides a summary of the results for this area, followed by a more detailed discussion.

Table 10. Breastfeeding Intention and Behavior - Emerging Primary Themes, Sub-Themes, Summaries and Example Quotations

Breastfeeding Intention and Behavior			
Emerging Themes	**Sub-Themes**	**Summary**	**Example Quote**
Result 9: **Breastfeeding intention**		Mothers often express intention to use "*las dos,*" despite a generally positive view of breastfeeding from their countries of origin, and previous history of exclusive breastfeeding.	"A lot of them when they are enrolled in the peer counselor program prenatally, they are already letting me know that they are planning on doing "las dos."
Result 10: **Motivational factors for exclusive breastfeeding**		Motivational factors included positive affirmation from family members and expected health benefits of exclusive breastfeeding.	"If they have the right support at home. Because sometimes these moms have a husband that is wonderful and want their babies to be exclusively breastfeeding."
Result 11: **Feeding Practices**	Overfeeding	Overfeeding and pressure feeding is common in mothers using *"las dos*," and is related to expectations of baby behavior. Mothers often fully breastfeed and then give additional formula.	"They'll put the baby to the breast and baby's been on the breast, maybe both breasts. And on top of that, they'll give three to four ounces, the same week, the first week of age."
	Mixed breastmilk and formula feeding practices	Mothers often begin "*las dos*" within the first few weeks. Quantities of supplemental formula range from 15 ml bottles to much larger amounts. Mothers who begin supplementing may return to exclusive breastfeeding, but often continue to request formula.	"We have seen as early as a week old drinking three ounces. We have had a two week old drinking six ounces of formula after being breastfed."
	Spiting up/Vomiting	Infant Spitting up/vomiting after feeding "*las dos"* is often interpreted as a sign that the infant is well-fed rather than overfed. Doctors and pediatricians may diagnose reflux and prescribe medicine, without an understanding of how mothers may be using *"las dos*" and overfeeding.	"They [the pediatricians] don't know that the Hispanic moms are often breastfeeding and then giving formula on top, and then the baby is throwing up."

Breastfeeding Intention and Behavior			
Emerging Themes	**Sub-Themes**	**Summary**	**Example Quote**
	Mothers say one thing and do another	Mothers are often inconsistent when discussing their feeding practices with WIC staff, i.e., reporting exclusive breastfeeding to peer counselor but mixed feeding to nutritionist in order to get formula.	"And the mom's story changes from the moment she checks in at the window, to, I'm the last person that they see…. Every time she has to repeat the story, it just changes."
	Solid food introduction	WIC nutritionists, rather than peer counselors, address the introduction of solid foods. Mothers introduced a wide variety of foods prior to recommended time, as early as 2-3 weeks for cereal in a bottle.	"You do have moms that they're so proud, "Oh, I'm feeding my four month old baby beans and tacos, *pupusas,* and they feel so proud of that. They're not thinking, my baby's not ready for this."

Result 9: Breastfeeding intention. One of the questions that I asked during the interviews related to breastfeeding intention and when, in the experience of the breastfeeding peer counselors, Hispanic women usually made the decision to use "*las dos*." No clear pattern emerged in the responses regarding intention. Some participants noted that their Hispanic clients often expressed their intention to breastfeed and supplement with formula before the baby was born, even if they had exclusively breastfed a previous child.

> Yes, before the baby's born, even prenatally. Because I've tried…our goal is to reach that mom prenatally so that we can educate and support the prenatal mom. That way she will have or be able to make a better informed decision about how she wants to feed her child. So my goal is to work with them prenatally. But a lot of the even when they are in role in the peer counselor program prenatally, they are already letting me know that they are planning on doing "*las dos*."

> I think more common for Hispanics [to intend to mix feed]. I do hear it a few times maybe Asian or even Black African American, but when I first started working here, I used to see a lot of Black African American women who would start breastfeeding or would say, "Oh no, that's just not for me." Now I'm seeing more that are interested. With Hispanics, I'm seeing a lot of moms who straight from the beginning want to do both. It's their mindset.

Others observed that, their Hispanic clients generally had a positive view of breastfeeding and stated their intention to breastfeed exclusively, but that somehow these intentions quickly disappeared once the baby was born.

> Most of the women are like "Oh, I'm going to be breastfeeding." So we talk about the recommendations, how long they should be breastfeeding, we talk about exclusivity. How even one bottle of formula can hurt the babies. Their digestive system, their gut. But I always feel that once that they get to the hospital, something happens. There's something, it's just like a barrier, they get there and all the information that they have, they start doubting their bodies.

Result 10: Motivational factors for exclusive breastfeeding in lieu of "las dos."

Participants observed that there were a few factors that seemed to motivate Hispanic mothers to exclusively breastfeed rather than use "las dos." The first motivating factor was the positive, affirming influence and approval of exclusive breastfeeding from family members, including the client's mother, grandmother, and her husband or partner.

> I may say it's the family. There are moms that know about the benefits of breastfeeding. Their family…like "My mom told me that this is good." They go by what their moms believe that it's good, that they support breastfeeding. And they're truly know that this is good, so "you have to breastfeed." They have more knowledge about what is, why it's so good breastfeeding. They were breastfed before, something like that.

The second motivating factor was the expected health benefits of exclusive breastfeeding for the baby. Thirdly, participants noted that recent Hispanic immigrants were more likely to be motivated to exclusively breastfeed, particularly if they had additional children that were born in their country of origin and had been fully breastfed.

Result 11: Feeding practices. There were five distinct sub-themes related to feeding practices, including: (1) overfeeding, (2) mixed breastmilk and formula feeding, (3) spitting up/vomiting, (4) mothers say one thing and do another, and (5) solid food introduction.

Overfeeding

Overfeeding was a common theme that emerged during the interviews, with 14 of 17 participants discussing it (33 references). Participants often expressed frustration about the overfeeding practices they frequently saw with their Hispanic clients in particular, and they connected overfeeding with the practice of "*las dos*." Overfeeding frequently co-occurred with several other sub-themes, including "baby behavior," "mixed feeding practices," "spitting up/vomiting" and "challenging practices and cultural beliefs." In the interviews, various topics came up around overfeeding, including: 1) Hispanic mothers fully breastfeeding until the infant is satiated and then following up with an additional bottle, pressure feeding 2) doctors being unaware that this is taking place, and 3) beliefs about baby behavior as a cause of overfeeding.

> Yeah, because many times, like I said, if they are breastfeeding, and if the baby's waking up every hour, hour and a half to feed again, they feel like my milk is not good enough so I need to give the baby formula on top of it. And in their minds, the baby should be eating whatever amount, it could be 4 ounces, it could be 2. And maybe I'm working with a baby that is 6 pounds let's just say. And mom is thinking the baby has to finish this. They do a good job, trust me. They stick the bottle and they're like "Come on, you have to finish this!"

> Baby's not full. Baby doesn't get full. Baby's crying all the time. Baby's not full. They'll put the baby to the breast and baby's been on the breast, maybe both breasts. And on top of that, they give three to four ounces, the same week, the first week of age. And the first thing I asked them is, "Is baby spitting up?" "Yes." Because they're overfeeding the baby, baby's spitting up. Or they call and they're like, "Baby is spitting up. I think baby's allergic to breast milk." *No le caye bien la leche, mi leche no le caye bien. Está vomitando leche*. [The milk doesn't settle well on the baby's stomach. The baby is vomiting milk] And I'm like, "Okay. *Que le distes? Estuvo en el pecho?*" "*Si" Y despues le diste su biberon? "Si." Cuantas onzas le diste? "Tres onzas." De ti, agarró tres onzas, y otras tres del biberón. Son seis onzas. Y cada cuanto está comiendo? "Cada hora, cada dos horas."* That's a lot. [Ok, what did you give him? Was he breastfeeding? "Yes" And then you gave him the bottle? "Yes" And how much are you giving him? "Three ounces." From you, the baby got 3 ounces, and then 3 ounces from the bottle. That is 6 ounces. And how often is the baby eating? "Every hour, every two hours."] And I'm like, "How much does baby weigh?" "*Ah, no sé.*" [I don't know] And I see them, they're big! They come in, you see them, they're big. I would say 80 to 90% are overfeeding the babies.

> The Hispanic moms, they really respect the authority of the doctor, much more than other moms that I work with. So what they say is very, very important. The doctors don't seem

> to realize that the moms, the Hispanic moms especially, are often fully breastfeeding and then giving formula on top. It's not supplementing. It's overfeeding.

Mixed Breast and Formula Feeding Practices

Another sub-theme that emerged was related to mixed breast and formula feeding practices. Although this sub-theme frequently co-occurred with "overfeeding," it was a distinct and more commonly observed sub-theme. Mixed feeding practices also had co-occurrences with "baby behavior," "spitting up" and "doctor influence." A few distinct topics related to mixed breast and formula feeding became apparent during the interviews. The first related to the timing of the introduction of "*las dos*," which was most often at the hospital or within the first few weeks.

> I would say that unfortunately, a lot of Hispanic moms choose to do both. And, I would say that a good amount of them introduce formula very, very soon. What I've seen is that sometimes they introduce formula the first week, and sometimes they do stop for a while, but eventually they do start giving formula again. But the ones that are going to give formula, of course they start the first week…many of them do introduce formula at a very early stage. But many of them that are fully breastfeeding, even when they come here and they're thinking of fully breastfeeding at least for a month or two, regardless, when they come, they do say that they have introduced formula.

The second topic in the mixed breast and formula feeding sub-theme related to mothers who began by breastfeeding and supplementing with formula, but stop feeding formula, although they may continue to request it.

> Because here in the WIC program, we have found that a lot of our Hispanic moms do introduce formula in the hospital. But then they discontinue it once they get home. And I don't know if you've heard this before. They do request formula from WIC, but they're not using it. They're exclusively breastfeeding. But it's not what the statistics are saying. They're saying that they're using breastmilk and formula, but they are not.

The third topic related to the amount of supplemental formula that the participants had observed Hispanic mothers giving their breastfed infants which ranged from 15 ml bottles given at hospital discharge, to an additional 1-2 ounces, or even much larger quantities.

> Formula. Sometimes they're giving an ounce or two. Then baby takes it, because like I said, you are controlling the feeding in a sense. If they are newborn, they can't push that nipple out. They have to drink it. So babies are too full – *vomita* [it vomits]. Then *lo llevan al doctor* [they take it to the doctor], and then *tiene* [it has] acid reflux. And *ponen al bebé* [they put the baby] on Zantac.
>
> For us, overfeeding, it's when the mom breastfed 15-20 minutes and then gives the baby 2-3 ounces just after breastfeeding. And we have seen as early as a week old drinking 3 ounces. We have had a 2 week old drinking 6 ounces of formula after being breastfed.

Spitting up/Vomiting

The sub-theme of spitting up/vomiting was not found in the literature review, but it became apparent in 13 of the participant interviews. Spitting up/vomiting frequently co-occurred with overfeeding and mixed feeding practices. Participants observed that many of their Hispanic clients frequently overfed their infants to the point of the baby spitting up/vomiting, which was sometimes interpreted as a sign of being well-fed.

> It almost seems like the mom is okay with the baby spitting up because, oh, because the baby is full. "I topped him up. I topped him up." And then they're fine. They're happy with that because they're so sure the baby is well fed.
>
> Most of the times moms will say that yes, the baby breastfeeds, and yes, I bottle feed the baby 1-2 ounces afterwards. But then shortly after, the baby's just vomiting. Everything just gushes out. And then the baby's hungry again. So I think, I take that symptom or side effect as, ok, you know, your baby may be overfed…Sometimes they tell me, "Oh." They seem to be shocked. Or surprised. They would have never assimilated the extra amount with overfeeding.

In addition, participants specifically mentioned the relationship between "*las dos*" and vomiting, how babies were often being both breastfed and then bottle fed, resulting in overfeeding that caused vomiting. Doctors, unaware of this practice, were prescribing acid reflux medicine when moms mentioned vomiting. Some participants went so far as to call it an "epidemic."

> But in my opinion, to get this, the Hispanic moms, they often overfeed, breastfeeding and then giving a bottle on top, because it's one way they can ensure that the baby is chubby. So then when the mom comes in and says that the baby is taking baby Zantac, that the pediatrician has given them baby Zantac for reflux, I get frustrated because I want to say

> "Your baby does not have reflux!" when I know that the mom is doing *las dos*. Sometimes I even see it, the bottle propped up with the baby, after the baby has breastfed. The baby doesn't have reflux! The baby is being overfed, the mom is giving formula on top of breastmilk, sometimes 2 oz., 3 oz. when the baby is a week or two old! That isn't reflux. The baby is vomiting because it's too much. The pediatrician doesn't ask the mom if they're feeding too much, the mom just tells them that the baby is vomiting and the doctor gives reflux medicine. It's an epidemic, but that's just my opinion.
>
> And then there's baby Zantac. You can't even imagine how many babies I have on baby Zantac. It's an epidemic. It's so frustrating. The pediatricians don't know, or just don't have the time I guess, to ask about maybe why the baby is vomiting, they don't know that the Hispanic moms are often breastfeeding and then giving formula on top, and then the baby is throwing up. God forbid that a Hispanic baby loses 2 ounces! The moms, the Hispanic moms, they believe that if something is expensive, it's good. "The doctor is not going to recommend something that isn't healthy!"

Mothers Say One Thing and Do Another

This sub-theme emerged in seven of the interviews, and is best summarized by the idea that participants observed that their Hispanic clients often indicated that they were feeding their child one way, but actually doing another (for example, reporting "*las dos*" but actually exclusive breastfeeding, or vice versa). Or they reported their infant feeding practices differently to different members of the WIC staff and doctors. Participants expressed that it is often difficult to know exactly what a mom is doing in terms of feeding, because they are often not straightforward.

> And the mom's story changes from the moment she checks in at the window, to, I'm the last person that they see. So it changes. Every time she has to repeat the story, it just changes. So sometimes they go from "I'm using formula 5 times a day, 2 oz. every time." To, when they get here with me [the peer counselor], to "I'm just using formula one time a day, 2 oz., maybe 1 oz." "But I can see that you told the nutritionist that you were using 10 oz. of formula in 24 hours. And now you're telling me you're using it maybe 1-2 oz. a day." So why do they do that? Because they want to get formula. So they know how the flow works. They know who is going to give formula. And who's not going to give formula. They stock up the formula, I don't know.

Introduction of Solid Foods

The final sub-theme that I identified under feeding practices related to the introduction of solid foods. The majority of participants that I interviewed mentioned their experience with

Hispanic mothers and the early introduction of solid food. However, it is important to note that most felt that it was outside of their scope of practice, and felt they had limited experience upon which to answer the questions related to introduction of solid foods. This is largely due to the fact that the majority of breastfeeding peer counselors spend the most intensive time with mothers during the first month or two of their infants' lives. Participants also expressed the idea that solid foods was an area for WIC nutritionists to address. Those who were able to respond to the interview questions confirmed that that they frequently heard from their Hispanic clients about solid foods being introduced early. They also commonly cited a wide variety of foods, including mashed bananas, fruits and vegetables, cereal in the bottle, *caldo de pollo* [chicken broth] *sopa* [soup], noodles, mashed beans, mashed potatoes, oatmeal, *pupusas* [stuffed corn tortilla], pizza, ice cream, rice, *atoles* [hot corn/masa beverage], *agua de arroz* [rice water beverage], prune juice and *té de manzanilla* [chamomile tea]. Some participants had heard of the introduction of cereal in the bottle as early as two to three weeks of age. For other foods, responses varied from two to three months or four to five. Teas were given much earlier, even at one week.

Strategies for effective communication with Hispanic mothers. Aim 2 of this research was to determine perceived effective communication approaches of WIC peer educators to encourage behaviors that reduce the risk of early childhood obesity in low-income Hispanic infants. The sub-aims were as follows:

> Sub-Aim 2.1: Determine the messages that low-income Hispanic mothers find most persuasive regarding: (1) exclusive breastfeeding in lieu of mixed feeding, (2) not overfeeding (i.e., pressuring to finish a bottle) and (3) and delaying introduction of solid foods to the recommended 5–6 months.

Sub-Aim 2.2: Determine what motivates low-income Hispanic mothers to exclusively breastfeed rather than mixed feed ("*las dos*").

Result 12: Strategies for effective communication about "las dos," overfeeding and early introduction of solid foods. The results that are outlined in Table 11 are based on the personal experiences of the breastfeeding peer counselors and regional breastfeeding coordinators, one of whom had also worked as a breastfeeding peer counselor. The results reflect what they felt worked and did not work when it came to promoting and achieving exclusivity rather than "*las dos*" and discouraging overfeeding among the Hispanic mothers and infants they work with. These results do not reflect the thoughts and behavior of the Hispanic mothers themselves, which is a limitation of the research. What they do reflect are the lessons learned from a cumulative 137 years of experience working as breastfeeding peer educators with primarily Hispanic mothers and their families. Overall, participants had many experiences to share, but seemed to have a difficult time specifically identifying what communication approaches were most persuasive and motivating toward a behavior change on a consistent basis. Many participants mentioned that it was hard to know what actually worked and did not work, because each client is different, and that a breastfeeding peer counselor's job is to be able to effectively respond to the unique needs and situation of each mother.

> OK there's lots of reasons and every mom has her own reason. And this is part of being a good counselor. You have to kind of find out what's motivating this particular mom….The key is to bring parents back into, "Hey, there's a solution for this. I know you see a brick wall, but let me show you there's a door through this brick wall." And the door is in different places for different people. And a good counselor doesn't have pre-conceived notions, will be able to find out what makes this particular mom tick. It is an art more than a science.

It is important to note that one of the challenges that breastfeeding peer counselors face in trying to address "*las dos*" and/or overfeeding among their Hispanic clients is that they often are

not able to meet with new mothers until after they have already begun one or both of these practices. Because of this, one of the questions that I asked during the key informant interview was whether participants tried to convince mothers to stop supplementing with formula if these practices had already begun. Of the 16 participants that responded to the question, 11 stated that they tried to convince mothers to stop supplementing; some passionately advocating for exclusive breastfeeding and being firm with mothers about why supplemental formula was not necessary. Two participants stated that they did not address the issue if it had already started, and three stated that it depended on the situation. One pattern that was evident in the responses was breastfeeding peer counselors with more years of experience felt more comfortable advocating for exclusive breastfeeding, and challenging mothers on their practices of using "*las dos*." One complicating factor that they noted was the role of doctors, in that if a doctor had told a mother to go ahead and supplement with formula, they could not go against that recommendation.

> Well you know once I talk to them and see what their goals are, yeah, absolutely. I will try to do that [convince them to stop supplementing with formula]. And sometimes we see this sometimes, not all the time. I'll talk to them and say look...and I have a couple of nutritionists that are very supportive. And they'll say, "You don't have to do this. What are you doing? Don't you want your baby to be healthier?" They'll say here's the formula, but don't. But we give such mixed messages that we're kind of shooting ourselves in the foot.

> Yes [try to convince them to stop supplementing with formula]. But the thing is, if the doctor-- what I'm having a hard time working with following our policies. If I'm not a doctor or a nurse, if a doctor advise a mom to give formula, I cannot tell mom, "Don't listen to your doctor," because that's a no-no. So my hands are tied, in a sense, when a doctor says, "You need to supplement."

It is also important to note that while Sub-Aim 2.1 related to the introduction of solid foods, most participants were not able to identify communication approaches they perceived as effective at delaying solid foods until the recommended time. As discussed previously, many felt that this area was outside of their WIC-defined practice. A few participants mentioned that when they saw or heard about a mother giving solid foods at an early stage, they let the mom know that

it was not recommended to introduce solid foods early, and suggested that they speak with the WIC nutritionist or the baby's pediatrician about the topic. Notably, breastfeeding peer counselors who had more years of experience tended to be more comfortable addressing the topic with mothers, at the minimum to let them know that introducing solid foods before the baby was ready could be harmful.

> I do tell them that they need to check in. I say, "You should check in with a nutritionist. You can just call them and ask for the in charge nutritionist, and they will explain to you the age appropriate for baby to start solid foods." I'm not the appropriate one to give that information," I said, "But I would strongly suggest that you give them a call. Because I think you're a little too early on providing the foods."

> I haven't really dealt with that [early introduction of solid foods]. I haven't touched on that subject just because it's just a complicated subject for me, I think. I don't really know - and maybe I should just do a little more practice on that - I don't really know how to approach that in a way where I'm not being nosy or getting in their business. I don't really go there. I just tell them, "Your baby--" I will mention the baby is-- "The American Academy Pediatrics doesn't--" I always say that because it seems very professional, and they'll listen to it. I'm going to tell them-- and I'll translate that to Spanish, and I don't even know if that's fully a good translation, but I will translate it, and I'll say, "They recommend starting solids at six months, but take that and do what you want with it." I don't go into the solids because that's what the nutritionists talk about.

Table 11. Strategies for Effective Communication about Mixed Feeding/ "Las Dos" and the Early Introduction of Solid Foods

Strategy	Description
Strategy 1: Affirming healthy growth of baby	Affirm that baby is healthy and growing well on breastmilk alone.
Strategy 2: Challenging practices and cultural beliefs	Be willing to question why mothers are using "*las dos*," challenging commonly held beliefs and accepted practices. Consistently ask mothers the reason why they feel they need to give formula.
Strategy 3: Education	Provide education on specific topics of the impact of early supplementation on milk supply, superiority of breastmilk vs. formula, normal baby behavior, and overfeeding, using relatable examples to convey concepts.
Strategy 4: Focusing on continued breastfeeding	Encourage partially or exclusively breastfeeding mothers who are inquiring about formula supplementation to continue breastfeeding if it is going well.
Strategy 5: Focusing on health benefits of exclusive breastfeeding/not using "*las dos*"	Explain health benefits of breastmilk vs. formula for baby, including it being protective against illnesses, brain development, and higher IQs.
Strategy 6: Focusing on pumping as a solution	Propose pumping as a solution for common barriers to exclusive breastfeeding including returning to work, concerns about taking a bottle, and the potential negative influence of external factors on breastmilk quality.
Strategy 7: Referring to an authority figure	Refer mothers to speak about the issue in question (i.e., "*las dos,*" overfeeding, and the early introduction of solid foods) with someone who is considered an authority figure such as a doctor/pediatrician, WIC nutritionist or other clinician.
Strategy 8: Utilizing visual strategies and tools	Use visual tools when educating mothers and those that accompany her to visits, including: (1) pumping in the office so a mother can see how much milk she is producing; (2) visual props such as BellyBalls,™ building blocks and salt shakers to convey concepts about breastmilk, overfeeding and the effect of supplementation on milk supply; and (3) weighing baby in front of the mom and encouraging her to come in to weigh the baby if she's concerned about breastmilk alone not being sufficient for healthy weight gain.
Strategy 9: Strategies that do not work	The following strategies have not been found to work: (1) taking an authoritative tone or lecturing mothers, (2) focusing on the economic benefit of exclusive breastfeeding, (3) speaking too generally about breastfeeding being best for the baby; and (4) talking about pumping too early.

Strategy 1: Affirming Healthy Growth of Baby

Several participants (n = 5) observed that one effective approach to discouraging the practice of "*las dos*" with their Hispanic clients was to affirm that their baby is growing very healthy, and if applicable, is "chunky" or "chubby" on their breastmilk alone. Participants noted that this strategy is particularly appropriate for Hispanic mothers who are exclusively breastfeeding or are primarily breastfeeding but giving a small amount of additional formula. Many will ask about when they should start formula or how much supplemental formula they should be giving, based on the belief that it is necessary for a healthy baby. Reassuring them that the baby is healthy, growing well and *gordito* (chunky or chubby), if that is the case, on the milk they are producing alone is one way to address this issue.

> I always like to ask, "What's the reason why you've chosen to want to do a little bit of formula when you have such a great supply and you're doing so well? Your baby is so nice and chunky just on your breast milk." And so I ask kind of open-ended questions, which is how we're trained in this program as well, just to find out why. And a lot of them don't really know why. They just say they feel like they need to.

Strategy 2: Challenging Practices and Cultural Beliefs

The second strategy that emerged was challenging practices and cultural beliefs. This was mentioned by all but one participant (n = 16) and had the second highest number of references (65). Participants mentioned how important it was to listen to their Hispanic clients and question why they were using "*las dos*," and to challenge some of the beliefs associated with it. In challenging the practice of "*las dos*," the strategy was to consistently ask mothers "Why do you feel like you need to give formula?" or "Why are you planning to do "*las dos*?" and continue to probe for the reasons.

> And when we emphasize the benefits and, "Why did you think you have to give--?" I want to find a reason why she wants to give formula, and I give her a plan. "You don't have enough? Why?"

The moms' responses then allowed breastfeeding peer counselors to provide solutions, educate, and/or clarify some of the common beliefs previously outlined. In addition, I observed that more experienced peer counselors felt comfortable being assertive when it came to talking with mothers about stopping unnecessary supplementation and returning to exclusive breastfeeding. One very experienced peer counselor stated that she would directly tell them "we need to stop this," when it came to "*las dos*." In contrast, one newer participant expressed how she did not want to pry.

Another strategy that a few participants mentioned was challenging practices by referencing the infant feeding norm in the Hispanic client's country of origin. This was relevant for mothers who had been born in another country and often exclusively breastfed other children.

> I tell them, "In our countries we breastfeed. But now they're doing it, now they're trying to educate our moms in our countries. But you have not been educated. Did they tell you in Mexico how important it was for you to breastfeed?" "No, we just did it, because that was just something natural to do." "So why do you come here and you want to formula feed?" This is when moms have been breastfeeding in Mexico or El Salvador for 2-3 years, their first 2 kids in their country, and they come here and all of the sudden they want to use formula.

In challenging beliefs, participants noted the importance of being willing to counter some of the views that lead moms to believe that formula supplementation is necessary.

> I tell them, "Why are you giving the baby more formula?" "Because he's crying. He wants it." I say, "But the baby can't even talk. The baby is really not telling you he's hungry." "But he's crying." I say, "Well, try to comfort him in a different way. Have you tried that?" And then, a lot of women, they do pay attention to me. Others go home and they do whatever they're going to do.

> Because I tell them, "When you get upset," I said, "it's all in your mind, and maybe you feel like your heart is beating really hard because you're upset, but nothing else happens. If they draw blood, it's not affecting your blood. So it's just the same thing with your breastmilk, it does not have any-- because you're sad, or because you get upset and you're mad, it does not have any impact on the way your milk production, or what comes, or the nutrients or vitamins. It doesn't affect that."

Strategy 3: Education

All 17 participants mentioned the importance of education as a strategy to address "*las dos*" and overfeeding. There were 71 references to education during the interviews, which frequently co-occurred with the codes "challenging practices and cultural beliefs," "baby behavior," and "visual strategies and tools." Education is a core function of a breastfeeding peer educator, so this finding is not surprising. However, participants noted that they often used specific approaches to educate their Hispanic clients. The approaches included the following: (1) educating with visual tools about the impact of early supplementation with formula on their milk supply, which is particularly relevant because of the common perception of insufficient milk production; (2) educating about the superiority of breastmilk vs. formula (the specific components that each does and does not have) and why it is best for the health of the baby, which a closely held value for Hispanic mothers; (3) educating about normal baby behavior, correcting misconceptions about signs of hunger, and providing alternative strategies of comforting other than formula; and (4) educating about overfeeding and the size of the baby's belly.

> So sometimes they'll come in here and they have like a ten day old baby or three week old baby or sometimes even a you know, a baby younger than that and they'll say "You know I just don't feel like I feel I'm filling him up so I'm starting to give formula." So I'll say, OK what are your goals? How do you want this to play out? "Well, I want breastfeeding." Ok great. "You know most moms, all moms have the ability to make all the milk their baby needs." So I show them this little container with rice that's filled all the way to the top. I said "but every time you introduce formula, you tell your body to make less milk. OK. So the next day you're going to go, oh my gosh I have now I really have less milk." So what do you do? You give more formula, right? And so then, you're making even less milk. OK. "And then you really freak out because you really do have less milk, and you end up over here. So now you're over here and if you're wanting to wean your baby, you're well on your way. Is this what you want?" And they'll say, "No!" And I'll say, "Well then I'll say, "Well then where would you like to be?" I want to be over here. Well then, this process can work backwards and this is how we work backwards. And so, understanding the impact of supplementation on their particular ability to produce milk is something that sometimes works for some moms.

In addition, two participants noted that education about the superiority of breastmilk vs. formula was particularly effective with Hispanic fathers, who express a desire for their baby to receive the best and to be healthy, but do not necessarily understand the difference between the two feeding methods.

Participants also described how they used stories or relatable examples to convey concepts about "*las dos*" and overfeeding in a way that the Hispanic mothers were more likely to understand.

> So we have to explain about how the baby digests breastmilk. How the baby digests formula and the differences. That a lot of times helps moms to realize that "Ok, so it's not that something's wrong with my milk. It's just that the baby's able to digest it faster, that's why she or he is hungry. So I use like a salad. Eating a salad is much, much better for you, but you're going to get hungry quicker. So you're kind of like "Oh, ok, it makes sense." So they do – sometimes they're like "Ok, I guess I don't need formula."

> Of course I tell them my experience that…the difference when you see a healthy baby and the kind of chunky baby that you'll find in a formula fed baby. That is a totally kind of different kind of baby that you see. But also, that the milk is not the best milk, but it's a normal milk for the babies. It's from nature to you and from you to your baby. It's like feeding from a tree of your house than giving the baby McDonald's. Yeah, I say, where do you want to feed the baby? From the tree from your house, the apple tree from your house? Or from McDonald's? "Uh oh. "Yeah, from the apple tree from my house." That makes them think.

Strategy 4: Focusing on Continued Breastfeeding

A majority of participants (n=12) noted that an effective strategy was to encourage a partially or exclusively breastfeeding mother who was inquiring about formula supplementation to continue doing what she was doing if it seemed to be going well. This approach acknowledged that Hispanic mothers in particular often had already requested formula had either been using it to supplement, or had it on the shelf at home. Participants recognized that mothers often saw formula as security, but could be persuaded to hold onto the security (i.e., the can of formula), but continue to exclusively breastfeed.

> So let's just say that breastfeeding is going very well. And mom is giving formula regardless. Then still, I'm going to say, "Ok, since things are going so well, why don't you stick to fully breastfeeding for now?" And just keep the formula there, that's just fine. But don't use it. Pump instead." I'm not going to say, "What are you doing?" But I will put it more like, "Oh, everything is going great, so why even bother?"

Strategy 5: Focus on Health Benefits of Exclusive Breastfeeding/Not Using "*Las Dos*"

Half of participants observed that messages about the health benefits of breastmilk often resonated well with Hispanic mothers and fathers, and were a motivating factor to not continue giving "*las dos*" and to reduce the amount of overfeeding. Participants felt that explaining health benefits of breastmilk, including it being protective and supportive of brain development, higher IQs, not getting sick and fewer long-term health problems, did persuade some to not supplement or stop if they were already doing so. Participants also noted that in their experience, Hispanic mothers often did not understand that breastmilk and formula were not the same, and that their babies had a better chance of being healthier if they were exclusively breastfed. One participant did note that it was important to clarify to mothers that a healthy baby was not a fat baby, and what they wanted was a healthy baby.

> I always use my benefits. How beneficial it is for both mommy and baby to fully breastfeed. That it's the gift that continue giving because protects your baby now and also as an adult. Also, they love to hear, and they get really convinced - but it's true - when you tell them that babies that are fully breastfeed, it's proven that their brain develops better, and it's proven their IQ is higher. Especially fathers, they're like, *Que*? [Why]?

Strategy 6: Focusing on Pumping as a Solution

Several participants noted that in their experience, Hispanic mothers were generally not as comfortable with pumping as other groups, and sometimes preferred manual pumps or hand expression to electric ones. This strategy related both to proposing pumping as a solution for return to work (for whom it was feasible). In addition, proposing pumping as a solution was also related to the sub-theme previously identified as "It is necessary to introduce formula early in case baby needs to take a bottle," and for the theme of "External factors negatively affect milk quality, requiring formula use." Participants noted that it was often effective to explain to mothers how they could pump and put away their breastmilk for such occasions. For example, they could pump when they were not experiencing fear or other negative emotions, and then give their baby the pumped milk if they felt like their milk was "spoiled" for any reason. This approach embraces the fact that some cultural beliefs are unlikely to change even with education, and one approach to minimizing "*las dos*" is finding culturally appropriate strategies to encourage exclusivity.

> They know when they want to do exclusive breastfeeding they know it's because it's what's best, it's the healthiest thing….but then they ask me like, "What can I do for whenever I get upset because I know that I am going to have to stop breastfeeding when I get upset for a couple of days or even at least a day?" "You don't have to stop." "Well, what if I feel better?" "Then you start pumping then and save that. Every time you need to feed your baby, bring the baby to the breast. But if you ever feel that you need to supplement, you can do it with your own milk and you can prepare by pumping. Anything you pump just put away and then you'll have that for whenever you feel that way." Because sometimes really, I have to be honest, it's hard for me to get them off that mentality.

Strategy 7: Referring to an Authority Figure

Participants noted that one way they addressed the practices of "*las dos*," overfeeding and the early introduction of solid foods was to refer Hispanic mothers to speak about the issue in question with an authority figure, such as their doctor/pediatrician or the WIC nutritionist. Participants felt that while they could let the mom know that what they were doing was not a good idea and educate them on the reasons, they did not have the same authority as a doctor (a position that has a high level of respect in the Hispanic culture), or a WIC nutritionist, which is a clinical position. This perception was mentioned most frequently in regard to overfeeding and associated vomiting, and the early introduction of solid foods.

> I tell you that "your baby doctor recommends it [not introducing solids until 6 months]. And I'm sure you're going to talk to them, because every two months you will take your baby and talk to your doctor. From us, we need you to wait, feed baby, hopefully it's your breastmilk and no formula. But whichever, no soft food until baby's six months, because baby's tummy is still not well developed. It could develop allergies, stomach allergies. It could develop other type of diseases. You don't want to do that. Talk to your doctor. Usually what they advise is wait until the six months."

Participants also noted that they referred to the authority of the baby's doctor when Hispanic mothers are concerned about their baby not being sufficiently chubby, which is often one of the motivating factors for "*las dos*." They mentioned focusing on whether the doctor said the baby was healthy and growing fine, and then using that to affirm the healthiness of the baby to the mom.

> They do like chunky babies. I see moms that are fully breastfeeding, and if the baby's not that chunky, they're terrified. They're like, *Está muy flaquito.* [He is very skinny]. Uh, no….As you can see I'm very open. So I just say, "Tell me what the doctor said." Well the doctor is telling me the baby growing fine." "So why do you worry about it? He's doing great!" … hopefully when I put one and one together, it's like "Oh, yeah, baby's not chunky, but baby is healthy, yeah." At the end of the day I think that's what every mom wants, a healthy baby. So that's why I always ask that question. What does the doctor say?

Strategy 8: Utilizing Visual Strategies and Tools

The importance of utilizing visual strategies and tools was the third most salient sub-theme that emerged during the key informant interviews. Many participants (n=9) talked in detail about the importance of using various visual tools as they were educating mothers and other family members that often accompany them to consultations (e.g., fathers, grandmothers, sisters, peers, etc.). While this is considered a best practice for breastfeeding peer education in general, a few noted that illiteracy and low education levels of many of the Hispanic immigrant mothers and their partners made using visual strategies and tools particularly important. During the interviews, the following topics emerged that were related to visual strategies and tools: (1) using a pump while a mother is in the office so she can visually see how much milk she is producing, to counter the perception of insufficient milk supply; (2) using BellyBalls™ to demonstrate to mothers the small size of a newborn's stomach and educating them on how supplemental formula on top of breastfeeding will stretch the size of the stomach; (3) using props such as large building blocks/MegaBlocks™ or posters, to demonstrate the nutrient differences between formula and breastmilk while advocating for exclusivity being the best for the health of the child; 4) using props, such as salt shakers with two different contents to demonstrate the effect of supplementation on milk supply; and 5) weighing the baby in front of the mother, and encouraging her to come into the office to weigh the baby if she is concerned that the child will not gain weight without supplementing with formula.

> Because I really hear that so much about the lack of supply - and trying to convince them to do it is really the only thing I really try to do. To let them know that that is not true, that they do have enough, and that they're making plenty of milk. Sometimes what helps with the WIC is that I provide them a pump somehow so they can visually see it. Just like, okay, let's say a formula is modern, but hey, a pump is modern too, and you can use something like that to breastfeed your baby and actually see it. So I think it's really a very good thing. I offer the manual pump. So they can actually see. I've had moms that have partial packages and then after I tell them and show them they have enough milk, they go

> back to the nutritionist. I take them back and they do a package change to full breastfeeding. Just from the visual thing.
>
> They can go to the hospital and weigh the baby for free. I tell them they can come here with me, and we can do the weighing before and after feeds. And so then I have moms come here, some go to the hospital. And that way they feel comfortable knowing baby's gaining. That's one way that they'll stay away from the formula.

Strategy 9: Strategies that do not Work

While participants identified numerous strategies that they perceived as persuasive regarding exclusive breastfeeding in lieu of mixed feeding and overfeeding, and the age-appropriate introduction of solid foods, they also identified a number of strategies that they felt were not effective. Participants noted that taking an authoritative tone, lecturing, being too aggressive or forceful, and simply telling mothers to stop was likely to backfire. One participant also noted that cost savings with exclusive breastfeeding was not a persuasive argument, as WIC provides free formula that covers the majority of the cost to the mother. Another participant noted that it is not sufficient to simply tell Hispanic mothers that breastfeeding is best for their baby, because they largely know that. Rather, it is more effective to be specific about how breastmilk leads to a healthy baby. And a third noted that talking about pumping too early was ineffective, as some mothers see it as artificial and inconvenient.

> If you try to be too aggressive and try to come, "You need to breastfeed – " To me, if you make it too pushy, moms are going to, they're going to back off and then other – my moms don't want to be told what to do. They want to be helped with whatever they decide to do, and all of them, all of them. But with my Hispanic moms, if I tend to be—and that's why I try to connect in their own level because if you try to act like, "I know this information, and I'm going to tell you what's right and what's not right," then sometimes it's like going over their head, and they don't like that.

CHAPTER 5: QUANTITATIVE RESULTS

Summary statistics are displayed in Table 12. Statistical significance was established at $p \leq 0.05$ for all analyses. A majority of survey participants (69.7%) were Hispanic and spoke either Spanish (32.1%) or Spanish and English (22.1%) at home. One-third of the total participants were born in Mexico, compared to 46.8% of Hispanics (Of note, the survey included only three options for origin: U.S., Mexico and other country). Approximately three-quarters (72.5%) of Hispanics had an educational attainment level of high school graduation/GED or lower. Overall, Hispanic mothers had a lower educational attainment level than Blacks, Whites or Other.

Table 12. Characteristics of Survey Participants by Race/Ethnicity

Race[a]	Total N = 9,762	Hispanic n = 6,699 (69.7%)	White n = 1,557 (16.2%)	Black n = 1,125 (11.7%)	Other[b] n = 245 (2.5%)	P value†
Maternal age	%	%	%	%	%	< 0.001
18–24	40.9	38.6	48.2	44.9	29.1	
25–29	27.7	27.7	29.3	25.5	29.7	
30–34	18.5	19.3	15.5	17.2	22.0	
35–39	9.9	11.4	5.5	6.9	11.9	
40+	2.9	3.2	1.4	2.8	4.7	
Education[c]						< 0.001
Less than high school	34.9	43.7	16.9	11.9	16.6	
High school diploma or GED	30.8	28.8	35.5	36.3	27.5	
Some college or technical training, but no degree	26.6	21.5	37.2	40.7	32.3	
Associates degree or higher	7.7	5.9	10.4	11.0	23.6	
Place of birth[d]						< 0.001
United States	60.8	47.6	94.2	94.8	49.5	
Mexico	33.7	46.8	3.8	0	6.0	
Other country	5.9	5.8	2.1	5.2	44.5	
Language spoken at home[e]						< 0.001
Spanish	32.1	44.9	3.9	0	5.8	
English	45.0	24.4	92.4	98.7	64.7	
Spanish & English	22.1	30.7	47	0.6	3.9	
Other	0.7	0	0.7	0.6	25.6	

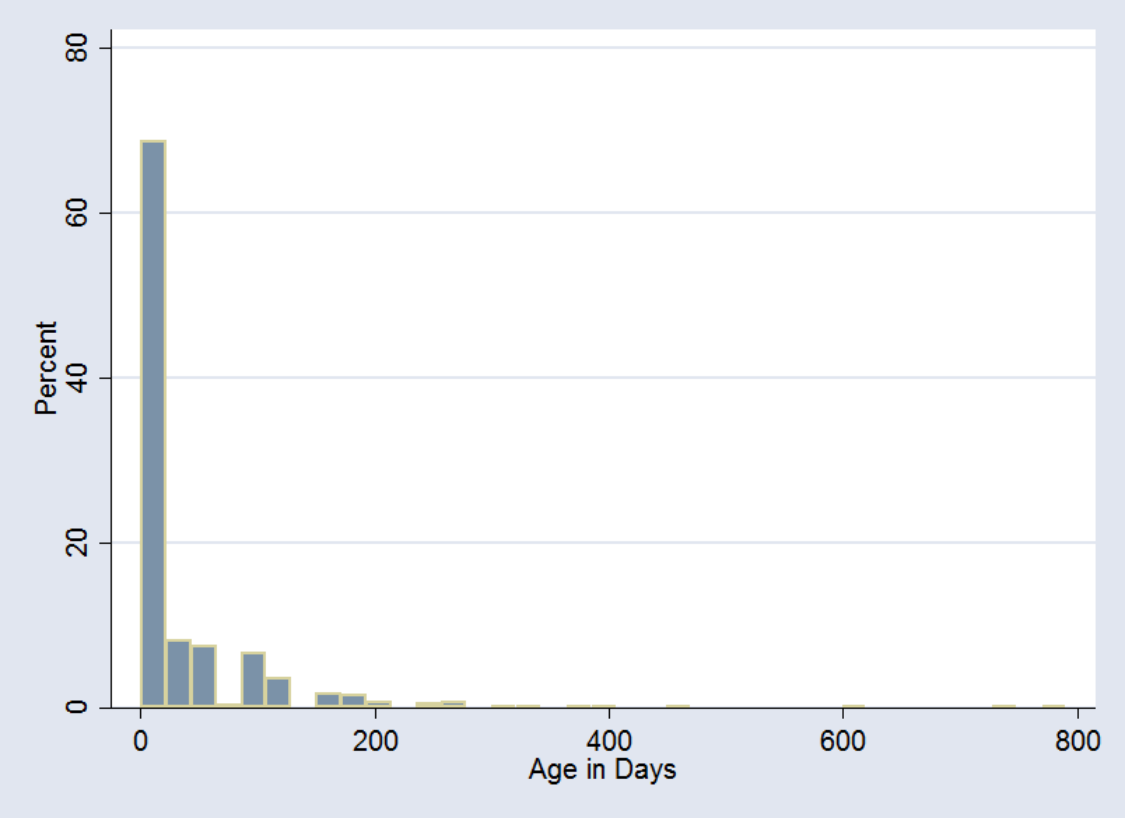
[a]Missing for 145 subjects. [b]"Other" is inclusive of Native American/Alaskan Native, Asian or Pacific Islander and Other, which was collectively n = 236 (2.5%) of the survey population. [c]Missing for 299 subjects. [d]Missing for 183 subjects. [e]Missing for 117 subjects. † $P \leq 0.05$, χ^2 test.

There were notable differences between race/ethnicity groups for breastfeeding intention, initiation and adding cereal to baby's bottle, all of which were statistically significant (Table 13). Hispanic mothers were more likely to report that that their intention was to both breast and formula feed (51.6%), versus 22.7% of Whites, 35.6% of Blacks and 42.0% of Other. In contrast, they were less likely than Whites and Others to indicate that they intended to exclusively breastfeed (35.1% of Hispanics, vs. 55.7% of Whites, 35.4% of Blacks and 42.0% of Other) or exclusively formula feed (9.5% of Hispanics, vs 15.3% of Whites, 23.3% of Blacks and 42.0% of Other). Note, these responses were based on recall of intention for feeding methods, rather than intention measured during the prenatal period. Of those surveyed, Hispanic mothers had the highest percentage that had breastfed at least once (88.0%), while the percentage that had formula fed was similar across all groups. Interestingly, fewer Hispanic mothers reported adding cereal to their baby's bottle (36.0%). This percentage was similar to mothers categorized as "Other," but nearly 14 and 30 percentage points lower than White and Black mothers, respectively.

The average number of days (mean) for the introduction of formula to breastfed babies demonstrated a statistically significant difference between the four categories of race/ethnicity, with Hispanic mothers having the lowest mean. This number should be interpreted with caution, however, as the distribution of the data was not normal (skewness 3.20, kurtosis 20.30), which was confirmed with a Shapiro-Wilk test. Figure 4 demonstrates the skewed data distribution of the baby's age when formula was introduced. Pairwise comparisons of means using the Tukey's HSD (honest significant difference) test indicated that differences were statistically significant only between Hispanic vs. White and Hispanic vs. Other. In addition, 40% of participants who reported breastfeeding at least once and reported formula feeding indicated they introduced

formula on the first day of their baby's life. Because of this, in subsequent logistic regression analysis, three dichotomous variables were created to reflect introduction of formula during the first day, week and month of a baby's life.

Figure 5. Age of Introduction of Formula to Infants Breastfed or Fed Breastmilk at Least Once Among All Mothers Surveyed (n = 6,070)



Similarly, the mean number of days for the introduction of solid foods should be interpreted with caution as the data did not have a normal distribution (skewness 0.68, kurtosis 9.85), as confirmed with a Shapiro-Wilk test. While Hispanic mothers had the highest mean number of days for the introduction of solid foods (158.1, or approximately 5.5 months), the median was the same for Hispanic, Black, and White mothers. Pairwise comparisons of means with Tukey's HSD test indicated that differences were statistically significant only between Hispanic vs. White and Black vs. White populations. Figure 5 demonstrates the distribution of

the data, which clustered around four months (22.6%), five months (17.8%) and six months (32.7%). This is likely explained by the structure of the survey questionnaire which allowed participants to answer in terms of the number of days, weeks, or months.

Figure 6. Age of Introduction of Foods or Liquids other than Breastmilk or Formula Among All Mothers Surveyed (n = 6,744)

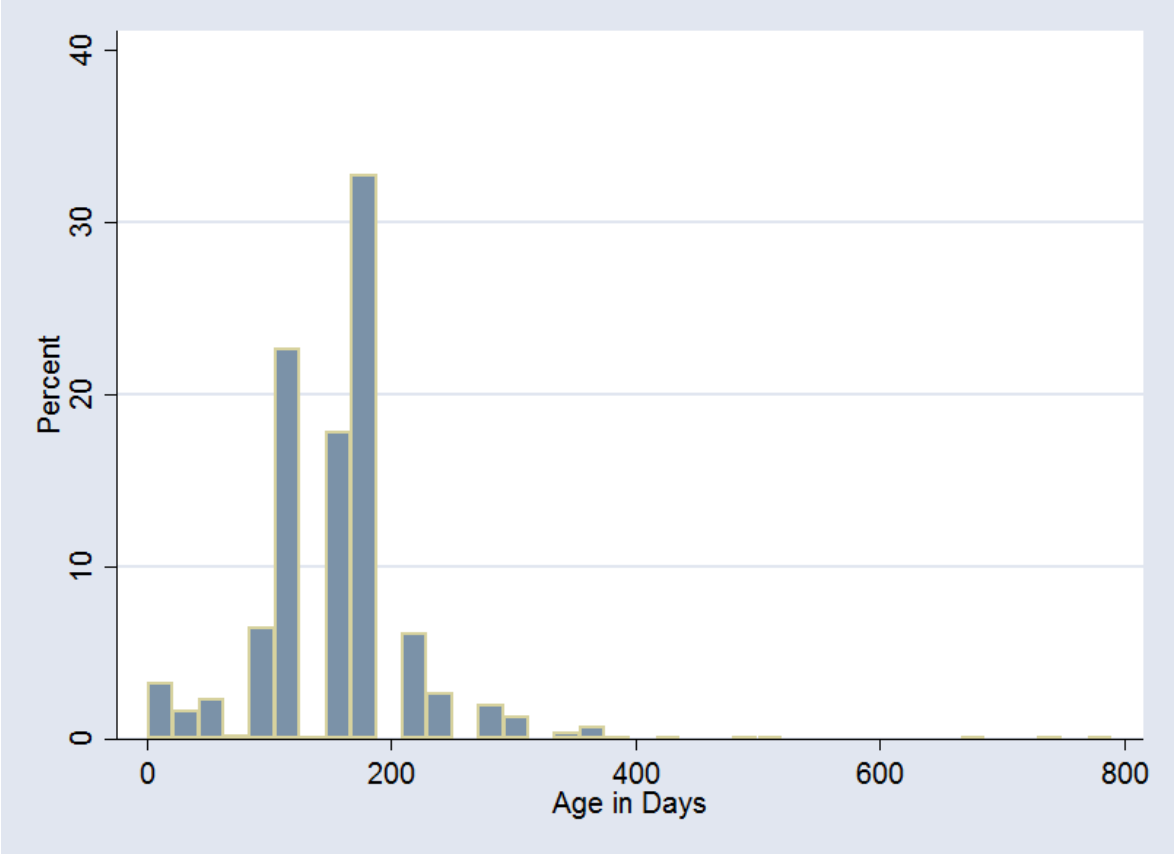


Table 13. Feeding Intention, Behaviors, and Beliefs by Race/Ethnicity

	Total (N = 9,617)[a]					P value
Race		**Hispanic** n = 6,699 (69.7%)	**White** n = 1,557 (16.2%)	**Black** n = 1,125 (11.7%)	**Other**[b] n = 236 (2.5%)	
Intention for feeding in first few weeks of life[b]	%	%	%	%	%	< 0.001†
Both breast and formula feeding	44.8	51.6	22.7	35.6	42.0	
Breastfeeding or breastmilk only	38.6	35.1	55.7	35.4	42.0	
Formula feed only	12.2	9.5	15.3	24.3	9.8	
I was not sure how I would feed my baby	3.9	3.6	5.4	3.9	3.0	
I don't know	0.5	0.3	0.8	0.8	3.4	
Ever breastfed baby/fed breastmilk[c]						< 0.001†
Yes	84.5	88.0	80.1	70.1	83.7	
No	15.5	12.0	19.9	30.0	16.3	
Ever given formula to baby[d]						< 0.001†
Yes	93.0	94.0	89.3	93.6	89.3	
No	7.0	6.0	10.7	6.4	10.7	
Ever added cereal to baby's bottle[e]						< 0.001†
Yes	41.7	36.0	49.9	65.6	35.7	
No	58.3	64.0	50.1	35.4	64.3	
Believe that breastfed babies are less likely to become obese children and adults[h]						0.003†
True	52.7	53.6	52.3	47.6	54.1	
False	20.7	20.8	19.7	19.6	16.0	
I don't know	26.6	25.6	28.0	28.0	28.0	

Continued

	Total (N = 9,617)[a]					P value
Race		**Hispanic** n = 6,699 (69.7%)	**White** n = 1,557 (16.2%)	**Black** n = 1,125 (11.7%)	**Other**[b] n = 236 (2.5%)	
Age of introduction of formula to infants who had ever been breastfed[g]						0.002ǂ
Mean days (SD)	31.7 (56.6)	30.1 (55.8)	35.8 (60.0)	32.8 (53.6)	42.6 (66.1)	
Median days (IQR)	3 (29.4)	3 (29.4)	7 (48.0)	3 (37.5)	7 (59.9)	
Age of introduction of solid foods (mean days) (SD)[h]						< 0.001ǂ
Mean days (SD)	155.7 (59.8)	158.1 (59.2)	144.7 (67.1)	157.8 (65.0)	156.8 (61.5)	
Median days (IQR)	152.2 (60.9)	152.2 (60.9)	152.2 (60.9)	152.2 (60.9)	175.3 (60.9)	

[a]Missing for 145 subjects. [b]Missing for 80 subjects. [c]Missing for 310 subjects. [d]Missing for 1,970 subjects. [e]Missing for 283 subjects. [f]Missing for 547 subjects. [g]Missing for 1,185 subjects. [h]Missing for 3,018 subjects. † $P \leq 0.05$, χ^2 test. ǂ $P \leq 0.05$, ANOVA test.

Table 14 displays the results of the analysis of feeding intention, behaviors and beliefs of Hispanic mothers only, exploring differences in language spoken at home, which serves as a proxy for acculturation. One of the notable trends is the intention to feed both breastmilk and formula (i.e., mixed feeding), which followed a pattern of acculturation, with 57.8% of Spanish-speaking mothers intending to do mixed feeding, compared to 52.9% of those that spoke Spanish and English at home an 38.4% who spoke only English at home. A similar pattern was found in Hispanic mothers who reported ever breastfeeding, with Spanish-speaking mothers more likely to have breastfed (94.6%), followed by Spanish- and English-speaking (87.6%), and then English-speaking (76.9%). Meanwhile, the percentages among these groups that had introduced formula were similar. An opposite pattern of acculturation was found with adding cereal to the bottle, with fewer Spanish-speaking mothers reporting adding cereal (31.6%) than Spanish- and English-speaking (38.6%) and English-speaking (40.4%). Small differences can be seen in the mean age of formula introduction to breastfed infants and age of introduction of solid foods in terms of the language spoken at home, although these measures have the same limitations as described previously. Finally, the small differences found between groups for the belief that breastfed babies are more likely to be obese children and adults were statistically significant.

Table 14. Feeding Intention, Behaviors, and Beliefs of Hispanic Mothers by Language Spoken at Home[a]

	Spanish-Speaking (n = 2,979)	**English and Spanish Speaking** (n = 2,041)	**English Speaking** (n = 1,621)	**P value**
Intention for feeding in first few weeks of life[b]	%	%	%	< 0.001†
Both breast and formula feeding	57.8	52.9	38.4	
Breastfeeding or breastmilk only	32.8	34.4	40.1	
Formula feed only	5.6	9.2	17.0	
I was not sure how I would feed my baby	3.5	3.2	4.3	
I don't know	0.3	0.4	0.2	
Ever breastfed baby[c]				< 0.001†
Yes	94.6	87.6	76.9	
No	5.4	12.4	23.1	
Ever given formula to baby[d]				0.0257†
Yes	93.6	94.7	93.4	
No	6.4	5.3	6.6	
Ever added cereal to baby's bottle[e]				< 0.001†
Yes	31.6	38.6	40.4	
No	68.4	61.4	59.6	
Believe that breastfed babies are less likely to become obese children and adults[f]				0.155†
True	55.2	52.9	51.7	
False	19.6	21.3	22.2	
I don't know	25.2	25.8	26.0	
Age of introduction of formula to infants who had ever been breastfed[g]				0.003‡
Mean days (SD)	28.8 (54.1)	30.2 (55.2)	32.1 (59.5)	
Median days (IQR)	3 (29.4)	3 (29.4)	3 (34.0)	
Age of introduction of solid foods[h]				0.015‡
Mean days (SD)	154.9 (56.8)	159.8 (60.8)	160.5 (60.5)	
Median days (IQR)	152.2 (60.9)	152.2 (60.9)	152.2 (60.9)	

[a]Missing language for 58 Hispanic subjects. [b]Missing for 61 subjects. [c]Missing for 247 subjects. [d]Missing for 1,161 subjects. [e]Missing for 207 subjects. [f]Missing for 398 subjects. [g]Missing for 970 subjects. [h]Missing for 2,139 subjects. † $P \leq 0.05$, χ^2 test. ‡ $P \leq 0.05$, ANOVA test.

Analysis of Introduction of Formula to Infants Breastfed at Least Once

Table 15 displays the results of the multivariate logistic regression models with adjusted odds ratios and confidence intervals (CI) for introduction of formula to infants who had been breastfed at least once, which I have broken down into three variables, including introduction on the first day of the infant's life, during the first week and during the first month. Independent variables were race, age, education origin and language. The variables of Day 1, Week 1 and Month 1 are not mutually exclusive. Predictors of introducing formula on Day 1 that were statistically significant include the following: (1) Hispanic and Black mothers had higher odds than White mothers (Hispanic AOR 1.31 (CI 1.09–1.57), Black AOR 1.50 (CI 1.21–1.87), and White referent); (2) Ages 25–39 had higher odds (age 25-29 AOR 1.24 (CI 1.08–1.42), age 30–34 AOR 1.45 (CI 1.23–1.70), age 35–39 AOR 1.27 (CI 1.03–1.57); (3) Mexican origin had slightly lower odds (AOR 0.83 (CI 0.70–0.98); and (4) Spanish- and Spanish- and English-speaking mothers had higher odds than those that spoke English only (AOR 1.23 (CI 1.0–1.52) and 1.32 (CI 1.12–1.56), respectively). The overall model for Day 1 was statistically significant ($p < 0.001$, pseudo R2 = 0.054. Hosmer-Lemeshow test also confirmed goodness of fit for the logistic regression model.

The multivariate model for introduction of formula during the first week had fewer statistically significant results (Week 1 model $p < 0.001$, pseudo R2 = 0.007, Hosmer-Lemeshow test confirmed goodness of fit). Ages 30–34, Spanish-speaking, and Spanish- and English-speaking predicted a higher likelihood of introducing formula during the first week to infants who had been breastfed at least once (ages 30-34 AOR 1.27 (CI 1.08–1.50), Spanish-speaking AOR 1.33 (CI 1.08–1.64), Spanish- and English-speaking AOR 1.23 (CI 1.04–1.45), and Mexican origin predicted a lower likelihood for the same (AOR 0.82 (CI 0.69–0.98).

The multivariate model for introduction of formula during the first month also had fewer statistically significant results than Day 1 (first month model p = 0.001, pseudo R2 = 0.007, Hosmer-Lemeshow test confirmed goodness of fit). Mothers who were ages 30-34, had less than a high school diploma, and spoke Spanish at home had higher odds of introducing formula during the first month to infants who had been breastfed at least once (ages 30-34 AOR 1.30 (CI 1.01–1.48), less than high school AOR 1.18 (CI 1.00–1.40), Spanish-speaking AOR 1.28 (CI 1.01–1.64).

Table 15. Predictors of Introduction of Formula to Infants Breastfed at Least Once by Day 1, Week 1 and Month 1 Among all Mothers Surveyed, by Maternal Characteristics[a]
(Odds Ratios with 95% Confidence Intervals)

Total (n = 6,070)[b]	**Introduced on Day 1** (n = 2,182)		**Introduced During Week 1** (n = 3,585)		**Introduced During Month 1** (n = 4,590)	
Variable	**Adjusted OR (95% CI)**	**P Value**	**Adjusted OR (95% CI)**	**P Value**	**Adjusted OR (95% CI)**	**P Value**
Race						
White	1	--	1	--	1	--
Hispanic	1.31 (1.09–1.57)*	0.004	1.18 (0.99–1.40)	0.059	1.15 (0.94–1.39)	0.151
Black	1.50 (1.21–1.87)*	< 0.001	1.20 (0.97–1.48)	0.085	1.13 (0.89–1.43)	0.311
Other	0.78 (0.49–1.25)	0.302	0.77 (0.51–1.17)	0.217	0.75 (0.48–1.70)	0.206
Age						
18–24	1	--	1	--	1	--
25–29	1.24 (1.08–1.42)*	0.002	1.08 (0.95–1.24)	0.236	1.00 (0.86–1.17)	0.949
30–34	1.45 (1.23–1.70)*	<0.001	1.27 (1.08–1.50)*	0.003	1.23 (1.01–1.48)*	0.034
35–39	1.27 (1.03–1.57)*	0.026	1.16 (0.94–1.43)	0.175	1.15 (0.90–1.47)	0.255
40+	1.28 (0.88–1.87)	0.193	1.0 (0.69–1.45)	0.988	1.02 (0.67–1.57)	0.925
Education						
Less than high school	1.07 (0.92–1.24)	0.377	1.10 (0.96–1.28)	0.172	1.18 (1.00–1.40)*	0.049
High school diploma or GED	1	--	1	--	1	--
Some college or technical training, but no degree	1.03 (0.90–1.19)	0.660	0.95 (0.83–1.09)	0.494	0.94 (0.80–1.10)	0.412
Associates degree or higher	0.89 (0.71-1.11)	0.294	1.04 (0.69–1.05)	0.122	0.84 (0.67–1.07)	0.157
Origin						
United States	1	--	1	--	1	--
Mexico	0.83 (0.70–0.98)*	0.033	0.82 (0.69–0.98)*	0.027	0.84 (0.69–1.03)	0.096
Other country	1.0 (0.76–1.32)	0.99	1.09 (0.82–1.45)	0.533	1.05 (0.76–1.46)	0.766
Language						
English	1		1	--	1	--
English & Spanish	1.32 (1.12–1.56)*	0.054	1.23 (1.04–1.45)*	0.015	1.10 (0.91–1.33)	0.314
Spanish	1.23 (1.0–1.52)*	0.001	1.33 (1.08–1.64)*	0.008	1.28 (1.01–1.64)*	0.043

[a]Among women who reported ever breastfeeding and also reported that their baby was ever given formula. [b]Missing for 1,185 subjects.
*Indicates statistically significant result.

Table 16 provides the results of the multivariate logistic regression analysis with adjusted odds ratios and confidence intervals for Hispanic mothers only, analyzing the introduction of formula to infants who had been breastfed at least once, on the first day of the infant's life (Day 1), during the first week (Week 1) and during the first month (Month 1). Independent variables were race, age, education origin and language. Results that were statistically significant are indicated with an asterisk (Day 1 model – p = 0.001, pseudo R2 = 0.007, Hosmer-Lemeshow test confirmed goodness of fit). Predictors of formula introduction on Day 1 that were statistically significant included the following: (1) Ages 25+ had higher odds (ages 25–29 AOR 1.29 (CI 1.25–1.94), ages 30–34 AOR 1.52 (CI 1.25–1.83), ages 35–39 AOR 1.29 (CI 1.02–1.64); and (2) Spanish- and English-speaking mothers had higher odds (AOR 1.31 (CI 0.94–1.81) than those that spoke English only.

The multivariate model for introduction of formula during Week 1 (Hispanic mothers only) had fewer statistically significant results (Week 1 model p = 0.001, pseudo R2 = 0.006, Hosmer-Lemeshow test confirmed goodness of fit). Similar to the general population model, ages 30–34 were significant, predicting a higher likelihood to introduce formula during the first week to infants who had been breastfed at least once (AOR 1.24 (CI 1.02–1.51). Differences from the general population model included a higher likelihood of Hispanic mothers from a country other than the U.S. or Mexico or those that speak both English and Spanish at home to introduce formula during the first week to infants who had been breastfed at least once (Other country AOR 1.57 (CI 1.09–2.25), English and Spanish AOR 1.20 (CI 1.01–1.42).

The multivariate model for introduction of formula during the first month (Hispanic mothers alone) had only one statistically significant result (Month 1 model p = 0.003, pseudo R2 = 0.0065 Hosmer-Lemeshow test confirmed goodness of fit). Hispanic mothers who were born

in a country other than the U.S. or Mexico had higher odds of introducing formula during the first month to infants who had been breastfed at least once (Other country AOR 1.59 (CI 1.01–2.48).

Table 16. Predictors of Introduction of Formula to Infants Breastfed at Least Once on Day 1, Week 1 and Month 1 – Hispanic Mothers by Maternal Characteristics[a]
(Odds Ratios with 95% Confidence Intervals)

Total[b] (n = 4,233)	**Introduced on Day 1** (n = 1,594)		**Introduced During Week 1** (n = 2,586)		**Introduced During Month 1** (n = 3,261)	
Variable	**Adjusted OR (95% CI)**	**P Value**	**Adjusted OR (95% CI)**	**P Value**	**Adjusted OR (95% CI)**	**P Value**
Age						
18–24	1	--	1	--	1	--
25–29	1.29 (1.25–1.94)*	0.002	1.13 (0.96–1.32)	0.148	1.04 (0.87–1.25)	0.667
30–34	1.52 (1.25–1.83)*	< 0.001	1.24 (1.02–1.51)*	0.028	1.21 (0.96–1.51)	0.105
35–39	1.29 (1.02–1.64)*	0.036	1.15 (0.91–1.46)	0.243	1.28 (0.96–1.72)	0.087
40+	1.25 (0.80–1.95)	0.326	0.83 (0.54–1.29)	0.411	0.83 (0.51–1.36)	0.459
Education						
Less than high school	1.07 (0.91–1.26)	0.430	1.05 (0.73–1.04)	0.534	1.16 (0.96–1.40)	0.135
High school diploma or GED	1	--	1	-	1	-
Some college or technical training but no degree	1.02 (0.86–1.21)	0.866	0.90 (0.76–1.07)	0.249	0.90 (0.74–1.10)	0.292
Associates degree or higher	0.90 (0.68–1.19)	0.470	0.82 (0.62–1.07)	0.141	0.81 (0.60–1.11)	0.191
Origin						
United States	1	--	1	--	1	-
Mexico	0.87 (0.72–1.04)	0.123	0.87 (0.73–1.04)	0.119	0.90 (0.74–1.10)	0.260
Other Country	1.30 (0.94–1.81)	0.110	1.57 (1.09–2.25)*	0.014	1.59 (1.01–2.48)*	0.044
Language						
English	1	--	1	--	1	-
English & Spanish	1.31 (0.94–1.81)*	0.003	1.20 (1.01–1.42)*	0.039	1.11 (0.91–1.35)	0.308
Spanish	1.14 (1.10–1.56)	0.267	1.24 (0.99–1.54)	0.058	1.19 (0.92–1.53)	0.182

[a]Among women who reported ever breastfeeding and also reported that their baby was ever given formula. [b]Missing for 970 subjects.
*Indicates statistically significant result.

Analysis of Introduction of Foods or Liquids other than Breastmilk or Formula

Table 17 provides the results of the multivariate logistic regression analysis with adjusted odds ratios and confidence intervals for the introduction of foods or liquids other than formula or breastmilk to infants prior to four months of age. Independent variables were race, age, education, origin, and language. Results that were statistically significant are indicated with an asterisk. Initial bivariate logistic regression analysis indicated that while all of the five independent variables had at least one statistically significant result, race was the strongest predictor. With the multivariate logistic model for all mothers ($p < 0.001$, pseudo $R2 = 0.006$, Hosmer-Lemeshow test confirmed goodness of fit), only three of the variables were statistically significant. Hispanic and Black mothers had lower odds of introducing foods or liquids other than breastmilk or formula prior to four months (Hispanic AOR 0.61 (CI 0.52–0.72), Black AOR 0.66 (CI 0.54–0.80), White referent), along with mothers ages 30–34 (AOR 0.85 (CI 0.73–0.98), ages 18–24 referent). Mothers from a country other than the U.S. or Mexico had higher odds of introducing foods or liquids other than breastmilk or formula prior to four months of age (AOR 1.47 (CI 1.14–1.91)). The multivariate regression model for Hispanic mothers only ($p = 0.025$, pseudo $R2 = 0.004$, Hosmer-Lemeshow test confirmed goodness of fit) had similar results for origin, as Hispanic mothers from a country other than Mexico or the U.S. had higher odds of introducing foods or liquids prior to four months (AOR 1.66 (CI 1.23–2.26).

Table 17. Predictors of Introduction of Foods or Liquids Other than Breastmilk or Formula Prior to 4 Months of Age, by Maternal Characteristics
(Odds Ratios with 95% Confidence Intervals)

	All Mothers		Hispanic Mothers	
Variable	**Adjusted OR (95% CI)**	**P Value**	**Adjusted OR (95% CI)**	**P Value**
Race				
White	1	--		
Hispanic	0.61 (0.52–0.72)*	< 0.001		
Black	0.66 (0.54–0.80)*	< 0.001		
Other	0.80 (0.53–1.19)	0.268		
Age				
18–24	1	--	1	--
25–29	0.95 (0.84–1.08)	0.456	1.00 (0.96–1.18)	0.920
30–34	0.85 (0.73–0.98)*	0.031	0.94 (0.78–1.13)	0.489
35–39	0.88 (0.72–1.07)	0.202	0.95 (0.75–1.20)	0.659
40+	1.08 (0.77–1.52)	0.641	1.16 (0.78–1.73)	0.455
Education				
Less than high school	1.09 (0.88–1.30)	0.492	0.95 (0.81–1.12)	0.574
High school diploma or GED	1	--	1	--
Some college or technical training, but no degree	1.14 (0.95–1.37)	0.155	1.24 (1.04–1.47)*	0.017
Associates degree or higher	0.99 (0.95–1.37)	0.925	0.99 (1.75–1.31)	0.933
Origin				
United States	1	--	1	--
Mexico	1.03 (0.87–1.23)	0.743	1.05 (0.88–1.26)	0.594
Other Country	1.47 (1.14–1.91)*	0.004	1.66 (1.23–2.26)*	< 0.001
Language				
English	1	--		
English & Spanish	0.96 (0.87–1.32)	0.656	0.97 (0.82–1.16)	0.740
Spanish	1.07 (0.87–1.32)	0.528	1.02 (0.81–1.27)	0.882

* Indicates statistically significant result.

Reasons for Introducing Formula to Infants Breastfed at Least Once

Table 18 provides cross-tabulations of the reasons for introducing formula to infants who had been breastfed at least once, as indicated by survey participants. Differences between race/ethnicity were statistically significant for 14 of 17 reasons. On average, the mean number of reasons indicated was highest for Hispanic mothers (Hispanic 2.60, White 2.29, Black 1.98 and Other 2.30, $p < 0.001$). It should be noted that the survey instrument allowed mothers to mark "yes" or "no" for each reason, which resulted in a large number of skips/missing values (i.e.,

some respondents marked “yes” for 3 out of 17 reasons but did not mark “no” for the other 14, leaving both “yes” and “no” blank). These are indicated at the bottom of Table 14 and subsequent tables that analyze the reasons for introducing formula.

The top reasons indicated by Hispanic mothers were “I didn’t think I had enough milk,” (57.0%), followed by “Breastmilk alone did not satisfy my baby” (56.8%) and “My baby had trouble sucking or latching on” (47.9%; Table 19). While these top three reasons were the same for White and Other mothers, and two were the same for Black mothers, the overall percentages were higher for Hispanics, and the differences between these groups were statistically significant. Nineteen percent more Hispanic mothers than Black mothers indicated that “Breastmilk alone did not satisfy my baby.” Other notable differences for some of the most common reasons include the following: (1) Hispanic mothers were more likely to indicate that they had introduced formula because their baby had lost interest in nursing or began to wean themselves (28.7%), because they did not want to breastfeed in public (20.9%), and they did not like breastfeeding (18.1%, with the difference largest between Hispanics and Whites); (2) Hispanic mothers were slightly less likely than White mothers to indicate that they had introduced formula because a health professional had told them to (Hispanic 16.3%, White 20.9%); and (3) Black mothers were more likely than Hispanic mothers to indicate returning to work or school as a reason for introducing formula (Black 44.7%, Hispanic 29.4%).

Table 18. Reasons for Introducing Formula to Infants Breastfed at Least Once, by Race, Among Women Who Reported Ever Breastfeeding and Also Reported that their Baby Was Ever Given Formula

Reasons for Introducing Formula Indicating "Yes" to the following reasons	**Total**[a] N = 7,255 %	**Hispanic** n = 5,203 %	**White** n = 1,086 %	**Black** n = 701 %	**Other** n = 167 %	**P Value†**
I didn't think I had enough milk.[b]	54.7	57.0	52.4	42.2	55.8	< 0.001
Breastmilk alone did not satisfy my baby.[c]	52.9	56.8	45.7	37.3	48.5	< 0.001
My baby had trouble sucking or latching on.[d]	45.2	47.9	39.7	36.4	37.8	< 0.001
I could not tell how much my baby ate.[e]	32.9	34.1	31.4	26.7	34.9	0.004
I was going back to work or school outside of the home.[f]	30.0	29.4	23.9	44.7	27.1	< 0.001
My baby lost interest in nursing or began to wean himself or herself.[g]	25.4	28.7	16.4	18.8	19.1	< 0.001
Pumping milk was too hard or inconvenient.[h]	22.9	21.9	22.9	28.0	23.0	0.017
Breastfeeding was too painful.[i]	22.5	23.1	18.7	24.2	22.5	0.028
Another reason not listed here.[j]	19.7	16.3	31.8	17.4	36.5	< 0.001
I was not able to make enough milk after I went back to work.[k]	19.5	19.5	17.6	23.2	17.7	0.067
I did not want to breastfeed in public.[l]	18.7	20.9	12.9	13.5	15.5	< 0.001
Pumping milk was too painful.[m]	17.6	18.4	15.6	16.0	16.0	0.160
I felt that I breastfed long enough for my baby to get the benefits of breastfeeding.[n]	17.3	17.5	15.5	19.2	15.6	0.283
A health professional said I should feed my baby formula.[o]	16.9	16.3	20.9	13.3	19.5	0.001
I did not like breastfeeding.[p]	16.6	18.1	11.4	17.3	8.7	< 0.001
My baby began to bite.[q]	7.9	8.8	4.5	7.0	10.2	< 0.001
My baby became sick and could not breastfeed.[r]	6.4	6.6	6.7	4.5	5.5	0.258

[a]Missing (blank, no reasons given for any of the responses) for 242 subjects that reported ever breastfeeding and reported that their baby was ever given formula. Race missing for 98 subjects. [b]Missing for 1,388 subjects (blank, neither "yes" nor "no" selected, same for the following values). [c]Missing for 1,413 subjects. [d]Missing for 1,364 subjects. [e]Missing for 1,837 subjects. [f]Missing for 1,711 subjects. [g]Missing for 1,762 subjects. [h]Missing for 1,896 subjects. [i]Missing for 1,855 subjects. [j]Missing for 3,087 subjects. [k]Missing for 1,921 subjects. [l]Missing for 1,961 subjects. [m]Missing for 1,926 subjects. [n]Missing for 1,961 subjects. [o]Missing for 1,846 subjects. [p]Missing for 2,025 subjects. [q]Missing for 1,867 subjects. [r]Missing for 1,815 subjects. †$P \leq 0.05$, χ^2 test

Table 19. Hispanic Mothers Reasons for Introducing Formula to Infants Breastfed at Least Once, in Order of Frequency

Reason for Introducing Formula (n = 5,203)	%
I didn't think I had enough milk.	57.0
Breastmilk alone did not satisfy my baby.	56.8
My baby had trouble sucking or latching on.	47.9
I could not tell how much my baby ate.	34.1
I was going back to work or school outside of the home.	29.4
My baby lost interest in nursing or began to wean himself or herself.	28.7
Breastfeeding was too painful.	23.1
Pumping milk was too hard or inconvenient.	21.9
I did not want to breastfeed in public.	20.9
I was not able to make enough milk after I went back to work.	19.5
Pumping milk was too painful.	18.4
I did not like breastfeeding.	18.1
I felt that I breastfed long enough for my baby to get the benefits of breastfeeding.	17.5
A health professional said I should feed my baby formula.	16.3
Another reason not listed here.	16.3
My baby began to bite.	8.8
My baby became sick and could not breastfeed.	6.6

Table 20 provides cross-tabulations by language spoken at home (a proxy for acculturation) of the reasons that Hispanic mothers give for introducing formula to infants who had been breastfed at least once. Differences in language were statistically significant for 16 of 17 reasons. Notable differences were found for multiple reasons. Spanish-speaking mothers were more likely to indicate that "Breastmilk alone did not satisfy my baby" (67.4%, compared to 51.7% of Spanish- and English-speaking and 43.7% of English-speaking mothers). To provide a point of comparison, 37.3% of Black mothers indicated this as a reason (Table 18). A similar pattern of acculturation was found for "My baby lost interest in nursing or began to wean himself or herself."

Spanish-speaking mothers were more likely to indicate “I didn’t think I had enough milk,” “A health professional said I should feed my baby formula,” and “I did not like breastfeeding,” and were less likely to indicate that they had introduced formula because they were going back to work or school outside of the home.

Table 20. Reasons for Introducing Formula to Infant Breastfed at Least Once, by Language Spoken at Home Among Hispanic Mothers Who Reported Ever Breastfeeding and Also Reported That Their Baby Was Ever Given Formula

Reason for Introducing Formula (Indicating "yes" to following reasons)[a] (n = 5,203)[b]	**Spanish-Speaking** (n = 2,382) %	**English and Spanish Speaking** (n = 1,641) %	**English Speaking** (n = 1,135) %	**P Value†**
I didn't think I had enough milk.[c]	62.1	53.2	53.4	< 0.001
Breastmilk alone did not satisfy my baby.[d]	67.4	51.7	43.7	< 0.001
My baby had trouble sucking or latching on.[e]	44.2	51.2	49.5	< 0.001
I could not tell how much my baby ate.[f]	31.9	33.6	38.2	0.005
I was going back to work or school outside of the home.[g]	24.2	33.2	32.1	< 0.001
My baby lost interest in nursing or began to wean himself or herself.[h]	31.1	27.8	22.2	< 0.001
Pumping milk was too hard or inconvenient.[i]	16.5	24.5	26.4	< 0.001
Breastfeeding was too painful.[j]	20.8	24.6	25.2	0.016
Another reason not listed here.[k]	14.5	15.3	20.0	0.005
I was not able to .make enough milk after I went back to work.[l]	17.0	21.6	20.0	0.008
I did not want to breastfeed in public.[m]	23.7	18.7	19.3	0.002
Pumping milk was too painful.[n]	17.4	19.2	18.9	0.466
I felt that I breastfed long enough for my baby to get the benefits of breastfeeding.[o]	20.6	15.7	15.7	< 0.001
A health professional said I should feed my baby formula.[p]	20.0	12.9	15.3	< 0.001
I did not like breastfeeding.[q]	24.4	13.4	15.2	<0.001
My baby became sick and could not breastfeed.[r]	8.0	5.4	5.8	0.008
My baby began to bit.[s]	11.0	8.0	6.4	< 0.001

[a]Missing (blank, no reasons given for any of the responses) for 198 subjects that reported ever breastfeeding and reported that their baby was ever given formula. [b]Missing language (i.e., blank answer) for 45 Hispanic subjects that reported ever breastfeeding and reported that their baby was ever given formula. [c]Missing (neither yes nor no marked) for 1,054 subjects. [d]Missing for 1,053 subjects. [e]Missing for 1,028 subjects. [f]Missing for 1,429 subjects. [g]Missing for 1,328 subjects. [h]Missing for 1,345 subjects. [i]Missing for 1,487 subjects. [j]Missing for 1,435 subjects [k]Missing for 2,359 subjects. [l]Missing for 1,495 subjects. [m]Missing for 1,521 subjects. [n]Missing for 1,500 subjects. [o]Missing for 1,516 subjects. [p]Missing for 1,475 subjects. [q]Missing for 1,589 subjects. [r]Missing for 1,409 subjects. [s]Missing for 1,447 subjects. † $P \leq 0.05$, χ^2 test.

Table 21 provides cross-tabulations of the reasons that Hispanic mothers give for introducing formula to infants who had been breastfed at least once by their country of origin (U.S., Mexico or Other). Differences in origin were statistically significant for 11 of 17 reasons. Notable differences between countries of origin were found for multiple reasons. Hispanic mothers born in Mexico and other countries were more likely to indicate that "Breastmilk alone did not satisfy my baby" (64.6% born in Mexico, 74.1% born in another country, and 47.1% born in the U.S.) A similar difference was found for "I didn't think I had enough milk" (60.9% born in Mexico, 68.1% born in another country, 51.9% born in the U.S) and "A health professional said I should feed my baby formula" (17.8% born in Mexico, 28.9% born in another country, 13.8% born in the U.S.).

Table 21. Reasons for Introducing Formula to Breastfed Infants by Country of Origin Among Hispanic Mothers Who Reported Ever Breastfeeding and Also Reported That Their Baby Was Ever Given Formula

Reason for Introducing Formula to Breastfed Infant (Indicating "yes" to following reasons) [a] (n=5,203) [b]	**United States** (n = 2,339) (%)	**Mexico** (n = 2,512) (%)	**Other Country** (n = 271) (%)	**P Value†**
I didn't think I had enough milk.[c]	51.9	60.9	68.1	< 0.001
Breastmilk alone did not satisfy my baby.[d]	47.1	64.6	74.1	< 0.001
My baby had trouble sucking or latching on.[e]	49.9	46.2	55.2	0.051
I could not tell how much my baby ate.[f]	34.5	33.1	35.8	0.598
I was going back to work or school outside of the home.[g]	33.3	24.5	33.1	< 0.001
My baby lost interest in nursing or began to wean himself or herself.[h]	25.5	31.0	38.4	< 0.001
Pumping milk was too hard or inconvenient.[i]	24.5	18.2	25.0	< 0.001
Breastfeeding was too painful.[j]	23.7	22.9	21.9	0.879
Another reason not listed here.[s]	17.7	13.7	26.0	< 0.001
I was not able to make enough milk after I went back to work.[k]	21.1	16.6	26.9	< 0.001
I did not want to breastfeed in public.[l]	18.9	22.7	22.5	0.020
Pumping milk was too painful.[m]	17.3	18.9	22.1	0.211
I felt that I breastfed long enough for my baby to get the benefits of breastfeeding.[n]	16.0	19.2	15.9	0.038
A health professional said I should feed my baby formula.[o]	13.8	17.8	28.9	< 0.001
I did not like breastfeeding.[p]	14.3	21.7	20.7	< 0.001
My baby began to bite.[q]	6.5	11.4	8.9	< 0.001
My baby became sick and could not breastfeed.[r]	5.7	7.2	9.8	0.051

[a]Missing (blank, no reasons given for any of the responses) for 198 subjects that reported ever breastfeeding and reported that their baby was ever given formula. [b]Missing origin (blank response) for 81 Hispanic subjects that reported ever breastfeeding and reported that their baby was ever given formula. [c]Missing (neither yes nor no marked) for 1,054 subjects. [d]Missing for 1,053 subjects. [e]Missing for 1,028 subjects. [f]Missing for 1,429 subjects. [g]Missing for 1,328 subjects. [h]Missing for 1,345 subjects. [i]Missing for 1,487 subjects. [j]Missing for 1,435 subjects. [k]Missing for 2,359 subjects. [l]Missing for 1,495 subjects. [m]Missing for 1,521 subjects. [n]Missing for 1,500 subjects. [o]Missing for 1,516 subjects. [p]Missing for 1,475 subjects. [q]Missing for 1,589 subjects. [r]Missing for 1,409 subjects. [s]Missing for 1,447 subjects. † $P \leq 0.05$, χ^2 test.

Tables 22 and 23 provide the results of a series of multivariate logistic regression analyses conducted for the top six reasons Hispanic that mothers indicated why they introduced formula to infants who had been breastfed at least once. All models were statistically significant at $p < 0.001$ and Hosmer-Lemeshow tests confirmed goodness of fit. Results that were statistically significant are indicated with an asterisk. Notable results include the following: (1) Birth in a county other than the U.S. (Mexico AOR 1.49 (CI 1.25–1.78), Other country AOR 2.20 (CI 1.55-3.13), Speaking Spanish or Spanish and English (AOR 2.02 (CI 1.62–2.53) and 1.29 (1.08-1.54), respectively), and having an associate's degree or higher (AOR 1.38 (CI 1.03–1.84) were associated with the reason "Breastmilk alone did not satisfy my baby;" (2) Mothers older than 25 had lower odds of indicating "My baby had trouble sucking or latching on;" (3) Spanish-speaking and Spanish- and English-speaking mothers had lower odds of indicating "I could not tell how much my baby ate;" (4) Mothers from Mexico and those with less than a high school education had a lower odds of indicating "I was going back to work or school outside of the home;" (5) Speaking Spanish or Spanish and English (AOR 1.50 (CI 1.16–1.94) and 1.26 (CI 1.02–1.55), respectively), birth in another country other than Mexico (AOR 1.57 (CI1.09–2.26) and being aged 25–35 were associated with the reason "My baby lost interest and began to wean him/herself;" and (6) Birth in a county other than the U.S. (Mexico AOR 1.27 (CI 1.07–1.52), Other country AOR 1.74 (CI 1.22–2.46), being age 30–34 (AOR 1.3 (CI 1.08–1.58), and having less than a high school education (AOR 0.82 (CI 0.70–0.97) were associated with the reason "I didn't think I had enough milk."

Table 22. Predictors of Common Reasons for Introducing Formula to Infants Breastfed at Least Once Among Hispanic Mothers

	Reason					
Variable	**Breastmilk alone did not satisfy my baby** (n = 4,222)		**I didn't think I had enough milk** (n = 4,224)		**My baby had trouble sucking or latching on** (n = 4,235)	
	Adjusted OR (95% CI)	**P Value**	**Adjusted OR (95% CI)**	**P Value**	**Adjusted OR (95% CI)**	**P Value**
Age						
18–24	1	--	1	--	1	--
25–29	1.09 (0.94–1.38)	0.285	1.05 (0.89–1.23)	0.554	0.70 (0.60–0.82)*	< 0.001
30–34	1.14 (0.94–1.38)	0.180	1.30 (1.08–1.58)*	0.007	0.70 (0.58–0.85)*	< 0.001
35–39	1.17 (0.93–1.49)	0.186	1.24 (0.98–1.58)	0.067	0.66 (0.52–0.83)*	< 0.001
40+	1.05 (0.68–1.60)	0.835	1.25 (0.82–1.92)	0.300	0.52 (0.34–0.79)*	0.002
Education						
Less than high school	0.85 (0.72–1.0)	0.056	0.82 (0.70–0.97)*	0.018	0.90 (0.77–1.06)	0.226
High school diploma or GED	1	--	1	--	1	--
Some college or technical training, but no degree	1.13 (0.95–1.36)	0.175	1.05 (0.88–1.25)	0.621	0.94 (0.79–1.13)	0.531
Associates degree or higher	1.38 (1.03–1.84)*	0.031	1.14 (0.86-1.51)	0.375	1.08 (0.82–1.42)	0.593
Origin						
United States	1	--	1	--	1	--
Mexico	1.49 (1.25–1.78)*	< 0.001	1.27 (1.07–1.52)*	0.007	1.07 (0.90–1.28)	0.403
Other country	2.20 (1.55–3.13)*	< 0.001	1.74 (1.22–2.46)*	0.002	1.00 (0.73–1.40)	0.979
Language						
English	1	--	1	--	1	--
English & Spanish	1.29 (1.08–1.54)*	0.005	0.93 (0.78–1.11)	0.448	1.06 (0.89–1.26)	0.537
Spanish	2.02 (1.62–2.53)*	< 0.001	1.18 (0.94–1.47)	0.146	0.89 (0.71–1.11)	0.291

* Indicates statistically significant result.

Table 23. Predictors of Common Reasons for Introducing Formula to Breastfed Infants Breastfed at Least Once Among Hispanic Mothers

Variable	Reason					
	I could not tell how much my baby ate (n = 3,823)		**I was going back to work or school outside of the home** (n = 3,936)		**My baby lost interest in nursing or began to wean him/herself** (n = 3,910)	
	Adjusted OR (95% CI)	**P Value**	**Adjusted OR (95% CI)**	**P Value**	**Adjusted OR (95% CI)**	**P Value**
Age						
18–24	1	--	1	--	1	--
25–29	1.14 (0.96–1.36)	0.140	1.06 (0.88–1.27)	0.541	0.80 (0.67–0.93)*	0.018
30–34	0.99 (0.80–1.22)	0.928	1.02 (0.82–1.27)	0.830	0.74 (0.60–0.92)*	0.008
35–39	1.18 (0.91–1.52)	0.219	1.26 (0.96–1.66)	0.091	0.81 (0.62–1.07)	0.140
40+	1.0 (0.62–1.57)	0.968	1.23 (0.77–1.97)	0.381	0.74 (1.20)	0.224
Education						
Less than high school	0.99 (0.83–1.18)	0.948	0.74 (0.61–0.90)*	0.002	1.11 (0.89–1.33)	0.398
High school diploma or GED	1	--	1	--	1	--
Some college or technical training, but no degree	0.91 (0.74–1.11)	0.347	1.19 (0.99–1.45)	0.069	0.91 (0.74–1.12)	0.392
Associates degree or higher	1.07 (0.80–1.44)	0.646	1.58 (1.18–2.12)	0.435	0.87 (0.62–1.21)	0.411
Origin						
United States	1	--	1	--	1	--
Mexico	1.58 (0.96–1.40)	0.134	0.78 (0.64–0.94)*	0.011	1.09 (0.89–1.33)	0.398
Other country	1.34 (0.92–1.95)	0.123	1.16 (0.80–1.68)	0.435	1.57 (1.09–2.26)*	0.014
Language						
English	1	--	1	--	1	--
English & Spanish	0.77 (0.64–0.93)*	0.007	1.17 (0.97–1.41)	0.111	1.26 (1.02–1.55)*	0.029
Spanish	0.62 (0.49–0.79)*	< 0.001	0.94 (0.73–1.20)	0.597	1.50 (1.16–1.94)*	0.002

* Indicates statistically significant result.

Analysis of Mothers' Feeding Intention

Table 24 provides the results of the multivariate logistic regression analysis adjusted odds ratios and confidence intervals for mothers' intention to both breastfeed and formula feed, for both the general population and Hispanic mothers only. Note, the responses for this survey question were based on recall of intention for feeding methods, rather than intention measured during the prenatal period. For this analysis, I created a dichotomous 0/1 variable from the breastfeeding intention variable. Statistically significant results are indicated with an asterisk.

In the case of the general multivariate model ($p < 0.001$, pseudo $R2 = 0.0585$, Hosmer-Lemeshow test confirmed goodness of fit), all of the results except one were statistically significant. Predictors for intention to both breastfeed and formula feed included the following: (1) being Hispanic, Black or Other (Hispanic AOR 2.21 (CI 1.90–2.57), Black AOR 2.06 (CI 1.72–2.45), Other 2.01 (CI 1.41–2.85); (2) Being age 18–24; (3) having an educational attainment of less than high school (AOR 1.22 (CI 1.09–1.38); (4) being born in a country other than the United States (Mexico AOR 1.23 (CI1.07–1.41), Other country 1.52 (CI 1.22–1.89); and (5) Speaking Spanish or English and Spanish at home (Spanish AOR 1.76 (CI 1.49–2.09), English and Spanish AOR 1.69 (CI 1.47–1.93). Mothers with an educational attainment of associates degree or higher and those age 25 or older had lower odds of intention to both breastfeed and formula feed. -

When the multivariate logistic regression model was limited to Hispanic mothers only, the origin was removed from the model because of the results of the Hosmer-Lemeshow test indicating that the model was not a good fit (model after removal of origin – $p < 0.001$, pseudo $R2 = 0.0225$, Hosmer-Lemeshow test confirmed goodness of fit).

Predictors for intention to both breastfeed and formula feed were similar to the general population, with Spanish-speaking Hispanic mothers having slightly higher odds of intention to both breastfeed and formula feed (AOR 2.05 (CI 1.79–2.36) than the general population model (AOR 1.76 (CI 1.54–2.02).

Table 24. Predictors of Mother's Intention to use Mixed Feeding (i.e., Breastfeed and Formula Feed) During the First Few Weeks of Infants' Lives
(Odds Ratios with 95% Confidence Intervals)

(n=4,351)	All Mothers		Hispanic Mothers	
Variables	**Adjusted OR (95% CI)**	**P Value**	**Adjusted OR (95% CI)**	**P Value**
Race				
White	1	--		
Hispanic	2.21 (1.9–2.57)*	< 0.001		
Black	2.06 (1.72–2.45)*	< 0.001		
Other	2.01 (1.41–2.85)*	< 0.001		
Age				
18–24	1	--	1	
25–29	0.87 (0.78–0.97)*	0.015	0.83 (0.73–0.95)*	0.005
30–34	0.87 (0.77–0.99)*	0.040	0.88 (0.76–1.02)*	0.080
35–39	0.80 (0.68–0.94)*	0.007	0.79 (0.66–0.94)*	0.009
40+	0.76 (0.58–1.00)*	0.054	0.74 (0.55–1.00)	0.052
Education				
Less than high school	1.22 (1.09–1.38)*	< 0.001	1.22 (1.07–1.38)*	0.003
High school diploma or GED	1	--	1	--
Some college or technical training, but no degree	0.98 (0.87–1.10)	0.672	0.91 (0.79–1.05)*	0.209
Associates degree or higher	0.69 (0.57–0.83)*	< 0.001	0.72 (0.57–0.93)*	0.006
Origin				
United States	1	--		
Mexico	1.23 (1.07–1.41)*	0.004		
Other country	1.52 (1.22–1.89)*	< 0.001		
Language				
English	1	--	1	--
English & Spanish	1.69 (1.47–1.93)*	< 0.001	1.76 (1.54–2.02)*	< 0.001
Spanish	1.76 (1.49–2.09)*	< 0.001	2.05 (1.79–2.36)*	< 0.001

*Indicates statistically significant result.

CHAPTER 6: DISCUSSION

This study was designed to answer the research question "How can communication from peer counselors about infant feeding enable low-income Hispanic mothers enrolled in WIC to lower the risk of early childhood obesity in their infants?" The first two aims of the study are included below. The third is addressed in the Plan for Change (Chapter VII).

1) Determine why low-income Hispanic mothers who initiate breastfeeding begin to supplement with formula from birth ("*las dos*") and/or introduce solids early.
2) Determine perceived effective communication approaches of WIC peer educators to encourage behaviors in Hispanic mothers that reduce the risk of early childhood obesity in low-income Hispanic children.

A mixed methods study was an ideal way to approach the research question because of the complexity of attitudes, beliefs, and behaviors about infant feeding. The qualitative study reinforced many of the results of the TX-WIFPS survey, identified a number of additional factors that influence the practice of "*las dos,"* and provided valuable insight into communication strategies for breastfeeding peer counselors that have not been explored previously.

Key findings from the study are presented below in alignment with the Conceptual Model for Breastfeeding Behavior (Figure 2 in Chapter 3). Limitations are discussed at the end of the chapter. While some of the results confirmed prior research on the topic, other findings were novel. Overall, both the qualitative and quantitative studies confirmed that *"las dos*" or mixed breast and bottle feeding beginning at an early age is a very common practice among low-income Hispanic mothers enrolled in WIC. The quantitative analysis demonstrated that demographic

factors play a role in the early introduction of formula to infants who have been breastfed at least once, particularly on the first day of life. Also, the findings suggest that Hispanic mothers, and particularly Spanish- and Spanish- and English-speaking mothers, are more likely to intend to use mixed feeding. It also demonstrated that there are demographic differences in the top reasons mothers introduce formula to infants who have been breastfed. The qualitative results painted a much more complex picture of the practice, highlighting the role of social environment and cultural context in a manner that was not captured in the quantitative research. In addition, the qualitative results produced valuable findings around the practice of overfeeding as it relates to "*las dos.*"

The quantitative results for early introduction of solid foods indicated that while Hispanic mothers enrolled in WIC do introduce solid foods early (prior to 4 months), they do so at a lower rate than White mothers and are significantly less likely to add cereal to the baby's bottle than both White and Black mothers. This result aligned with previous findings in the literature review. The qualitative results also provided some understanding of some of the beliefs and the foods used, although this was limited by the experience and scope of practice of the breastfeeding peer counselors that I interviewed.

Demographic and Socioeconomic Factors

Acculturation. Acculturation plays an important role in the practice of *"las dos.*" The practice is more common among Hispanic mothers who have come from another country and those that speak Spanish or Spanish and English at home. The qualitative results suggested that "*las dos*" is related to the immigrant experience, with immigrant Hispanic mothers viewing the provision of formula as an opportunity to ensure that their baby is healthy/chubby, and this opportunity was not economically feasible previously.

Generational differences. There are generational differences in the intention and practice of mixed feeding among Hispanic mothers. This is complex, as in the quantitative study younger mothers were more likely to indicate that they intended to feed both breastmilk and formula, but less likely to introduce formula on the first day to infants who had been breastfed. The qualitative results indicated that younger mothers were often more aware of the health benefits of exclusive breastfeeding and open to trying to breastfeed exclusively, but had more barriers related to returning to work and school that facilitated the introduction of formula.

Work. Returning to work is one of the reasons that Hispanic mothers use *"las dos,"* but it is not one of the top reasons. Hispanic mothers were significantly less likely to cite this as a reason for introducing formula than Black mothers. In the quantitative results, birth outside of the U.S. and low educational attainment decreased the likelihood that returning to work or school was cited as a reason. However, the qualitative results indicated that work environments at low-wage employers were a facilitator of *"las dos."*

Cultural Context

Beliefs about breastfeeding and the introduction of solid foods. Beliefs about breastfeeding and "*las dos,*" particularly those related to infant satiety, have a strong influence on feeding practices of low-income Hispanic mothers. In the quantitative analysis, "Breastmilk alone did not satisfy my baby" and "I didn't think I had enough milk" were the top reasons Hispanic mothers gave for introducing formula to breastfed infants. These reasons were identified in the literature review, but there was not a sense of how acculturation might affect these beliefs. Hispanic mothers were more likely to cite these two reasons than other racial/ethnic groups, and lower levels of acculturation (i.e., born outside of the U.S. and speaking Spanish or Spanish and English at home) were associated with an increased likelihood of these responses. The qualitative results reinforced these findings, as they were two of the most

frequently cited beliefs that facilitated "*las dos."* Peer counselors revealed the nuances of beliefs around infant satiety and milk supply, describing how Hispanic mothers were more likely to associate baby behavior such as crying or insufficient sleep to infant satiety, often concluding that the infant was not sufficiently full on breastmilk alone or because the mother's supply was not sufficient, even if this was not the case. Beliefs about infant satiety and the desire to ensure the infant was full also influenced the early introduction of solid foods. In addition, other beliefs influenced the practice, including the belief that formula provided by WIC has an economic and health-related value, along with the need for formula "just in case" and because of external factors negatively affecting the milk supply.

Value of a chubby baby. The cultural value of a chubby baby among Hispanic mothers and families was one of the most salient topics that emerged in the qualitative interviews. A chubby baby was equated with being healthy and well-fed. While chubbiness is valued by many mothers, the majority of those interviewed felt that it had a higher value among Hispanic mothers within WIC. As a result, participants identified affirming the healthy growth of the baby on breastmilk alone as one of the effective strategies for addressing the practice of *"las dos."*

Baby behavior. Baby behavior was the only theme mentioned by all of the key informants in the qualitative study and had the highest number of references. Although only one mentioned the actual term "baby behavior," their descriptions of the increased tendency of Hispanic mothers and families to misinterpret crying and sleep patterns as hunger cues aligns with research conducted by Heinig et al.[36] This relates directly to the two reasons most frequently cited by Hispanic mothers, particularly those who spoke Spanish and/or were of foreign origin ("I didn't think I had enough milk" and "Breastmilk alone did not satisfy my baby"). It also relates to the reason "My baby lost interest in nursing or began to wean himself,"

as formula is often introduced as a solution for undesired baby behavior, which can lead to decreased milk supply and loss of interest. In this area, the qualitative study provides valuable insight into the quantitative results. The peer counselors noted how Hispanic mothers and families were more prone to conclude that an infant was crying, fussy, or not sleeping long enough because their milk supply was insufficient, or because breastmilk alone was not sufficient to keep them full.

Social Environment

Network influence. The qualitative study confirmed the important influence that a mother's network has on her feeding practices. Although this is true for all mothers, key informants highlighted the ways in which the community and family often encourage "*las dos,"* based on beliefs about baby behavior, infant satiety and insufficient milk production, the value of a chubby baby, and the economic value of formula. These findings are consistent with previous literature.

One of the novel findings, however, related to the role that doctors may play in the practice of "*las dos."* The breastfeeding peer counselors expressed frustration with doctors/pediatricians who seemed to be quickly recommending formula supplementation without an understanding of the practice of "*las dos*" and the tendency of Hispanic mothers to continue to feed both and/or overfeed. They noted that it was common for Hispanic mothers to view physicians as authority figures that should not be questioned, which reinforces recommendations they provide to introduce formula to breastfed infants. This concept of *respeto*, or high respect for physician authority, has been previously described in the literature, although not in relation to *"las dos.*" [104,105] The results of the quantitative study confirmed that one of the reasons Hispanic mothers introduce formula is because a "health professional" instructed them to do so. This was one of the less frequent responses however, and the low numbers run contrary to the perspectives

of the peer counselors. One possible explanation is the wording of the question on the TX-WIFPS survey, which used "health professional" *(professional de salud* in Spanish) in lieu of "doctor." It may be likely that the responses would have been different using the term "doctor," based on the qualitative results.

It is important to recognize that the generalizability of the findings around doctors are limited because it they are based on perspectives of the breastfeeding peer counselors, and do not reflect the actual experiences of the mothers or the doctors. Breastfeeding peer counselors noted that mothers frequently indicated that doctors instructed them to introduce and/or supplement with formula. While this could be the case, it is possible that the cultural values and beliefs related to "*las dos*" lead Hispanic mothers to interpret doctors' recommendations in a way that is different from their intention. For example, a doctor may recommend that a mother supplement for a short period of time with a small amount of formula during the first few weeks because of insufficient weight gain. For a Hispanic mother, this can reinforce cultural values and beliefs about the insufficiency of breastmilk and the need for "*las dos*," and mothers may interpret the doctor's instructions as "You need to feed your baby both."

Breastfeeding Behavior

Both the quantitative and qualitative results provided important insights into mixed feeding practices. In the quantitative analysis, although the means for introduction of formula to breastfed infants and introduction of solid foods were only slightly different between race/ethnicity groups, a higher percentage of Hispanic mothers that were Spanish-Speaking or Spanish- and English-speaking had initiated breastfeeding, but a similar percentage fed formula. Hispanic mothers were more likely, along with Black mothers, to introduce formula on Day 1. The key informants spoke of the tendency to introduce formula quickly, although there was not a clear sense of how quickly Hispanic mothers tended to introduce formula. What they did discuss,

however, is the role that hospitals play in encouraging formula use while a mother is in the hospital, often in response to worry about supply. This is a particular concern with Hispanic mothers who tend to be quick to doubt the sufficiency of their milk supply, as discussed previously. This dynamic of quick introduction of formula, often on the first day of life or during the first week, highlights the challenge that breastfeeding peer counselors face, as they are often not able to meet with moms prenatally, but rather a few days or even weeks after a baby is born. By this time, "*las dos*" is often already established.

In addition, the qualitative research yielded interesting findings about overfeeding and vomiting/spitting up. Recent literature has highlighted the practice of overfeeding in Hispanic infants and the need to better understand the contributing factors.[79,106] Literature has also highlighted the practice of pressure-feeding in low-income Hispanic mothers.[38,84,107] The findings of this study provided a more detailed picture of what overfeeding looks like for Hispanic mothers enrolled in WIC. It also highlighted the need for doctors to have a better understanding of the practice of overfeeding and "*las dos,*" the possible connection to vomiting/spitting up, and the prescribing of anti-reflux medicine. Key informants felt strongly that doctors were largely unaware of the feeding practices that they were seeing on a daily basis.

Strategies for Effective Communication

One of the novel aspects of this study was the identification of strategies that breastfeeding peer counselors perceived as effective for addressing "*las dos,"* overfeeding and the early introduction of solid foods. To my knowledge, no prior study has sought to not only understand these practices, but to also learn how WIC breastfeeding peer counselors might more effectively address them. The qualitative study yielded nine strategies that could be operationalized for use by WIC breastfeeding peer counselors in North Carolina, and potentially other areas of the country. These were based on 137 years of cumulative experience of

breastfeeding peer counseling, describing both what has and has not worked. These strategies play an important role in the plan for change that is discussed in Chapter VII.

It is important to note that the communication strategies identified in the study reflect the experiences of the breastfeeding peer counselors, but further research and message testing is needed to determine whether or not the strategies are actually effective with Hispanic mothers, leading to a reduction of "*las dos*" and an increase in exclusive breastfeeding. This is particularly true for certain strategies such as "Affirming healthy growth of the baby," which focused on reassuring mothers that their baby is healthy, growing well and *gordito* (chunky or chubby) on the breastmilk they are producing alone. While breastfeeding peer counselors may perceive that this is effective, it also may reinforce beliefs and cultural values about the importance of a chubby baby. This could be counterproductive in the long-term when it comes to discouraging rapid infant weight gain and early childhood obesity.

Limitations

This study had several limitations that should be acknowledged. First, the qualitative research was conducted with key informants from WIC in North Carolina, while the quantitative data was from Texas. The Hispanic populations of each state are slightly different in both origin and newer vs. older immigrant populations, as has been detailed previously in Chapter 1. Ideally, the research would have been conducted with peer counselors that worked with the same population that completed the survey. However, this was not possible due to geographic limitations and the lack of availability of a dataset such as TX-WIFPS in North Carolina.

Secondly, there were limitations in the analysis of the TX-WIFPS dataset, including a large number of blanks (i.e., missing data) for various answers. One possible explanation is the structure of the original survey questionnaire, which could have biased responses for the reasons of formula introduction. Similarly, the survey response structure may have biased responses for

the timeframe of the introduction of formula and solid foods. In addition, low literacy levels may have led to the large number of missing responses. The original questionnaire was available in English or Spanish which likely helped to reduce literacy barriers, but the Hispanic mothers surveyed had a significantly lower level of educational attainment which would affect literacy in either language.

In addition, the dataset I was provided by TX-DSHS included the subset of questions/responses requested for my study, but did not include additional survey questions that might have been valuable for analysis, such as age of baby, caesarean birth, whether a mother had sought help for breastfeeding problems, etc. Furthermore, although the TX-WIFPS questions were based on the Infant Feeding Practices II Study, the Texas survey was not a randomized sample and did not have weighted data. It also overrepresented Hispanics of Mexican origin, which is not reflective of the heterogeneous nature of the Hispanic population in the U.S. Finally, language and origin were used as a proxy measures of acculturation in the analyses. Although researchers consider these suitable substitutes when more comprehensive measures are not available, they are single measures that do not reflect the complexity of acculturation. Various acculturation scales have been developed for Hispanics in the U.S. that would have provided a more accurate measure, however no such scale was incorporated into the TX-WIFPS survey.[108,109]

For the qualitative study, meeting the selection criteria for key informants (bilingual Spanish speakers with at least one year of breastfeeding peer counseling experience within WIC) was prioritized over ensuring equal geographic representation for rural vs. urban environments in North Carolina. Although some of the participants serviced rural populations, the majority were

in more urban locations. This could have biased the qualitative results to be more reflective of urban areas versus rural where there are a large number of farmworkers, for example.

In addition, they key informant interviews were subject to response bias and researcher bias. Key informants might have been selective about the information they reported, for a variety of reasons. For example, they may have hesitated to speak negatively about WIC. Additionally, as 16 of the 17 key informants were Hispanic, the interviewees may have viewed me as an outsider to their culture who may not understand the issues being discussed. In an effort to minimize this, I spent some time establishing rapport at the beginning of each interview, explaining that I was a bilingual Spanish speaker, had lived, worked and traveled in Latin America, and that my research was focused on Hispanic mothers and babies because of my strong interest in the topic.

Additionally, the interviews reflected the experiences of breastfeeding peer counselors and regional breastfeeding coordinators who worked with Hispanic mothers, rather than the mothers themselves. Consequently, the conclusions reached may not be generalizable. Finally, the interviews asked questions about their experience working with Hispanic mothers. Hispanic is a broad ethnic category representing a heterogeneous group of people of various racial backgrounds, from Central America, South America, Caribbean, and other Spanish-speaking areas. There are likely many differences that exist between groups that were not captured due to this generalization.

CHAPTER 7: PLAN FOR CHANGE

Aim 3 of this dissertation focused on using the results of the mixed methods study to develop a plan for change for the North Carolina WIC Breastfeeding Peer Counselor program that improves approaches to communication about behaviors that can reduce the reduce the risk of early childhood obesity in low-income Hispanic children. As a result, the primary focus of the plan for change is within the NC WIC program. However, the qualitative results clearly highlighted the important role of Hispanic mothers' network in the practice of "*las dos*," including physicians and hospitals. Consequently, I have included additional stakeholder groups in the plan for change for North Carolina. To begin, I provide six broad recommendations based on the study findings. I then provide the process and steps to implement the recommendations, aligned with a framework to guide change (Table 25). In the steps, I have delineated between what I am able to do in my role as a doctoral student that is external to the NC-DHHS WIC program and the stakeholder groups, and what could be done by internal champions.

In addition, the results of the study have the potential for a much broader application both within the state and nationally. Following the broad recommendations and steps to change for NC, I discuss other considerations for how the results could be disseminated to inform and positively influence breastfeeding peer counseling on a larger scale.

Broad Recommendations Based on Study Findings

Recommendation 1: Increase awareness among NC WIC breastfeeding peer counselors, regional breastfeeding coordinators, peer counselor managers and competent professional authority (CPAs) (i.e., nutritionists, physicians, nurses that provide nutrition

education) of the practice of "*las dos*," the patterns of rapid infant weight gain that are higher among low-income Hispanic mothers and infants, and the relationship to early childhood obesity.

In recent years, there has been an increasing amount of research that has highlighted the important role of accelerated weight gain during the first two years in the development of childhood obesity.[110,13] Research has also demonstrated the relationship of feeding practices with excess weight gain in Hispanic children in particular.[111-113] In the qualitative study, breastfeeding peer counselors identified *"las dos,"* overfeeding and the desire for a chubby baby as a particular challenges with their Hispanic clients. They also noted that Hispanic mothers introduced formula quickly, often within the first week. Because breastfeeding peer counselors are paraprofessionals, they may not be aware that what they are seeing in their practice is part of a larger trend and one that researchers and practitioners alike are trying to both understand and address. It is important to provide a broader context of the importance of their efforts to support exclusive breastfeeding in lieu of "*las dos*" and to discourage overfeeding, as appropriate and always within their scope of practice. In many ways, because of their dual role as both peer and community member, breastfeeding peer educators have the potential to be a front-line defense to address the practices that are contributing to infant overfeeding and rapid weight gain in Hispanic infants.

Any efforts to increase awareness and/or provide training to breastfeeding peer counselors need to begin with regional breastfeeding coordinators and peer counselor managers, as they provide quarterly continuing education and oversee their work in local WIC agencies. In addition, training needs to include CPAs to ensure that all staff interacting with breastfeeding clients have the same baseline understanding.

Recommendation 2: Increase knowledge among breastfeeding peer counselors, regional breastfeeding coordinators, peer counselor managers and CPAs in local WIC agencies of key results of the study, including: (1) the primary reasons Hispanic mothers introduce formula to infants who have been breastfed at least once, with a focus on the differences between different races/ethnicities and patterns of acculturation; 2) how demographic and socioeconomic factors, cultural context, the social environment and breastfeeding intention influence "*las dos*"; and 3) the relationship between "*las dos*" and expectations of baby behavior.

The results of the quantitative research provided valuable findings related to feeding intention and the reasons that mothers who have breastfed at least once introduce formula. The top reasons and some of the underlying factors related to baby behavior may be intuitive to experienced breastfeeding peer counselors. However newer, less experienced staff are less likely to have this knowledge. In addition, the study identified important differences between races, levels of acculturation and origin for the top reasons and for breastfeeding intention. Given the fact that nearly one-third of WIC enrollees in NC are Hispanic,[56] training should focus on how these factors may impact some of the top reasons. While breastfeeding peer counselors and peer counselor managers receive a standardized core training prior to beginning their position, this type of information is currently not a part of it. Ensuring that all WIC breastfeeding-related staff have a more complete understanding of the reasons for introducing formula would help breastfeeding peer counselors to more proactively address them, both prenatally and during the first clinic visit. In addition, including CPAs in education and training efforts would help to achieve consistency of messaging and support of exclusive breastfeeding in lieu of "*las dos*"

across local agencies. This could be accomplished through continuing education and a learning collaborative, as outlined in Table 25.

Finally, the results of the qualitative study demonstrated a strong connection between the practice of "*las dos*" and baby behavior. Because of this, all breastfeeding-related staff should have least a baseline understanding of the concepts in the Baby Behavior training that is used by California WIC, based on the research by Dr. Jane Heinig.[114] This training focuses on the infant cues that are often misunderstood as hunger cues, resulting in formula supplementation particularly in low-income populations. Research has demonstrated that training WIC staff in the Baby Behavior concepts leads to caregivers that are better able to differentiate hunger cues from other cues, and are more likely to continue breastfeeding and less likely to use excessive amounts of formula.[115]

Recommendation 3: Increase breastfeeding peer counselor's communication skills related to addressing the practice of "*las dos*" based on the strategies identified in the study.

The qualitative research produced eight strategies that the breastfeeding peer counselors and key informants perceived as effective for communicating about "*las dos,*" overfeeding and early introduction of solid foods. Some of these strategies, such as using visual tools during breastfeeding education, are a part of core peer counselor training. However, the specific application of them for addressing the practice of "*las dos*" was unique. In addition, the key informants identified other strategies that have not been documented elsewhere, including challenging cultural values and beliefs and referring to the authority of doctors. These strategies are based on many years of experience and directly address many of the influential factors related to cultural context and social environment that were identified in the research. The goals

of training would be to equip breastfeeding peer counselors with a set of messages and strategies that they could use when Hispanic mothers express the desire to use or report using "*las dos,*" and to increase the comfort level of peer counselors to challenge cultural values and beliefs that are related to "*las dos.*" This could be accomplished through role plays and peer-to-peer sharing, leveraging the experience of some of the participants in the key informant interviews that expressed confidence and appeared to excel in this area.

It should be noted that one of the limitations of this study was the communications strategies identified were those that breastfeeding peer counselors, rather than mothers, perceived as effective. Ideally, additional research is needed to determine the communication strategies and messages that mothers identify as effective for reducing the practice of "*las dos."* This could be accomplished through focus groups and key informant interviews with Hispanic mothers enrolled in WIC. In the meantime, the strategies identified in this study are a good starting point.

Recommendation 4: Adopt strategies to increase the percentage of WIC enrollees that meet with a breastfeeding peer counselor either in a group or individual setting prenatally.

Although the findings from the qualitative research did not produce a clear idea of when mothers made the decision to use *"las dos,"* the results of the quantitative study were clear: Hispanic mothers are more likely than Whites to intend to intend to feed both breastmilk and formula, and foreign birth and acculturation (as measured by Spanish language use) are factors that increase the likelihood. In the qualitative study, key informants noted the importance of prenatal visits for proactively addressing the intention to use "*las dos,*" before it starts. Research supports the importance of prenatal visits, showing that prenatal participation in the WIC peer counseling program is associated with higher rates of breastfeeding initiation[50] and that prenatal

WIC entrants vs postpartum entrants breastfeed longer.[51] Peer counselors noted that their first encounter was often postpartum, sometimes two weeks after birth and after *"las dos"* had already begun. In some cases, interviewees noted that this is despite attempts to connect with the mom prenatally. In others, mothers were not enrolled in WIC prenatally. In NC, 75.9% of WIC recipients in NC receive access to general WIC program services prenatally,[116] although enrollment does not consistently lead to clients meeting with a breastfeeding peer counselor prenatally. The specific strategies that could be used to increase prenatal encounters with breastfeeding peer counselors were not within the scope of this study. However, a literature review and follow-up questionnaire with the seventeen key informants could be used to identify best practices and barriers to prenatal breastfeeding peer counseling consultations within their clinics.

Recommendation 5: Engage clinicians that serve WIC clients in NC to consider how common hospital and clinic practices may be encouraging "*las dos*" and overfeeding in low-income Hispanic mothers and their infants.

One of the most novel findings of the qualitative portion of this study was around the interaction between WIC clients and their pediatricians, recommendations to supplement with formula, patterns of overfeeding and vomiting, and the subsequent prescription of anti-reflux medication. Multiple key informants in the qualitative study expressed the idea that pediatricians often were unaware of the common practice of "*las dos*" in Hispanic mothers in particular, and how doctor recommendations to supplement with formula were interpreted and applied in this population. Peer counselors felt that their scope of practice limited what they could say to mothers who indicated that they had been told by their physician to supplement with formula. Because of their strong influence and the high degree of respect they tend to be given within the

Hispanic community, physicians, and particularly pediatricians, have an important role in addressing "*las dos*" particularly when it comes to overfeeding. Communicating about this is a delicate matter, as physicians are often concerned about adequate infant growth in the first weeks of life, failure to thrive, and the responsibility and liability they assume for ensuring healthy outcomes for their patients. However, this must be balanced with concern for the long-term health of a child, which could be negatively impacted by overfeeding and subsequent obesity.

In addition, participants noted the role of hospital personnel and practices in facilitating "*las dos"* by encouraging mothers to introduce formula. Although much progress has been made in recent years through the Baby Friendly Hospital designation, the results of the qualitative interviews indicated that hospital practices continue to be a challenge. Changing hospital practices to support exclusive breastfeeding is an extensive process that is beyond the scope of this plan for change. However, a starting point for reducing "*las dos*" is to engage clinicians, increase their awareness of the issue, and begin to identify strategies to change practices.

Recommendation 6: Disseminate a summary of the findings to state and local WIC agencies NC, NC breastfeeding organizations, and state associations of clinicians that serve WIC clients.

This dissertation was completed with the collaboration and support of the NC WIC program, which resides within the Division of Public Health/Nutrition Services Branch in the North Carolina Department of Health and Human Services. The NC WIC program conducts trainings and continuing education for WIC breastfeeding peer counselors. The role of NC-DHHS is key in disseminating results of the research in North Carolina, as it has a supervisory and advisory role to local WIC agencies that have an established breastfeeding peer counselor

program. In addition, it plays an important role as a stakeholder in other breastfeeding organizations within the state that could benefit from the study's findings.

Process for Implementing Recommendations

After considering various models to guide the development of a plan for change, I selected John Kotter's "8 Stages of Change"[117] (Figure 7), aligning the stages with the broad recommendations derived from this study (Table 25). While Kotter's model was originally designed for change within a corporation, the framework can be used to organize steps towards change in organizations and systems. The plan includes three main stakeholder groups: NC WIC breastfeeding peer counseling and nutrition staff, clinicians in NC, and NC breastfeeding stakeholder groups. The last three phases are focused on NC WIC, as it is the primary focus of Aim 3.

Figure 7. John Kotter's Eight Stages of Change

Table 25. Steps to Implement Recommendations, Aligned with Kotter's Stages of Change

Phases	Target Audience	Steps
Establish a sense of urgency	NC WIC Breastfeeding Peer Counseling and Nutrition Staff	• **Meet with NC WIC staff**: State Breastfeeding Coordinator, State Breastfeeding Peer Counseling Coordinator and NC WIC Director to raise awareness and establish a sense of urgency by sharing the results of the study. Provide a detailed and shortened summary of the findings of the study, along with recommendations. (My role) • **Raise awareness and establish a sense of urgency** about the practice of "*las dos*" in Hispanic mothers with breastfeeding peer counselor leadership (Regional Breastfeeding Coordinators) and with WIC nutritionist leadership in local agencies. (Champion within NC-DHHS WIC)
	Clinicians in NC	• **Meet with the leadership** of Community Care of North Carolina (pediatric leadership), North Carolina Pediatric Society and North Carolina Medical Society to raise awareness and establish a sense of urgency, focusing the qualitative findings from the study that related to the role of doctors in "*las dos.*" (My role)
	NC Breastfeeding Stakeholder Groups	• **Meet with the leadership** of North Carolina Lactation Consultants, North Carolina Breastfeeding Coalition and NC Association of Women's Health, Obstetric and Neonatal Nurses to raise awareness and establish a sense of urgency by sharing the study results. (My role).
Form a powerful guiding coalition	NC WIC Breastfeeding Peer Counseling and Nutrition Staff	• **Engage the support of the NC WIC program** leadership and regional breastfeeding coordinators to address the results and recommendations that emerged from the study. (Champion within NC-DHHS WIC)
	Clinicians in NC	• **Engage the support of leadership** and identify champions in the breastfeeding and immigrant health sections of the in NC Pediatric Society and North Carolina Medical Society that could help to communicate the findings to peers, identify opportunities to present findings and advocate for change in clinical practices to support exclusive breastfeeding in lieu of "*las dos*." (My role)
	NC Breastfeeding Stakeholder Groups	• **Engage the support of the leadership** of NC Lactation Consultants and NC Breastfeeding Coalition to support dissemination of the study results to members, identify opportunities to present findings and provide training at state and regional meetings, and identify possible champions for advocating for hospital practices that are informed by an understanding of the practice of "*las dos*." (My role)

Phases	Target Audience	Steps
Create a Vision	NC WIC Breastfeeding Peer Counseling and Nutrition Staff	• **Create a shortened summary** of the results and recommendations that can be distributed to peer counselor managers in local WIC agencies and regional breastfeeding coordinators in the six perinatal regions in local WIC agencies, and participants in the key informant interviews. Focus messages on the important role that peer counselors have to positively impact "*las dos*," related overfeeding and rapid infant weight gain. (My role) • **Prioritize the topic of "*las dos*" at trainings** for regional breastfeeding coordinators and in quarterly continuing education trainings for peer counselors. (Champion within NC-DHHS WIC) • **Create a vision statement for reducing the practice of "*las dos*"** among Hispanic mothers by: 1. Equipping regional breastfeeding coordinators, breastfeeding peer counselors and CPAs with knowledge of patterns of rapid infant weight gain, an understanding of the common practice of "*las dos*" and common reasons for introducing formula to breastfed infants. 2. Increased communication skills to address "*las dos"* in the clinic setting. 3. Increased percentage of mothers who meet with peer counselors prenatally (Champion within NC-DHHS WIC). • **Establish annual targets** for local WIC agencies for increasing the percentage of WIC enrollees that meet with peer counselors prenatally. (Champion within NC-DHHS WIC).
	Clinicians in NC	• **Create a vision statement**: Doctors/pediatricians serving WIC populations in NC are informed about the practice of "*las dos*" and overfeeding in low-income Hispanic mothers and infants, and change clinical practices to discourage both practices and encourage exclusive breastfeeding. (Champion within Community Care of NC, NC Pediatric Society, NC Medical Society)
Communicate the vision	NC WIC Breastfeeding Peer Counseling and Nutrition Staff	• **Submit an abstract for presentation** of study results at the annual NC WIC meeting in Fall 2017. (My role) • **Communicate the vision statement** to local WIC directors, WIC regional breastfeeding coordinators, breastfeeding peer counselors and CPAs (Champion within NC-DHHS WIC) • **Disseminate a shortened summary** of the results and recommendations in an accessible, clear format to state and local WIC agencies in NC, including leadership, peer counselors, peer counselor managers and CPAs. (Champion within NC-DHHS WIC)

Phases	Target Audience	Steps
	Clinicians in NC	• **Submit an abstract** to present the study findings at the Annual Meeting for the NC Pediatric Society in August of 2017. (My role) • **Identify opportunities to share study results** in local hospital Ground Rounds (i.e.,WakeMed, Duke Health, UNC Rex Healthcare). (My role) • **Share a shortened summary** of the results and recommendations in an accessible, clear format to NC Medical Society and NC Pediatric Society, with a focus on the breastfeeding and immigrant health sections. (My role)
	NC Breastfeeding Stakeholder Groups	• **Present the study findings** at the North Carolina Lactation Consultants Organization in May 2017 (My role, invited speaker) • **Submit an abstract** to present the study results at the annual conference of NC Association of Women's Health, Obstetric and Neonatal Nurses. (My role) • **Disseminate a shortened summary** of the results and recommendations to leadership of state and regional breastfeeding coalitions in NC: North Carolina Breastfeeding Coalition, Central North Carolina Breastfeeding Coalition, Harnett, Johnston, and Sampson Community Breastfeeding Coalition, Cumberland County Breastfeeding Coalition, Guilford County Breastfeeding Alliance and Wake County Human Services' Northern Regional Center Breastfeeding Support Group: Liquid Gold. (My role)
Empower others to act on the vision	NC WIC Breastfeeding Peer Counseling and Nutrition Staff	• **Provide training** for WIC regional breastfeeding coordinators based on study findings, as highlighted in recommendations. (My role, NC-DHHS WIC would require attendance at training) • **Provide training through quarterly continuing education** for breastfeeding peer counselors and PCAs based on study findings. (NC-DHHS WIC/Regional Breastfeeding Coordinators, NC-DHHS WIC would require participation in at least 2 CE session). • **Provide Baby Behavior training** (Dr. Jane Heinig) to NC WIC breastfeeding leadership and regional breastfeeding coordinators, who could then in turn train peer counselors and CPAs (NC-DHHS WIC/Regional Breastfeeding Coordinators, NC-DHHS WIC would require participation in CE session). • **Facilitate a learning collaborative** among breastfeeding peer counselors in NC to discuss challenges related to "*las dos*" and overfeeding, and strategies to address them. Leverage the knowledge of Hispanic breastfeeding peer counselors that have significant experience to benefit newer breastfeeding peer counselors. (NC-DHHS WIC) • **Provide policy and practice recommendations** to local WIC agency leaders regarding strategies for increasing prenatal peer counseling visits. (NC-DHHS WIC)
	Clinicians in NC	• **Develop an additional short training** that could be used by breastfeeding organizations in NC, based on the study findings. (My role)

Phases	Target Audience	Steps
	NC Breastfeeding Stakeholder Groups	• **Develop an additional short training** that could be used by breastfeeding organizations and regional breastfeeding coalitions in NC, based on the study findings. (My role)
Plan for and create short-term wins	NC WIC Breastfeeding Peer Counseling and Nutrition Staff	• **Conducting 3-month follow-up survey** to measure increased knowledge and changes in practice (self-reported) of quarterly trainings with WIC staff. (Champion within NC-DHHS WIC) • **Conducting a pre- and post- survey** in a subset of clinics where peer counseling, peer managers and CPA staff have participated in trainings outlined above (also maintaining a control group where all staff have not). These could relate to common beliefs of Hispanic mothers about "*las dos*" and feeding practices. • **Track rates of exclusive breastfeeding and prenatal visits** among Hispanic mothers in agencies where breastfeeding peer counselors and/or peer counselor managers have received quarterly training. (Champion within NC-DHHS WIC)
Consolidate improvements and produce more change	NC WIC Breastfeeding Peer Counseling and Nutrition Staff	• **Revise and strengthen training** using feedback from quarterly trainings, and breastfeeding data from local WIC agencies. (Champion within NC-DHHS WIC) • **Identify best practices** in clinics that have been able to increase the number of prenatal peer counseling visits for Hispanic mothers. (Champion within NC-DHHS WIC) • **Share study findings and trainings with state WIC agencies** in other states, following a format similar to the research and resulting training from Dr. Heinig. (Champion within NC-DHHS WIC, in collaboration with a university partner)
Institutionalize new approaches	NC WIC Breastfeeding Peer Counseling and Nutrition Staff	• **Incorporation of study recommendations and baby behavior concepts** into core training (Loving Support©) for breastfeeding peer educators and peer counseling managers in NC. (Champion within NC-DHHS WIC) • **Incorporation of best practices** for increasing prenatal peer counseling visits in local WIC clinics. (Champion within NC-DHHS WIC, Local WIC agency leaders)

Limitations

It should be noted that one of the significant limitations of this plan for change is that I am not employed by NC-DHHS, am not directly involved in the WIC breastfeeding peer counseling program, and am currently not a member of the clinician or lactation consultant stakeholder groups. The broad recommendations and plan for change are based on my research findings, conversations with the leadership of the NC WIC breastfeeding program, and understanding of leadership and organizational change theories. I have indicated the steps that I am able to take based on my current position as a doctoral student. The actual implementation of the other aspects of the plan for change are dependent upon decisions of the leadership of the NC WIC program, funding to support the changes, the successful engagement of stakeholder groups, and funding to support conference presentations and dissemination of results.

Additional Plans for Disseminating Findings beyond North Carolina

In addition to the efforts to disseminate the findings in North Carolina, I will attempt to publish the findings of the qualitative and quantitative studies in peer-reviewed journals. I also will submit a late-breaking abstract for presentation in the annual meeting of the 2017 American Public Health Association and the next WIC Nutrition Education and Breastfeeding Promotion conference (date yet to be determined). The success of the plans for publishing are contingent on review and acceptance of manuscripts by external reviewers. The presentations at national conferences are dependent upon acceptance of abstracts and a source of funding to support travel.

In addition, although not a central part of the plan for change and not required by the TX-DSHS IRB, the results of the both the quantitative and qualitative aspects of the research and the summary recommendations will be communicated back in summary form to the TX-DSHS. The findings and recommendations, along with the plan for change, could be used and adapted by the

state agency to increase the awareness, knowledge and skills of WIC breastfeeding peer counselors statewide.

Conclusion

The rates of childhood obesity and early childhood obesity in Hispanic children have remained stubbornly high over the past decade, despite many obesity prevention efforts spanning multiple sectors, systems, environments and policies. Recently, there has been an increased focus on the importance of early life risk factors in the development of childhood obesity. Interventions that effectively modify risk factors, such as overfeeding or early introduction of solid foods, are essential for reducing the rate of overweight and obesity among Hispanic children in the future. WIC is well-positioned to address these risk factors, particularly the practice of "*las dos"* among Hispanic mothers and their infants. Through increased prioritization of the issue, along with increased awareness, training and skills development, the role of WIC breastfeeding peer counselors can be leveraged to reduce "*las dos,*" increase exclusivity and decrease overfeeding in Hispanic mothers and their infants both in North Carolina and other states. More research is needed to fully understand this complex public health issue, particularly to identify the messages that resonate with Hispanic mothers around "*las dos,*" and to better understand the ways that current physician and hospital practices may be supporting "*las dos*." This study, the resulting broad recommendations and plan for change, have provided an excellent starting point that can be built upon in the future.

APPENDIX A: SUMMARY OF LITERATURE REVIEW FINDINGS

Author	Year	Title	Journal	Population	Sample Size	Limitations	Key Findings
Bartick and Reyes	2012	*Las dos* cosas: An analysis of attitudes of Latina women on non-exclusive breastfeeding	Breastfeeding medicine	Hispanic - Dominican, Puerto Rican, Mexican, Ecuadoran	17	Small sample size, not generalizable	Most common reasons for introducing formula: treatment for insufficient milk to keep the baby fuller longer, planning for return to work. Lack of understanding of potential risks of introducing formula on the establishment of breastfeeding, particularly on milk supply. Failure to understand a negative does-response on effect of formula on health and milk production. Lack of familiarity with medical recommendations on breastfeeding duration or exclusivity.
Bunik et al.	2006	Early infant feeding decisions in low-income Latinas	Breastfeeding medicine	Low-income Hispanic women,	35 focus group participants, 29 individual interviews	Qualitative - focus groups and interviews may not be generalizable, particularly to non-Mexicans. Convenience sample held in clinical setting,	Four domains with 15 categories were identified: 1) best of both: mothers desire to ensure their babies get both healthy aspects of breast milk and vitamins in formula, 2) breastfeeding can be a struggle: is natural but can be painful, embarrassing and associated with breast changes and diet restrictions, 3) Not in Mother's control: mothers want to breastfeed, but things happen that cause them to discontinue, 4) family and cultural beliefs: relatives give messages about supplementation for babies who are crying or not chubby.
Cartagena et al.	2014	Factors contributing to infant overfeeding with Hispanic mothers	Journal of Obstetric, Gynecological and Neonatal Nursing	Systematic Review	N/A	No gray literature included, limited to dates of 1998-2012	Most common reason given by mothers for nonexclusive breastfeeding was fear of having inadequate milk supply. Perceived lack of understanding of why early supplementation with formula may interfere with establishing an adequate breastmilk supply. Belief that feeding a combination of breast milk and formula is best for the infant. Cultural traditions and advice from family members play an important role in maternal feeding beliefs and practices.

Author	Year	Title	Journal	Population	Sample Size	Limitations	Key Findings
Cartagena et al.	2015	Factors contributing to infant overfeeding in low-income immigrant Latina mothers	Applied Nursing Research	Hispanic low-income immigrant Latina mothers & infants, WIC population	62	Convenience sample, selection bias, not generalizable, one instrument was in dialect not easily understood	Maternal education and infant's age were significant predictors of healthier feeding practices. Majority of mothers preferred feeding infants either formula or a combination of breast milk and formula. Approx. 1/3 of overweight infants' mothers failed to recognize their infants as overweight, and expressed desire for heavier babies. Maternal perception of weight nor desired infant's weight did not predict feeding practices.
Crocetti	2004	Parental beliefs and practices regarding early introduction of solid foods to their children	Clinical Pediatrics	Female caregivers	102	Small population size, Hispanics were only 18. Not generalizable. Recall bias.	Hispanic caregivers were less likely to introduce cereal at less than 4 months of age. Those who breastfed were less likely to introduce cereal at less than 4 months. Reasons for introducing solids early were 1) the child was not satisfied with formula or breast milk alone and it helped the child sleep better at night. 76% were aware of guidelines regarding proper infant feeding. Female caregivers were more likely to introduce solids early. Of those who did before 4 months of age, 76% were aware of AAP feeding guidelines
Dancel, Perrin et al.	2015	The relationship between acculturation and infant feeding styles in a Latino population	Obesity	Hispanic (Greenlight study)	431, with 398 available SASH data	Cross-sectional study, attrition, all low-socioeconomic status, difficult to generalize, no subgrouping	Latino parents with lower acculturation were more likely than those with higher acculturation to endorse feeding styles that are associated with child obesity
de Bocanegra	1998	Breast-feeding in immigrant women: the role of social support and acculturation	Hispanic Journal of Behavioral Sciences	low-income immigrant women, 73% Hispanic	962	convenience sample at prenatal care clinics, limited to low-income, not generalizable, questionnaire was not validated	At time of post-partum visit, only 4% were breastfeeding exclusively. 55% were mix feeding. 90% introduced formula within 1 week after delivery. Top reasons: 1) my baby is not satisfied when I breast feed, 2) I do not have enough milk, 3) I have to work outside of the home, 4) breastfeeding is inconvenient. Very little social support received from health care provider. More likely from family members.

Author	Year	Title	Journal	Population	Sample Size	Limitations	Key Findings
							Women more likely to breastfeed if they have a role model.
Flores et al	2016	"*Las dos* cosas," or why Mexican American mothers breastfeed but not for long	Southern Medical Journal	Mostly self-identified Mexican or Mexican-American mothers delivering at a hospital near the U.S./Mexican border	300	Not generalizable, limited geographic location in border community, non-validated, self-administered surveys. Cross-sectional design precludes causal inferences.	92% of mothers initiated breastfeeding, but 20% were breastfeeding exclusively at hospital discharge. Intention for exclusive breastfeeding was high (64%), but after delivery, 80% wanted "*las dos* cosas." Cognitive dissonance noted, mothers indicating exclusive breastfeeding while feeding formula. Top reasons for not breastfeeding exclusively: insufficient milk, returning to work or school, lack of support from female relative. Maternal education, breastfeeding intention, education and previous breastfeeding experience were significant predictors of exclusive breastfeeding.
Gross et al.	2014	Maternal infant feeding behaviors and disparities in early childhood obesity	Childhood Obesity		412 mothers in low risk and high risk group	Study were of two specific groups, results not representative. Intentionally chosen samples, lack of validated surveys, cross-sectional design precludes causal inferences	High risk group was less likely to exclusively breastfeed, and add cereal to the bottle, exhibited greater restrictive and pressuring feeding styles, and more likely to believe that mothers can recognize infant hunger and satiety, less likely to believe that infants can recognize their own satiety.
Heinig et al.	2006	Barriers to compliance with infant-feeding recommendations among low-income women	Journal of Human Lactation	WIC-eligible Spanish- and English speaking mothers	65 WIC-eligible women	Small sample size and limited geographic area, not generalizable. Qualitative data not generalizable	Participants shared common beliefs that breastfeeding was beneficial, however many believed that early introduction of formula and solid foods was unavoidable in certain situations. WIC staff were a source of infant-feeding information. Higher reliance on relatives than health providers for guidance. Behavioral beliefs related to solid food introduction were very powerful in the population. Many mothers believed that solid foods were effective in altering infant behavior, and it was not uncommon for them to give solid food after their child had expressed signs of satiety.

Author	Year	Title	Journal	Population	Sample Size	Limitations	Key Findings
Higgins	2000	Puerto Rican cultural beliefs: Influence on infant feeding practices in western New York	Journal of Transcultural Nursing	Self-described Puerto Rican	15	Small population, limited to Puerto Rican only, not generalizable	11 universal and 2 diverse themes were identified. One of the themes related to infant feeding - culture care feeding patterns of infants means overfeeding (until they spit up). Most mothers interviewed use the bottle and put baby foods in it, feeding babies until they spit up. Mothers would ask for additional cans of formula and were proud of children doubling birth weight by 3 months of age, exceeding growth standards. Mothers worried that their children were not healthy if weight gain was not excessive. When infant vomiting occurred, mothers did not tell health care provider. By 2 months of age mothers were adding rice cereal to bottle, common reasons were it is quicker, easier, I'm in a hurry. Vegetables, carrots & sweet potatoes were added by 4 months.
Kaufman, Deenadayalan and Karpati	2009	Breastfeeding ambivalence among low-income African American and Puerto Rican women in north and central Brooklyn	Maternal and Child Health journal	Puerto Rican and African American	14 Puerto Rican mothers, 14 African American, plus family members	Small population, limited to Puerto Rican, not generalizable, qualitative study	In terms of complementary feeding, women in the study expressed uncertainty about "reading" their infant's nutritional need, concern about infants being fed adequately. Complementary feeding of breast milk and formula played a key role in assuaging that concern, ensuring child's wellness and fulfilling on values of good mothering. Belief that combination foods were necessary to satisfy their infant. Underlying the belief was anxiety around a child fed by breast alone would remain hungry. Women interpreted crying as hunger. Women described the economic and social benefits of additional food supplements (i.e. adding cereal to formula bottles)

Author	Year	Title	Journal	Population	Sample Size	Limitations	Key Findings
Kuo et al.	2011	Introduction of solid foods to young infants	Maternal and Child Health Journal	National Survey of Early Childhood Health	2068 parents of children 4-36 months	Parent reports possibly resulting in recall bias. NSECH data were collected nearly 10 years prior to analysis. Latino and African American were oversampled	Latino mothers have high rates of introduction in 4-6 month timeframe. Lower maternal education, having only one adult in the household, never breastfeeding for any period, breastfeeding for shorter duration and participation in WIC was associated with introducing solids early. No association of education and early introduction of solids and Spanish- or English-speaking Latinos.
Linares et al.	2015	Factors influencing exclusive breastfeeding at 4 months postpartum in sample of urban Hispanic mothers in Kentucky	Journal of Human Lactation	Urban Hispanic mothers	72		Most common reason among mothers who were exclusively breastfeeding at discharge but introduced formula during the study were perception of low milk production (45%) followed by having to work (31%). Self-efficacy was associated with continued exclusive breastfeeding between 1 and 4 months. Among those who were exclusive breastfeeding at 1 month postartum, it was more likely that her partner was the most important person in her life.
Newton et al.	2009	Factors associated with exclusive breastfeeding among Latina women giving birth at an inner-city baby-friendly hospital	Journal of Human Lactation	Latina women giving birth at baby-friendly hospital	349	Not generalizable, large amount of data missing from secondary data set. Unable to control for parity.	Factors positively associated with exclusive breastfeeding as opposed to mix feeding: maternal age less than 25 years, presence of a Birth Sister. Factors associated with exclusive breastfeeding in hospital were maternal age less than 25 years, mother being US-born and involvement of a Birth Sister. Among women who mixed fed, 79% had no reason charted for formula supplementation.

Author	Year	Title	Journal	Population	Sample Size	Limitations	Key Findings
Perrin et al.	2014	Racial and ethnic differences associated with feeding- and activity-related behaviors in infants	Pediatrics	parents, 86% Medicaid, 50% Hispanic	863	Difficulty defining race and ethnicity, differences between subgroups weren't analyzed, relationships are clearly related to community and family environments, including confounding biases unmeasured in the study. Social desirability bias. Not nationally representative sample	Hispanics more likely to finish bottle (1.93 OR) and prop bottle (2.47). Much higher proportion of Hispanics feed mostly breast milk and some formula or mostly formula and some breastmilk.
Waldrop	2013	Exploration of the reasons for feeding choices of Hispanic mothers	MCN American Journal of Maternal and Child Nursing	Spanish-speaking women 48 hours after giving birth	19	Not generalizable, small convenience sample	Themes identified: 1) Previous experience of having a child who refused to take a bottle or difficulties with breastfeeding, 2) Desire to make sure their infant was full or didn't experience hunger, equating crying with hunger. 3) Formula feeding for the purpose of health, perception that infant needed both breast and formula, and 4) Prepare infants for when they go back to work.
Wojcicki et al.	2011	Infant formula, tea and water supplementation of Latino infants at 4-6 weeks postpartum	Journal of Human Lactation	Latino mothers & infants in San Francisco area, 92% WIC	102 dyads	Can identify associations but not causal relationships between supplementation and patient characteristics. Not sufficient power to examine role of clinical depression in relation to early infant supplementation.	44% of women were feeding both breastmilk and formula, 25% were supplementing with tea or water. Did not find statistically significant risk of depression with supplementation with formula. Did find that a statistically significant proportion of mothers with depressive symptoms and cesarean delivery were supplementing with tea or water.

Author	Year	Title	Journal	Population	Sample Size	Limitations	Key Findings
						Not generalizable to general Latino population	
Woo Baidal et al.	2015	Reducing Hispanic children's obesity risk factors in the first 1000 days of life: A qualitative analysis	Journal of Obesity	Hispanic women who were pregnant or had children less than 24 months	49	Geographically limited population, not generalizable, focus groups didn't include perspective of fathers	Themes: Coping with pregnancy may trump healthy eating and physical activity; early life weight gain is unrelated to later life obesity, fear of infant hunger drives bottle and early solids introduction, beliefs about infant taste promote early introduction to solid foods and sugary beverages, belief that screen time promotes infant development

APPENDIX B: KEY INFORMANT INTERVIEW GUIDE

Welcome: Thank you for agreeing to participate in this interview to discuss your experiences working with Hispanic mothers in your role as a WIC Breastfeeding Peer Counselor (or Regional Breastfeeding Coordinator). I am Rachelle Chiang, a student in the UNC Doctor of Public Health Program. The information I collect as a part of this study is for my dissertation research. It could also be used to help develop recommendations for how to improve training for WIC Peer counselors around approaches to communication about behaviors that can reduce the risk of early childhood obesity in low-income Hispanic mothers. I may publish portions of the dissertation, in which case the findings would become publicly available. The interview will be completely confidential and any information you provide will be released only as group summaries. Your name is not connected to your answers. Recordings and transcriptions will be destroyed at the end of the research study. In order to fully capture your responses today, I would like to record our conversation. Do I have your consent to participate? [If yes, turn recorder on]. Do I have your permission to record the conversation? [If yes] If you would like to have me stop the recording at any point in our conversation, please let me know and I will stop the recording.

Introduction: Thank you so much for agreeing to talk to me and participate in this research study. The purpose of this interview is to learn more about your experiences working with Hispanic mothers in your role as a WIC Breastfeeding Peer Counselor (or Regional Coordinator). The aim is gain a better understanding of practices of combined breast and bottle feeding, early introduction of solid foods and effective communication strategies to encourage exclusive breastfeeding and age-appropriate introduction of solid foods. The interview should take no more than 45 minutes (1 hour for regional coordinators). I am happy to answer any questions you have about the research study or the interview.

1. Tell me a bit about the moms you work with who choose to breastfeed and also supplement with formula within the first few weeks after birth.

2. Are you familiar with the term "*las dos*?" (If yes, proceed to #2. If no, provide a definition of "*las dos*.").

3. In your experience, how common is the practice of "*las dos*" with the Hispanic moms that you work with?
    a. (Probe) Is it more common among Hispanic moms than other WIC enrollees, or similar?

4. The WIC program promotes exclusive breastfeeding. However rates of exclusive breastfeeding are particularly low among Hispanic women. Please tell me a bit about your experience working with Hispanic moms enrolled in WIC around promoting exclusive breastfeeding instead of "*las dos*."

5. When you breastfed your own baby, did you use "*las dos*?" during the first few months?
    a. (Probe, if yes) Given your experience, do you feel comfortable encouraging mothers that you work with to exclusively breastfeed and not supplement with formula? Why or why not?

6. In your experience, what are the reasons that Hispanic mothers who initiate breastfeeding quickly introduce formula while continuing to breastfeed?

7. Who are the people that seem to influence a mother's decision to introduce formula after they start breastfeeding?

8. Are there common beliefs that influence a mother's decision to introduce formula after they start breastfeeding?
    a. (Probe) What are some of the beliefs you have encountered in your role?
    b. (Probe) In your experience, what are some effective ways to respond to these beliefs?

9. What motivates low-income Hispanic mothers to exclusively breastfeed rather than combination feed ("*las dos*)?

10. What messages have you found to be most effective in motivating Hispanic moms to exclusively breastfeed and not introduce formula within the first weeks after birth?
    a. (Probe) What messages have you found to be the least effective?

11. What strategies have you found to be most effective in motivating Hispanic moms to exclusively breastfeed and not introduce formula within the first weeks after birth?
    a. (Probe) What messages have you found to be the least effective?

12. At what point do mothers commonly make the decision to use "*las dos*?"
    a. (Probe if no answer) Before the baby is born? At birth? Within the first few days? When breastfeeding challenges arise?

13. If mothers have already started using "*las dos*" before you have an opportunity to meet with them, do you try to convince them to stop supplementing with formula?
    a. (Probe, if yes) What strategies have you found to be the most effective?

b. (Probe, if no) What are the reasons you don't?

14. In your experience, do Hispanic mothers frequently introduce solid foods such as cereal or other foods before the recommended 6 months?
    a. (Probe) Is it more common among Hispanic mothers than other WIC enrollees, or similar?
    b. (Probe) What types of foods are they introducing and why?

15. Are there common beliefs that influence a mother's decision to introduce solid foods early?
    a. (Probe) What are some of the beliefs you have encountered in your role?
    b. (Probe) In your experience, what are some effective ways to respond to these beliefs?

16. What messages have you found to be most effective in motivating Hispanic moms to not introduce solid foods before the recommended time?
    a. (Probe) What messages have you found to be the least effective?

17. What strategies have you found to be most effective in motivating Hispanic moms to not introduce solid foods before the recommended time?
    a. (Probe) What strategies have you found to be the least effective?

18. Overfeeding: (provide definition). In your experience, do mothers that you work with commonly overfeed their infants?
    a. (Probe) Is it equally common among all WIC mothers or more common in certain groups?
    b. (If common in Hispanic mothers) What are some of the reasons that Hispanic mothers overfeed infants?

19. What messages or strategies have you found to be the most effective in discouraging overfeeding?
    a. (Probe) What messages or strategies have you found to be the least effective?
    b. (Probe) When discouraging overfeeding, do you talk about the health risks that are associated with obesity? What do you say?

20. In your experience, how important is it to Hispanic mothers to have a very chubby baby?
    a. (Probe, if important) Is it equally important in other mothers that you work with that are not Hispanic?
    b. (Probe, if yes) What are some of the reasons that Hispanic mothers see having a very chubby baby as important?
    c. (Probe) Does this influence the practice of "*las dos*"? (If yes) How?

Additional Questions for Regional Breastfeeding Coordinators

1. Tell me a little bit about your role as a regional coordinator breastfeeding peer education.

2. In your opinion, is "*las dos*" and early introduction of solid foods adequately addressed in current training for breastfeeding peer counselors?
    a. (Probe) (If yes) Tell me a little bit about how it is addressed in training?
        i. Are there ways that the training could be improved to more adequately address these topics?
    b. (Probe) (If no) In your opinion, should these topics be more specifically addressed in training?
        i. (If yes) What are your recommendations for how this might be done in your region and across the state?
        ii. (If no) Why not?

3. If you wanted to strengthen the training that peer education breastfeeding educators receive to address "*las dos*" and early introduction of solid foods how would you approach it?

4. Are there any other changes that could be made to the WIC peer breastfeeding program or the peer breastfeeding educator's role and responsibilities that would make it easier to address practices of "*las dos*" and strengthen exclusive breastfeeding in Hispanic mothers?

APPENDIX C: INVITATION FOR KEY INFORMANT INTERVIEWS

My name is Rachelle Chiang and I am a student in the UNC Doctor of Public Health Program. I am conducting interviews of WIC Breastfeeding Peer Counselors in North Carolina who work with Hispanic mothers and their infants as a part of my dissertation research. I am interested in interviewing you because of your current role as a WIC breastfeeding peer counselor in _____ (name of local WIC agency). Grisel Rivera, Breastfeeding Coordinator for the WIC Program at the North Carolina Department of Health and Human Services, recommended you as a potential person to interview.

The purpose of my study is to more fully understand infant feeding practices of Hispanic mothers enrolled in WIC, with an emphasis on exploring mixed feeding practices (simultaneous breast and formula feeding) and early introduction of solid foods. The study aims to identify effective communication approaches of WIC breastfeeding peer counselors to encourage infant feeding behaviors that reduce the risk of early childhood obesity in this population, and to develop recommendations for the North Carolina WIC Breastfeeding Peer Counseling program in accordance with the findings.

I am seeking to interview up to 15 WIC breastfeeding peer counselors (or regional coordinators) in North Carolina. The interview can be conducted either in person at a location that is convenient for you, or over the phone or via Skype, and will take approximately 45 minutes. The interview will be completely confidential and any information you provide will be released only as a summary. Participation in the interview is voluntary and not required as a part of your job responsibilities as a WIC breastfeeding peer educator.

Please let me know if you would be willing to participate in an interview so that others can benefit from your valuable experience as a WIC peer breastfeeding educator. Thank you for your consideration and I look forward to hearing from you.

Sincerely,

Rachelle Chiang, MPH
Doctoral Student, Health Policy and Management
University of North Carolina at Chapel Hill

APPENDIX D: INTERVIEW CONSENT FORM

Title of Study:
Perspectives on Infant Feeding Beliefs, Attitudes and Practices of Hispanic Mothers Enrolled in WIC: Implications for Breastfeeding Peer Counseling

Investigators:
Rachelle Johnsson Chiang, MPH, DrPH (candidate, Department of Health policy and Administration, University of Carolina at Chapel Hill, Chapel Hill, North Carolina.
Asheley Cockrell Skinner, PhD, Faculty, Duke Clinical Research Institute, Duke University

Purpose:
The purpose of this study is to more fully understand infant feeding practices of Hispanic mothers enrolled in WIC, with an emphasis on exploring mixed feeding practices (simultaneous breast and formula feeding) and early introduction of solid foods. The study aims to identify effective communication approaches of WIC breastfeeding peer counselors to encourage infant feeding behaviors that reduce the risk of early childhood obesity in this population, and to develop recommendations for the North Carolina WIC Breastfeeding Peer Counseling program in accordance with the findings.

Potential Benefits and Harms:
There is no direct or indirect harm that could result in your participation in this study. However, through your participating in this study, you may benefit personally by being able to explore the important issues that relate to breastfeeding peer counseling with Hispanic mothers and their infants.

Anonymity:
Your anonymity will be maintained at all times during this study. No information that you as a participant share with the investigator will ever be traced back to you, and the final reports will provide only aggregated data. All data files will be stored on a password-protected laptop and held in a secure location, and all files will be destroyed once the final analysis is completed.

Consent

I, _____(interviewee's name), understand that I am being asked to participate in a University of North Carolina study to answer questions relating to peer counselor perspectives on infant feeding practices of Hispanic mothers enrolled in WIC and identify effective communication strategies to reduce the risk of early childhood obesity. I understand that it is my voluntary choice to participate in this study, and not participating will not affect my employment as a WIC peer breastfeeding counselor. I also understand that I may refuse to answer during the interview and/or withdraw from the study at any time.

A summary of the results will be made available to me upon completion of the study, should I request a copy. I understand what this study involves and I freely agree to take part, and I have been provided with a copy of this signed consent form.

Signature of participant	Name (please print)	Date
Signature of Witness	Name (please print)	Date

If you have any questions or concerns, either prior to or following your participation, please do not hesitate to contact us.
Rachelle Johnsson Chiang at 919-259-0803 or rmchiang@live.unc.edu
Asheley Cockrell Skinner at 919-668-6360 or asheley.skinner@duke.edu

APPENDIX E: SELECTED QUESTIONS FROM TX-WIFPS SURVEY

Questions from Texas WIC Infant Feeding Practices Survey that were used for analysis:

Q3. What is your race/ethnicity?

- White
- Black
- Hispanic
- Other

Q7. What language do you usually speak at home?

- English
- Spanish
- English and Spanish
- Other Language

Q5. How many years old are you?

- 18-24
- 25-29
- 30-34
- 35 and older

Q8. Where were you born?

- United States
- Mexico
- Another Country

Q2. What is the highest level of education you have completed?

- Less than high school diploma
- High school diploma or GED
- Some college credit, but no degree
- Associates, bachelor's degree, or postgraduate degree

Q12. Thinking back to the time when you were pregnant, how did you plan to feed your baby during his or her first few weeks of life?

- I was not sure how I would feed my baby
- Breastfeed or feed breastmilk only
- Formula feed only
- Both breast and formula feed

Q14. Was this child ever breastfed or fed breast milk even if only once?

- Yes
- No

Q23. Was your baby ever given formula? (Among infants who were ever breastfed)

- Yes
- No

Q24. How old was your baby when he or she was first fed formula? (If you are not sure, please give your best guess.) (Recorded in days)

Q25. Below is a list of reasons why women may begin feeding their babies formula. For each reason, please answer if it was a reason why you began feeding your baby formula. I started feeding my baby formula because… [Among women who ever breastfed (Q14) and also reported their baby was ever given formula (Q23)]

- I didn't have enough milk
- Breastmilk alone did not satisfy my baby
- My baby had trouble sucking or latching on
- I could not tell how much my baby ate
- I was going back to work or school outside the home
- My baby lost interest in nursing or began to wean him or herself
- Breastfeeding was too painful
- Pumping milk was to hard or inconvenient
- I did not want to breastfeed in public
- I was not able to make enough milk after I went back to work
- I did not like breastfeeding
- Pumping milk was too painful
- A health professional said I should feed my baby formula
- I felt that I breastfed long enough for my baby to get the benefits of breastfeeding
- Another reason not listed here
- My baby became sick and could not breastfeed
- My baby began to bite

Q37. How old was your baby when he or she first had any foods or liquids other than breast milk or formula?

- Before 1 month
- 3 months or before
- Before 6 months
- 6 months or after

Q38. Have you ever added cereal or other solids to your baby's bottle?

- Yes
- No

Q48. Do you believe the following statements about breastfeeding are true or false?

- Breastfed babies are less likely to become obese children and adults.
    - Yes
    - No
    - I don't know

APPENDIX F: DEFINITION OF TERMS

Early introduction of solid foods – introduction of solid foods prior to 4 months of age.

Exclusive breastfeeding – infant feeding with only breastmilk, without any additional food or drink other than drops of medicine or vitamins/minerals.

Hispanic or Latino – a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race (cite Census).

Infant overfeeding – Feeding behaviors leading to an energy intake for the infant that exceeds the requirements for normal growth and development.[77]

Mixed feeding (combined feeding/supplementary feeding/ "*las dos*") – infant feeding with breastmilk and supplemented with formula or other food or drink.

New settlement state – states in which the Hispanic population grew by at least 200,000 between 1980 and 2000, and roughly tripled in size (Pew).

Obesity (over age 2) – ≥85th Percentile of the Centers for Disease Control and Prevention growth charts.

Overfeeding in infants – A bottle-fed (breastmilk or formula) that is consuming more milk than they need for their growth and energy needs.

Overweight (over age 2) – ≥95th Percentile of the Centers for Disease Control and Prevention growth charts.

Overweight (under age 2) – a weight for recumbent length at or above the 95th percentile on the CDC sex-specific weight for recumbent length growth charts.[1]

Pressure feeding – pressuring or encouraging an infant to finish a bottle.[38,41]

WIC Peer counselor – paraprofessional support person who gives basic breastfeeding information and encouragement to WIC pregnant and breastfeeding mothers."[55]

APPENDIX G: EMERGING PRIMARY THEMES, SUB-THEMES, SUMMARIES AND EXAMPLE QUOTATIONS FOR AIM 1

Emerging Themes	Sub-Themes	Summary	Example Quote
Demographic and Socioeconomic Factors			
Result 1: **Nativity**	Acculturation and the immigrant experience	"*Las dos*" is not a common practice in countries of origin but viewed as a better, more "American way" to feed.	**"**They come to the U.S. and they know that breastmilk is the best, but somehow they think that formula is like a privilege…they think it's the American way."
	Country of origin cultural values and practices	Breastfeeding is the norm in countries of origin, often because of economic constraints. This leads to a high willingness to breastfeed, but also high value of formula.	"They still have that sense of wherever they come from, that breastmilk is the norm….And that motivates them to start breastfeeding." "They couldn't bottle feed in their countries because it was too expensive."
Result 2: **Generational differences**		Younger mothers are more receptive and informed about benefits of exclusive breastfeeding, but also face school-related barriers.	"Younger [Hispanic] women are easier…because they're more receptive of the newer information."
Result 3: **Education/Lack of Knowledge**		Lack of education about breastfeeding, normal baby development and baby behavior.	"What I find mostly is the lack of knowledge in the benefits and the power that they have in the milk production for the babies."
Result 4: **Work as a barrier to exclusive breastfeeding/ facilitator of "*las dos*"**		Low-paying jobs do not have supportive infrastructure for breastfeeding. Immigration status creates additional barriers. Formula viewed as easier for caregivers.	"They have to go back to work, but they're scared of asking for a pumping break. Because they feel like, 'If I ask, I may get fired.'"

Emerging Themes	Sub-Themes	Summary	Example Quote
		Cultural Context	
Result 5: **Beliefs about Breastfeeding and "*las dos*"**	Formula is necessary because milk supply is perceived as insufficient	Mothers supplement with formula because they believe their milk supply is not adequate. Beliefs about infant behavior of crying and fussiness due to perceived hunger reinforce belief.	"Most of them, they say that they have to supplement because they feel that they are not making enough milk for the baby."
	WIC formula is a valuable benefit	Mothers value the formula provided by WIC because of its perceived economic value and health value for the infant. Mixed messages from WIC reinforce this belief.	"They say *las dos cosas* [both things] because they're afraid that if they don't say that, then they might not be able to change their package and get formula later on."
	Breastmilk alone doesn't satisfy, fill baby	Mothers state "*No lo lleno*" [I can't fill him/her] and supplemental formula is necessary in addition to breastmilk.	"They'll say 'You know, I just don't feel like I'm filling him up so I'm starting to give formula."
	External factors negatively affect milk quality, requiring formula use	Negative emotions and certain foods affect the quality of milk, making it unhealthy for infant in the short-term.	"They say that if you are upset, if you're sad, if you get mad, you're not supposed to feed the baby."
	It is necessary to introduce formula early in case baby needs to take a bottle	Mothers believe that early introduction of formula is necessary to prepare for future situations such as insufficient milk supply, returning to work and being away from the baby.	"They feel that babies won't get the bottle, so they should start teaching them right away. So they introduce formula."
	Breastmilk is incomplete	Mothers believe that formula provides necessary nutrition and/or vitamins that breastmilk lacks.	"They still feel that they need to give at least one bottle feeding of formula a day for vitamins. Nutritional vitamins."
	Formula is needed as a supplement to breastfeeding for security, unexpected events	Mothers believe that formula is necessary "just in case" and therefore request it, even though they may not be using it.	"Some Hispanic women, they do take formula and they don't use it. It's just like a comforting kind of thing, security."

Emerging Themes	Sub-Themes	Summary	Example Quote
	Breastfeeding in public	Breastfeeding in public is perceived as uncomfortable and not as culturally acceptable as in countries of origin.	"For them [mothers], they perceive that in order to blend in, they have to bottle feed while they're away."
Result 6: **Beliefs about solid food introduction**		Mothers believe introducing solid foods will help modify behavior, and respond to perceived interest of infant.	So they say, "You know what, if I take cereal, mix it with breastmilk or formula, give it in the bottle, feed the baby at night, baby will let me sleep."
Result 7: **Ethnotheories of parenting**	Value of chubby baby	Mothers, family members and community value chubby infants, viewing them as healthier, more attractive and well-fed. Using "*las dos*" is seen as one way to ensure a healthy, chubby baby.	They are in competition to have a chubby baby because that's what translates to having a healthy baby. With their neighbors or whoever else has a baby."
	Baby behavior	Mother and family members often interpret normal baby behavior as hunger cues, introducing formula to modify behavior.	"They tend to use formula as a way of soothing the baby…they think the baby is hungry, and it's just a way of calming them."
		Social Environment	
Result 8: **Network Influence**	Community influence	Community (friends, neighbors) often encourage the use of "*las dos*" based on commonly held beliefs and values. Influence can also be positive from those who have exclusively breastfed, but is less common.	"They take a lot of what they [other people] tell them very seriously. And when you have somebody telling you, 'You probably don't have enough milk'…then you're already initiating doubts in the person's mind."
	Doctor influence	Doctors/pediatricians encourage mothers to give supplemental formula early, which reinforces beliefs about insufficiency of breastmilk alone, baby behavior, and overfeeding. Mothers' high sense of *respeto* [respect] for physicians leads to continued use of "*las dos.*"	If the doctor tells them, 'You should give your baby formula because your baby is an ounce underweight,' they're going to do it….To them it's like saying 'Give it to your baby.'"
	Family influence	Family members, particularly female members, encourage mothers to introduce formula to breastfed infants based on commonly held beliefs and values. Influence can also be positive for exclusive breastfeeding, although this is less common.	"It has to do with people who influence the mom. It's like a ladder. You have the mom, and then you have her mother, you know, it's a great influence on what decision she makes."

Emerging Themes	Sub-Themes	Summary	Example Quote
	Hospital influence	Hospital practices often encourage early formula supplementation, reinforcing perceptions of insufficient milk supply and overfeeding practices.	"If they're [mothers] thinking 'I'm going to be breastfeeding, but I'm at the hospital and I feel like I don't have milk.' And the nurse shows up with a bottle of formula, then I'll say 'My salvation, I'm going to use it.'"
	WIC influence	WIC provides support for exclusive breastfeeding, but also provides ample free formula, which is seen as a contradiction. Messaging from other WIC staff such as nutritionists, often encourage mothers to take formula.	"Their point of view is, 'Why are you pushing for me to be exclusively breastfeeding if you are also providing formula?'"
		Breastfeeding Intention and Behavior	
Result 9: **Breastfeeding intention**		Mothers often express intention to use "*las dos,*" despite a generally positive view of breastfeeding from their countries of origin, and previous history of exclusive breastfeeding.	"A lot of them when they are enrolled in the peer counselor program prenatally, they are already letting me know that they are planning on doing "las dos."
Result 10: **Feeding Practices**	Overfeeding	Overfeeding and pressure feeding is common in mothers using *"las dos*," and is related to expectations of baby behavior. Mothers often fully breastfeed and then give additional formula.	"They'll put the baby to the breast and baby's been on the breast, maybe both breasts. And on top of that, they'll give three to four ounces, the same week, the first week of age."
	Mixed breastmilk and formula feeding practices	Mothers often begin "*las dos*" within the first few weeks. Quantities of supplemental formula range from 15 ml bottles to much larger amounts. Mothers who begin supplementing may return to exclusive breastfeeding, but often continue to request formula.	"We have seen as early as a week old drinking three ounces. We have had a two-week-old drinking six ounces of formula after being breastfed."

Emerging Themes	Sub-Themes	Summary	Example Quote
	Spiting up/Vomiting	Infant Spitting up/vomiting after feeding "*las dos"* is often interpreted as a sign that the infant is well-fed rather than overfed. Doctors and pediatricians may diagnose reflux and prescribe medicine, without an understanding of how mothers may be using *"las dos*" and overfeeding.	"They [the pediatricians] don't know that the Hispanic moms are often breastfeeding and then giving formula on top, and then the baby is throwing up."
	Mothers say one thing and do another	Mothers are often inconsistent when discussing their feeding practices with WIC staff, i.e., reporting exclusive breastfeeding to peer counselor but mixed feeding to nutritionist in order to get formula.	"And the mom's story changes from the moment she checks in at the window, to, I'm the last person that they see…. Every time she has to repeat the story, it just changes."
	Solid food introduction	WIC nutritionists, rather than peer counselors, address the introduction of solid foods. Mothers introduced a wide variety of foods prior to recommended time, as early as 2-3 weeks for cereal in a bottle.	"You do have moms that they're so proud, "Oh, I'm feeding my four month old baby beans and tacos, *pupusas*, and they feel so proud of that. They're not thinking, my baby's not ready for this."
Result 11: **Motivational factors for exclusive breastfeeding**		Motivational factors included positive affirmation from family members and expected health benefits of exclusive breastfeeding.	"If they have the right support at home. Because sometimes these moms have a husband that is wonderful and want their babies to be exclusively breastfeeding."

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