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Fit WIC Baby Behavior Study

"Helping you understand your baby"

California WIC Program
Final Report
WIC Special Projects Grant

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UC Davis Human Lactation Center
Department of Nutrition

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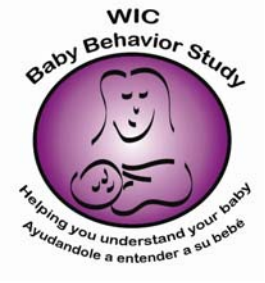

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Executive Summary

Background

Several years ago, California WIC partnered with the University of California, Davis Human Lactation Center to investigate why inappropriate feeding practices among participants persist despite extensive infant-feeding education offered by WIC. Several important themes emerged in those preliminary studies. Most participants believed breastfeeding was best for their infants; yet, many also believed early introduction of formula and solid foods was needed to address perceived indicators of infant hunger such as infant crying or night waking. Many of the parents participating in the studies had unrealistic expectations for their infants' behavior and expressed their desire to have a "full," quiet, sleeping child even in the first few weeks after their babies were born.

In order to prevent over- and inappropriate feeding among participants, staff from the UC Davis Human Lactation Center developed a curriculum and educational tools to help WIC families and staff members understand more about normal baby behavior. The Fit WIC Baby Behavior study, funded by this USDA Special Project Grant, was a multi-center study conducted from 2006 to 2009.

The Intervention

Eight WIC clinics from throughout California were matched on several characteristics. Half were assigned randomly to an intervention group and the others served as controls. Staff members were trained to better understand normal infant behavior and to promote positive interactions between caregivers and infants. Handouts and class materials were developed to reinforce and support study messages. Before and after the study, data were collected on staff and participants' knowledge and attitudes, infant-feeding practices, and food package distribution. Infant weights were also collected.

Study Outcomes

Although the information about infant behavior was new to most participants and staff, the study messages were well accepted and understood. Results indicated that infant-feeding behaviors were influenced by the intervention, particularly in the first 4 months postpartum. Over the study period, intervention clinics reported an average increase of about 6% in distribution of the exclusive breastfeeding package as compared to about 1% in the control group. Combination feeding decreased in the intervention clinics among infants from 0 to 4 months while results for exclusive formula feeding rates were mixed. Fewer participants in both study groups reported feeding solids to their infants prior to 4 months of age at the end of the study period as compared to baseline. While there was no difference between groups in infant weights prior to the study, at the end of the study, significantly fewer infants in the intervention group were above the 95th percentile for weight-for-age as compared to those in the control group (4.9 versus 12.6%).

Conclusions

Education about normal infant behavior resulted in better compliance with infant-feeding recommendations among WIC participants and fewer infants whose weight-for-age exceeded the 95th percentile. Baby Behavior education may be important in efforts to prevent childhood obesity by empowering parents to better understand the reasons for their infants' behavior and to reduce parents' unrealistic expectations that may lead to inappropriate feeding.

Introduction

Childhood obesity is a primary concern for local and national public health agencies. The health and human costs related to obesity continue to grow and public health eligible populations are disproportionately affected in both prevalence and severity.(Wang and Beydoun 2007) Nationally, rates of childhood obesity have stabilized since 2003 but the number of children affected remains unacceptably high.(Sharma 2009) Until recently, interventions to reduce obesity rates have concentrated on school-age children. However, Angold and Egger (Angold and Egger 2007) stated that 'the architecture of risk' for obesity is already in place in the preschool years. In fact, 14.6% of low-income preschool-aged children in the US are already overweight. Therefore, preventative interventions are needed very early in life.

Studies suggest that infant-feeding practices may play a major role in the development of child obesity (Birch, Fisher et al. 2003; Gartner, Morton et al. 2005) and that parents may use foods and fluids to control their infants' behavior. (Anderson, Guthrie et al. 2001; Khoury, Moazzem et al. 2005; Heinig, Follett et al. 2006) In earlier studies of low-income mothers, staff at the UC Davis Human Lactation Center found that many parents believe that infant crying is always a sign of hunger and that infants wake at night only because they are not getting enough to eat during the day.(Heinig, Follett et al. 2006) Participants repeatedly mentioned the desire for a "full," sleeping child. In their efforts to reduce infant crying and prolong infant sleep, mothers may ignore infant-feeding guidelines. For example, mothers who believed adding cereal to bottles was effective in prolonging infant sleep introduced solid foods to children as young as 6-weeks-of-age.(Heinig, Follett et al. 2006) Infant crying and waking have been reported by several researchers as a reason for weaning among breastfeeding populations.(Savage, Reilly et al. 1998; Bentley, Caulfield et al. 1999) However, weaning is not likely to stop infants from crying and waking. Mothers may then feed excessive amounts of formula, introduce solid foods too early, or give their infants inappropriate foods and sugary drinks.(Heinig, Follett et al. 2006) These behaviors have been associated with subsequent health risks including childhood overweight and diabetes and unchecked, are likely to continue into the toddler and preschool years.(Gartner, Morton et al. 2005)

Targeted interventions are needed to combat inappropriate infant-feeding behaviors. Effective explanations of normal infant behavior and tools to address behavioral concerns may reduce the pressure parents feel to use food and fluids to control sleeping and other behaviors in their children. Teaching parents about infant behavior may produce a broad range of benefits including increased caregiver confidence, improved infant-feeding practices and more positive infant-caregiver relationships.(Brazelton 1993; Leitch 1999)

In response to these findings, the California WIC Program partnered with the UC Davis Human Lactation Center on this Special Projects Grant to develop and implement an educational intervention to help caregivers to have more realistic expectations about their infants' behavior as well as to recognize and respond appropriately to a range of infant cues. By directly addressing behavioral triggers of over- and inappropriate feeding, it was expected that this intervention would result in increased compliance with infant-feeding guidelines among WIC participants.

Project Goals and Research Questions

Goal 1

The first goal was to determine the feasibility and costs of integrating new and modified educational materials into classrooms and environments of participating WIC sites. This information was intended to augment California WIC's current use of Fit WIC materials. The objectives for this goal included: (1) increasing staff and educator satisfaction with infant nutrition education classes and interventions at their sites through the use of Fit WIC Best Practices; (2) increasing participant satisfaction with infant nutrition education materials and classes at their sites; and (3) evaluating the costs associated with the use of the modified materials versus existing infant nutrition education materials.

Research Questions

- Objective 1.1. Will staff and educators' satisfaction with infant nutrition education be greater among intervention versus control site staff?
- Objective 1.2. Will participant satisfaction with infant nutrition education be greater at intervention versus control sites?
- Objective 1.3. What costs are associated with using the modified materials compared with the traditional approach?

Goal 2

The second goal was to evaluate the impact of modified education on 1) knowledge and attitudes of staff and caregivers, 2) breastfeeding duration, 3) formula use, and 4) early or inappropriate solid food introduction. The objectives for this goal included: (1) increasing staff knowledge and attitudes about infant nutrition and behavior; (2) increasing caregivers' knowledge and attitudes about infant nutrition and behavior; (3) increasing breastfeeding rates (either exclusively or partially) at 4 and 6 months; (4) decreasing requests for formula from WIC participants; and (5) decreasing early and/or inappropriate solid food introduction.

Research Questions

- Objective 2.1. Will there be improvement in staff knowledge, attitudes, and beliefs about infant nutrition and behavior in intervention versus control sites?
- Objective 2.2. Will there be improvement in caregivers' knowledge, attitudes, and beliefs about infant nutrition and behavior in intervention versus control sites?
- Objective 2.3. Will a greater proportion of women in the intervention sites breastfeed for 4 and 6 months as compared to control sites?
- Objective 2.4. Will formula requests be fewer at intervention versus control sites?
- Objective 2.5. Will adherence to current solid food guidelines be greater at intervention versus control sites?

Study Environment

California

California is the third largest state, covering over 163,000 square miles. From 2007-2008, the state's population was estimated at 36,408,700, consisting of 43% White; 37% Hispanic; 6% African-American; and 14% other.(Kaiser Foundation) In 2006[a], breastfeeding rates at hospital discharge in California were 88.6% any breastfeeding and 42.8% exclusive breastfeeding.(California Department of Public Health 2006) According to the Centers for Disease Control and Prevention (CDC), among low-income children under 5 years of age, 17.2% Hispanic and Native American children are overweight, as are 12.1% white children and 14.4% of African-American children.(Centers for Disease Control and Prevention)

California WIC

California WIC is the nation's largest WIC program, serving over 1.3 million participants, reflecting the state's ethnic and cultural diversity. California WIC's population is approximately 75% Hispanic; 12% white, non-Hispanic; 6.5% African-American; 6% Asian; and 0.5% Native American. In the California WIC population, 11.2% of infants less than 12 months of age are exclusively breastfed, 25.4% are fed both breast milk and formula, and 58.2% are exclusively formula-fed.[b]

California has 82 WIC agencies, more than 650 clinic sites, and employs over 3,000 state and local staff. Agencies vary in caseload, number of clinic sites, organizational type, participant demographics, availability and type of breastfeeding support services, ratio of personnel to infrastructure costs, ratio of professional to support personnel, and diversity of non-WIC services provided. Agencies also vary in amount of space available for education, in background and diversity of staff providing education, and in training-related equipment and materials. All of these variations could affect how nutrition education is implemented at individual WIC sites. Eight agencies were chosen to participate in the FitWIC Baby Behavior study.

Intervention Sites

Yolo County Women, Infant and Children's (WIC) Program, Woodland, CA

Location: Yolo County, population of 189,623,(US Census Bureau Population Division 2009) is located in the agricultural region of California's Central Valley and the Sacramento River Delta, west of Sacramento and northeast of the Bay Area. Yolo County is known for its agriculture, especially processing tomatoes, alfalfa, wine grapes, rice, and seed crops. In 2007, Yolo County's ethnic population was 58% White; 26% Hispanic; 10% Asian; 2% Black; 1% Indian; and 3% more than 1 race.(Yolo County) Woodland, 1 of only 4 incorporated cities in the county, has a population of 53,179.

Agency: The Yolo County WIC Program is the only WIC agency in the county. It is a small agency with a caseload of about 5,300 participants. This agency has 5 sites, located in the cities of Woodland, West Sacramento, Knights Landing, Davis, and Winters. Woodland is the only site that is open daily.

[a] All data (populations, caseloads, ethnic breakdowns, etc) are from 2006, unless otherwise specified.
[b] All California WIC breastfeeding rates come from the California WIC ISIS (Integrated Statewide Information System) program.

Clinic: The Woodland clinic has a caseload of about 3,000 participants and employs 11 staff members, including 6 WNAs, 1 clerk, 1 Breastfeeding Coordinator, 1 degreed nutritionist, and 2 RDs. The ethnic breakdown of the WIC participants at this site includes: 82.5% Hispanic; 12.2% Caucasian; 1.6% Asian; 1.5% Native American; 0.8% African-American; and 1% mixed ethnicity. When the study began, this clinic had an exclusive breastfeeding rate of 13.1%, a combination rate of 28.9% and an exclusive formula rate of 52.4%.

La Clinica de la Raza, Fruitvale Neighborhood WIC, Oakland, CA

Location: Oakland is the 8th largest city in California, with a population of 395,559. This major West Coast port city is located about 8 miles east of San Francisco, across the San Francisco Bay, and is the county seat of Alameda County. The median household income in Oakland is $47,179, while Alameda County's is $81,341. Alameda County had an estimated population of 1,443,492 in 2006.(US Census Bureau Population Division 2009)

Agency: La Clinica de la Raza, a small agency with about 5,000 participants, has 2 clinics in Oakland. La Clinica de la Raza, Fruitvale Neighborhood WIC, is located in the Fruitvale area of Oakland, an urban area with a large Hispanic population.

Clinic: Fruitvale Neighborhood WIC is a small clinic with a caseload of about 3,800 participants. This clinic's staff consists of 2 RDs, 3 WNAs, 2.5 clerks, and 1 health educator. The ethnic breakdown at this clinic includes: 90.1% Hispanic; 4.1% Asian; 3.7% African-American; 0.9% Caucasian; 0.5% Native American; and 0.6% mixed ethnicity. In 2006, this clinic had an exclusive breastfeeding rate of 18.6%, a combination rate of 27.9%, and an exclusive formula rate of 47.3%.

Public Health Foundation Enterprises (PHFE), Pico Rivera, CA

Location: Public Health Foundation Enterprises (PHFE) is located in high-density areas of need throughout Los Angeles and Orange counties. In 2006, Los Angeles County had an estimated population of 9,826,493 and Orange County had an estimated population of 3,063,159.(US Census Bureau Population Division 2009)

Agency: PHFE is the largest WIC agency in the country, with over 50 WIC clinics in 2 counties. PHFE serves approximately 316,000 participants every month which is about 25% California's WIC population.(Public Health Foundation Enterprises WIC Program)

Clinic: The local WIC clinic in Pico Rivera was chosen to participate in the Baby Behavior study. Pico Rivera, a suburban town with a population of 65,200, is situated approximately 11 miles southeast of downtown Los Angeles, on the eastern edge of the Los Angeles basin, and on the southern edge of the San Gabriel Valley. Pico Rivera is a large clinic with a caseload of 6,500 participants. This clinic has 2 RDs, 7 WNAs and 1 hourly employee. The ethnic breakdown at this clinic includes: 96% Hispanic; 2.1% Caucasian; 0.4% Native American; 0.25% Asian; 0.25% African-American; and 1% mixed ethnicity. In 2006, when the study began, this clinic had an exclusive breastfeeding rate of 8.6%, a combination rate of 28.6%, and an exclusive formula rate of 58.1%.

Scripps Mercy, San Diego Area, CA

Location: San Diego is a Southern California city bordered by the Pacific Ocean and the U.S.-Mexico border. San Diego County had an estimated population of 2,937,023 in 2006.(US Census Bureau Population Division 2009)

Agency: The Scripps Mercy WIC Program is a medium-sized agency with a caseload of over

10,000 participants. In 2006, this agency had an exclusive breastfeeding rate of 17.3%, a combination rate of 34%, and an exclusive formula rate of 42.2%.

Clinic: Two clinic sites were included in this study: City Heights Wellness Center WIC and Chula Vista Wellness Center WIC.

City Heights Wellness Center WIC, San Diego

City Heights, an urban area, is one of the most densely populated neighborhoods in San Diego County. City Heights Wellness Center is a small clinic with a caseload of close to 5,000 participants. The ethnic breakdown of the WIC participants at the City Heights Wellness Center WIC includes: 81.4% Hispanic; 9.6% African-American; 4% Asian; 3.2% Caucasian; 0.4% Native American; and 1.2% mixed ethnicity. In 2006, when the study began, this clinic had an exclusive breastfeeding rate of 17.3%. The staff consists of 5 WNAs, and 2 RDs.

Chula Vista Wellness Center WIC, Chula Vista

Chula Vista is just south of the city of San Diego and is bordered by the Pacific Ocean on the west and mountains on the east. The city, population of 230,000, covers 50 square miles. The Chula Vista Wellness Center WIC clinic is located in a suburban area of the city and has a small caseload under 2,000 participants. The ethnic breakdown includes: 86% Hispanic; 5.3% Caucasian; 4% African-American; 3.8% Asian; 0.4% Native American; and 0.5% mixed ethnicity.

Control Sites

Solano County WIC Program, Fairfield, CA

Location: Located between San Francisco and Sacramento, Fairfield is the seat of Solano County. Solano County is a rural/suburban county that is home to rolling hillsides, waterfronts and fertile farmland. In 2006, Solano County had an estimated population of 407,269.(US Census Bureau Population Division 2009)

Agency: Solano County WIC is a medium-sized agency with a caseload of over 10,000 participants. The agency has several clinics located in both urban and suburban areas.

Clinic: The Fairfield clinic is a small clinic with a caseload of nearly 3,500 participants. The ethnic breakdown for this clinic includes: 62.1% Hispanic; 15.4% African-American; 5.4% Asian; 10.1% Caucasian; 1.2% Native American; and 5.2% mixed ethnicity. In Solano County, 75% of WIC-eligible residents are enrolled in the program. In 2006, this clinic had an exclusive breastfeeding rate of 12.8%, a combination rate of 18.1%, and an exclusive formula rate of 63.3%.

Native American Health Center, Oakland, CA

Location: Native American Health Center is located in Oakland in the Fruitvale area within walking distance of La Clinica de la Raza, Fruitvale Neighborhood WIC.

Agency: Native American Health Center is a small agency with only 1 clinic and a caseload of about 2,500 participants.

Clinic: The ethnic breakdown for this clinic includes: 66.8% Hispanic; 14 % Asian; 10.5% African-American; 4.1% Native American; 1.4% Caucasian; and 2.5% mixed ethnicity. In 2006, when the study began, this clinic had an exclusive breastfeeding rate of 15%, a combination rate of 30.4%, and an exclusive formula rate of 46.9%.

Planned Parenthood of Orange and San Bernardino County WIC Program, Santa Ana, CA

Location: Orange County is located in Southern California. Santa Ana is located on the Santa Ana River, 10 miles east of the California coast. Santa Ana is the most populous city in Orange County, with an estimated population of 338,208.(US Census Bureau Population Division 2009)

Agency: Planned Parenthood of Orange and San Bernardino Counties is a medium-sized WIC agency with over 17,500 participants. Currently, Planned Parenthood of Orange and San Bernardino Counties is only offering WIC services in Orange County.

Clinic: The Santa Ana clinic has a caseload of about 6,100 participants. The ethnic breakdown for this clinic includes: 91.3% Hispanic; 1.9% Asian; 4.9% Caucasian; 0.7% African-American; 0.4% Native American; and 0.5% mixed ethnicity. In Orange County, 100% of WIC-eligible residents are enrolled. This clinic's staff consists of 1 Nutrition Educator and Training Counselor, 2 RDs, 1 RDE, 1 Degreed Nutritionist, and 8 WNAs. In 2006, this clinic had an exclusive breastfeeding rate of 6.7%, a combination rate of 36.1%, and an exclusive formula rate of 52.5%.

Spring Valley -American Red Cross San Diego/Imperial County

Location: American Red Cross WIC is located in the city of San Diego. Just east of the city of San Diego, Spring Valley is the largest unincorporated community in the county of San Diego, covering 13.5 square miles.

Agency: American Red Cross WIC is a large agency with 20 clinics, serving over 37,000 participants every month.

Clinic: The Spring Valley clinic was chosen to participate in this project. The caseload at the Spring Valley clinic is nearly 5,000 participants. The ethnic breakdown for the clinic includes: 64.2% Hispanic; 13.2% African-American; 9.7% Caucasian; 6.5% Asian; 1.4% Native American; and 4.2% mixed ethnicity. Eighty-nine percent of WIC-eligible residents in San Diego County are enrolled in the program. In 2006, this clinic had an exclusive breastfeeding rate of 17.2%, a combination rate of 26%, and an exclusive formula rate of 50.6%.

Sampling Method

Study Sites

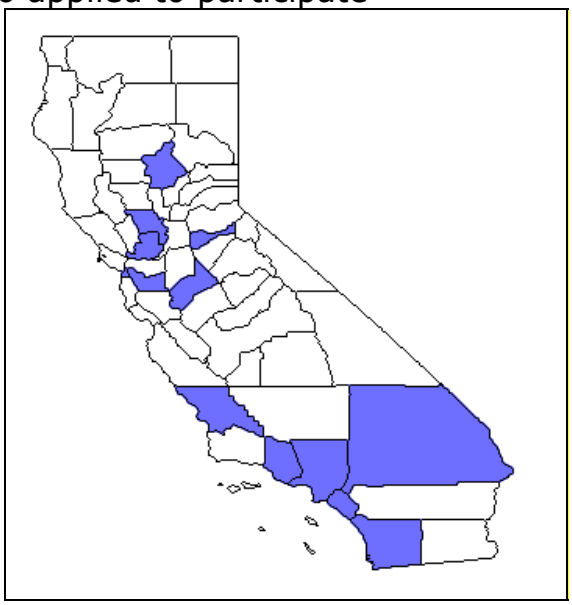
Invitation letters and applications were sent to all WIC agency directors in California. At the start of the study period, staff from the UC Davis Human Lactation Center and the California WIC Program met to discuss site selection criteria. Efforts were made to control for factors that might influence study outcomes. For example, because we were interested in understanding how our intervention would affect breastfeeding rates, we specifically selected sites that did not have outside funding for breastfeeding support services.

Agencies were eligible for participation in the study if they:

- Served both English- and Spanish-speaking participants
- Were led by administrators willing to comply with participation requirements including randomization to either the control or intervention group
- Had obtained no outside funds, including USDA Peer Counseling funds, for breastfeeding support services to be offered during the intervention or data collection periods (Sept. 1, 2007-Dec. 2008)
- Had not trained staff using the California WIC Breastfeeding Peer Counselor Manual
- Offered classes to participants using the group education model

Of the 82 agencies in California, 15 submitted applications and were qualified to be considered for participation. Figure 1 shows the counties served by the clinics that applied.

Figure 1: Counties served by agencies who applied to participate



The 15 agencies were matched into pairs based on 4 criteria:

- Exclusive breastfeeding rates in October 2006 ($\leq$ 5 % difference)
- Region (North vs. South)
- Setting (Urban vs. Rural)
- Agency Size/Caseload (Small < 10,000, Medium 10,001 – 45, 000, or Large > 45, 000)

Given the limited range of caseloads in the agencies that applied, it was decided that small clinics could be matched with medium clinics, and medium clinics could be matched with large clinics, but large clinics could not be matched with small clinics. Five agencies were excluded because they could not be matched using all 4 criteria. Details about the 5 matched-pairs are available in Table 1.

Table 1: Clinic characteristics of the 5 pairs eligible for participation in the study (based on 2006 data)

Pairs	Excl. BF Rates	Region	Setting	Agency Size
Yolo County	13.1%	North	Rural	Small
Solano County	12.8%	North	Rural	Medium
La Clinica de la Raza	18.6%	North	Urban	Small
Native American Health Centers	15.0%	North	Urban	Small
North East Valley	10.8%	South	Urban	Large
Ventura County Health Care Agency	12.2%	South	Urban	Medium
American Red Cross	17.2%	South	Urban	Medium
Scripps Mercy Hospital	17.3%	South	Urban	Small
Public Health Foundation Enterprises	8.6%	South	Urban	Large
Planned Parenthood of Orange and San Bernardino Counties	6.7%	South	Urban	Medium

In order to choose which 4 pairs would participate in the study, each agency name was written on a slip of paper and put into a bowl. The slips were pulled out of the bowl randomly, with the first agency drawn from each pair designated as the intervention clinic. After 4 slips representing different pairs were selected, the pair that was not represented was eliminated. A list of the participating agencies is provided in Table 2. Therefore, this study was a quasi-randomized trial because participating agencies were self-selected but randomly assigned to either the intervention or control group. Comparisons listed in this report will be referred to as "Northern Area" for Yolo and Solano Counties, "Oakland" for La Clinica del la Raza and Native American Health Centers, "San Diego" for Scripps Mercy Hospital and American Red Cross, and "Los Angeles Area" for PHFE and Planned Parenthood.

Table 2: Agencies selected for participation

Intervention Agencies	Control Agencies
Yolo County	Solano
La Clinica de la Raza	Native American Health Centers
Scripps Mercy Hospital	American Red Cross
Public Health Foundation Enterprises	Planned Parenthood of Orange and San Bernardino Counties

Participant Surveys

Surveys were conducted in the intervention and control clinics prior to and after the intervention period. Surveys were offered in English and Spanish. Participants were eligible for participation in the surveys if they 1) were pregnant or caring for an infant up to 12 months of age, 2) spoke English or Spanish, and 3) had come to WIC at least once prior to the current visit. Sample size calculations were based on a goal of increasing knowledge scores on staff and participant surveys within each site by 25%. The sample size is based on typical Type I and II error rates used in sample size calculations. Within-subjects standard deviation on pilot pre- post-test was 36. A difference of 12.5 points between

groups was desired. Based on these assumptions, a total sample size of 800 was needed to detect a statistically significant difference in scores between baseline and post-intervention measures. Individual participants were not followed over time; rather, cross sectional data were collected at each time point within each clinic.

Weights

Each clinic was asked to obtain infant weights from 55 consecutive infants brought in for the 6-month recertification appointment. Scales (Tanita BD-585 Digital Baby Scale) were calibrated using standard weights and provided to each clinic. All staff received training to ensure that infant weights were taken using standardized procedures. The sample size of 55 per clinic was calculated to detect a significant difference ($P<0.05$) between groups of 375g (Desired power=0.80, estimated SD = 692).(Dewey, Heinig et al. 1992) Infant weights were not part of the original procedure described in the grant application because it was believed that obtaining the weights would be too burdensome on the staff in the participating clinics. However, during the preliminary discussions about the project, all participating clinic administrators agreed to collect these data.

Staff Surveys

Staff surveys were conducted at both intervention and control clinics at 2 time points. The pre-intervention survey was administered in person to all staff attending the first training. Staff members who were unavailable during the first training received the survey from their supervisors. The surveys were then sent by mail to UC Davis for processing. The post-intervention surveys were administered at the end of the intervention to all staff members by the clinic supervisors. These surveys were also mailed to UC Davis.

Staff Training Pre- and Post-Tests

In order to evaluate knowledge transfer, all staff members attending the trainings were asked to complete tests at the start and end of each of the first 3 trainings. The fourth training included a review of the Baby Behavior messages and an overview of the classes to be offered at the clinic. Therefore, a quiz was not considered necessary for the last training. Standard evaluation questions were also asked at the end of each training.

Focus Groups

Focus groups were conducted at each of the intervention clinics. Mothers were eligible to participate if they were English- or Spanish-speaking, were pregnant or had a baby less than 6 months old, and were currently enrolled in the participating WIC programs. All participants were given monetary compensation to a local grocery store or department store.

Staff Interviews

At the end of the intervention period, 1 staff interview was conducted for each of the intervention clinics. Clinic supervisors were contacted and asked to identify a staff member who was not an RD, had been to all of the trainings, and was involved in teaching the classes and using the study materials. Interviews were conducted by phone during normal business hours.

Supervisor Surveys and Cost Surveys

At the end of the intervention period, supervisors from each of the intervention clinics were interviewed by phone. They were also asked to complete a 2-page cost survey detailing expenditures used to implement the intervention over and above their normal operating costs.

Description of Intervention

Overview

The intervention was designed to address triggers of over- and inappropriate feeding among WIC participants, specifically infant waking and crying. These behaviors were perceived by participants to be indicators of infant hunger. The project was designed to create clinic environments that promoted positive caregiver-infant interactions. A key feature of the intervention was that overfeeding was not specifically mentioned in any of the study handouts or suggested counseling messages. This was necessary because very few if any of the participants we spoke with during the preliminary research that led to this project believed that they were overfeeding their infants. They believed that they were responding to their infants' hunger cues and that their infants truly were not satisfied with whatever they had been feeding.

From the outset, it was clear that WIC staff members were concerned about 1) the time that the intervention might take from their busy schedules and 2) that participants would be offended by any messages that may be perceived as challenges to participants' parenting abilities. Therefore, it was important that messages and materials had to be inoffensive and simple enough to deliver in a short amount of time. The trainings included segments where staff members were asked to practice delivering key messages in very short segments (15 to 30 seconds) and conversation starters were provided to ensure that participants were never offended by our approach.

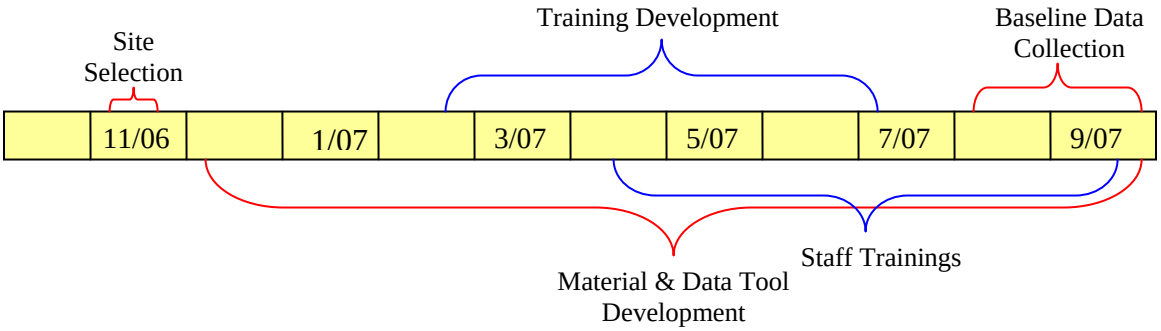
Elements of the Intervention

- Simple, targeted messages that addressed primary triggers of overfeeding. For example:
  - Infants cry for many reasons
  - Infants use simple cues to tell caregivers what they need
  - Infants sleep differently than adults, newborns fall asleep dreaming
  - Dreaming is important for infant brain development and babies sleep lightly when they dream
- Written materials included engaging pictures of infants and bright colors, handouts were formatted to answer parents' questions
- Classes were designed to be learner-centered and interactive
- Social marketing materials were used to introduce the concept to participants that WIC could be a source of information about infant behavior
- Staff members were trained in segments, separated by 2 or more weeks, to increase staff trust in the information
- Trainings included information about why WIC participants' coping skills may influence their decisions not to follow guidelines and education offered at WIC
- Trainings included many examples of how the information could be delivered within the WIC setting
- Conversation starters were used to build staff confidence and reduce fears about offending parents
- Training included discussions of modifications that might be needed for California's highly diverse population

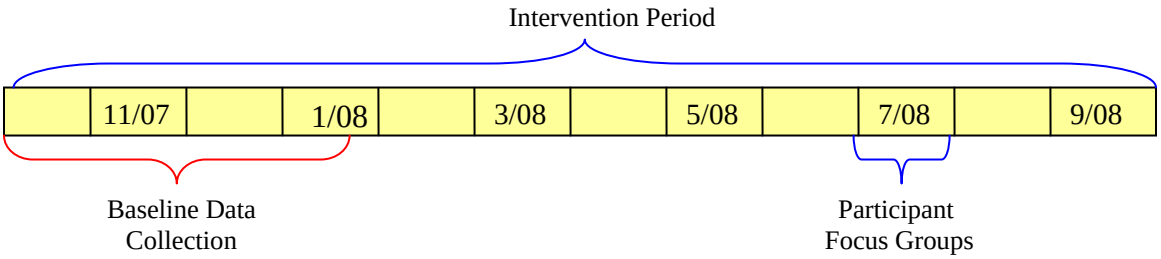
Detailed descriptions of the development and implementation of the messages and strategies follow.

Project Timeline

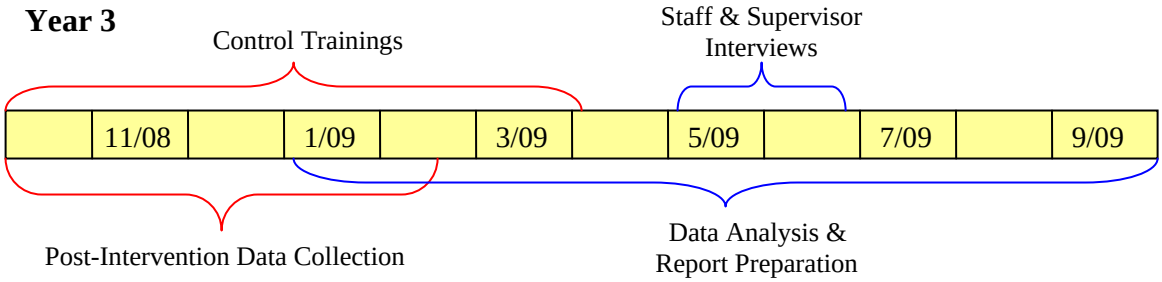
Year 1



Year 2



Year 3



Staff Training Development

Intervention Clinic Trainings

The original study plan was to provide 4 trainings, each 3-4 hours in length, to the intervention clinics. The first 2 trainings were to be designed for the entire staff and the last 2 trainings were to be provided to the upper-level staff and educators. The trainings were scheduled approximately 1 month apart, to provide attendees time to observe caregivers and infants between each of the trainings. Upon meeting with the clinic supervisors, however, it became clear that they expected that all of their staff would receive all 4 trainings.

The trainings were developed by the research team, with assistance from the Nutrition Education and Training team from California State WIC. Each learner-centered training included a variety of teaching methods to engage all types of learners. Table 3 lists the topics covered in each of the trainings. A post-test was administered at the end of each training to assess knowledge transfer and identify topics that needed to be discussed further. The topics that needed further attention were reviewed during the following training. All training materials were designed to be appealing to the attendees and included numerous photographs of babies.

Control Clinic Trainings

One 2-hour training was given to the control clinics prior to the baseline data collection. The purpose of this training was to gather support from the control clinics and to provide instructions for data collection. The training included a review of past FitWIC projects, the Baby Behavior project background and study design, data collection requirements and instructions, and infant and child growth measurement tips and tools. Even though the data collection information was the only topic necessary for the study, the additional topics added structure and provided the attendees with information they could use until the intervention was available.

Clinic Training Revisions

Using the training evaluations, site visits and phone calls, and staff and supervisor interviews, the research team modified the intervention trainings before they were conducted at the control clinics after the intervention period. After receiving additional feedback from the 4 control clinics, additional changes were made and final versions of the trainings were tested at a local WIC agency (that had not participated in the original study).

The Power Point slides and training materials were reformatted using 1 uniform template and the information on the slides was modified to be easily understood by those not familiar with the study. Presenter notes, that contain background information not included on the slides, were created for each of the trainings. The biggest difference between the original trainings and the final versions was the length. The original trainings were long and covered a lot of information, leaving many attendees feeling overwhelmed. By restructuring the flow of information, eliminating some of the time consuming activities, and adding homework assignments, the final versions of the trainings have been shortened to 2 to 2.5 hours each (8 to 10 hours total) and cover less information during each session. Table 3 shows how the trainings were restructured and topics covered in each of the final trainings.

Table 3: Topics covered in each of the baby behavior trainings

Training	Original Intervention Trainings	Final Revised Trainings
Training 1	Study background, participant coping skills, infant states, cues, sleep, data collection	Study background, participant coping skills, infant states & cues
Training 2	Infant crying, caregiver-infant interactions, counseling, handout preview	Infant sleep & crying
Training 3	Baby Behavior handouts, counseling tips	Caregiver-infant interactions, quick & easy counseling tips
Training 4	Main mom messages, review of previous trainings, preview of classes	Baby Behavior Classes, Tips for sustaining Baby Behavior education in agencies

Trainings 1-3 are clinic-wide trainings, appropriate for all WIC staff positions. Training 4 focuses on sharing Baby Behavior messages using group education and provides tools to sustain Baby Behavior education within agencies. Therefore, this last training is most appropriate for nutrition education and training staff and has been designed to be delivered to leadership staff (RD's, supervisors, etc.) and staff who are involved with education development. The training slides and activities are provided in Appendix A.

Handout Development

Getting to Know your Baby: Tips and Facts about the First 6 Weeks

Content Development - Focus Groups

Before the development of the "Getting to Know Your Baby" calendar, focus groups were conducted to determine what information was most needed by new mothers. The purpose of the focus groups was to talk with new mothers and use their experiences to identify the information that would be included in the calendar. The goal was to identify universal areas of confusion and frustration for new parents that could be addressed with messages in the calendar. The script was developed, reviewed by the research team, and revised until all members of the team approved. Once completed, the script was translated into Spanish and then back-translated to ensure that it was consistent with the English version.

Only mothers of infants 3-months-of-age or younger, who were enrolled in WIC, and who spoke either English or Spanish were eligible to participate. Fathers who accompanied mothers to the groups were given the option to participate in the group. Potential participants were recruited by WIC staff during regular clinic hours, in person and by phone. Four focus groups were conducted, 2 in English and 2 in Spanish.

After each focus group, the recording of the discussion was transcribed. For the Spanish groups, the recordings were transcribed in Spanish and then translated into English. In addition, a second translator reviewed the transcripts to check for accuracy. Once all of the focus groups had been transcribed, 3 members of the research team independently analyzed all 4 transcripts. The information was categorized based on where it would best fit in the 6 week calendar. For example, information explaining the onset of lactation was most appropriately placed in the first few days postpartum.

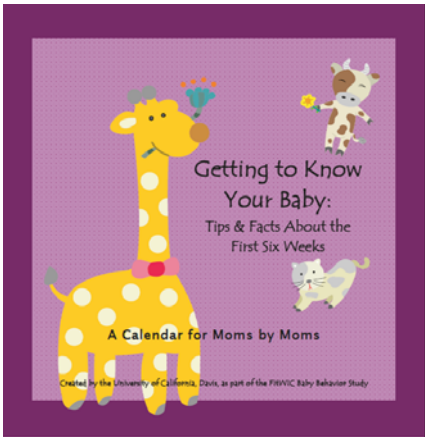
Calendar Design and Development

After gathering all of the information from the focus groups, the research team began designing the calendar. The goal was to maximize the information that could be included while minimizing the amount of text and ensuring readability. The calendar was designed to

be 7 inches wide by 7 inches tall. Each page included spaces for 2 days, a picture, and a quote. Each day was labeled with the age of the baby (Day 1, Day 2, etc) and the number of days until the baby turned 6-weeks-old. The cover was printed on heavy paper and the book was saddle-stapled.

Once the template was made, the information that had been gathered was added. The text was written at or below a 6th-grade reading level to ensure that it would appeal to participants with a broad range of education levels. The tips, advice, and facts about babies were placed into each day and selected quotes from the focus groups and pictures of babies were placed at the top of each page. A brief introduction and a description of how to use the calendar were included on the inside cover and the last 2 pages were reserved for a list of resources. The front cover was decorated with animals and the colors on the inside were pulled from the animal pictures to create continuity. After all of the information and pictures had been added, each member of the research team reviewed the calendar before testing it with mothers at the WIC clinic. The cover of the calendar is provided in Figure 2.

Figure 2: Countdown calendar cover



Calendar Testing

Draft versions of the calendar were taken to be tested at the same WIC clinic where the focus groups had taken place. The testing was conducted to ensure that the calendar and information provided in it were accepted, understood, and useful to new moms. Pregnant women and mothers of children 2 years-of-age and younger were asked to review the calendar while waiting for their appointments. After each participant had taken a few minutes to read the calendar, a member of the research team asked the participant questions about her opinion of the calendar design, what she liked and disliked about the calendar, if she would have found this calendar useful, and if there were any other suggestions that would make the calendar better. In addition, the participants were asked to look at a specific day and explain how they would use the information provided; this question was used to determine if the messages provided in the calendar were understood. The answers to the interview questions were recorded by the researcher and the results were reviewed independently by each member of the research team. The research team discussed the results and the necessary changes were made to the calendar. Only 1 round of testing was conducted before the study version of the calendar was completed. Additional testing of the calendar was part of the full Baby Behavior intervention.[c]

[c] The development of the Getting to Know Your Baby Calendar was Jennifer Bañuelos's Master's Project.

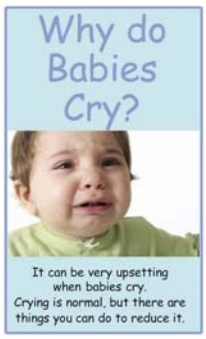
Participant Handouts

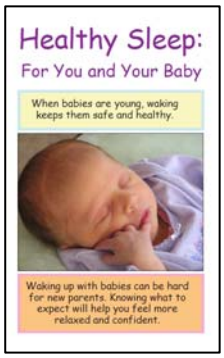
Development

Handouts covering the Baby Behavior messages were created to compliment the counseling and classes that would be available at the intervention clinics. Using information from focus groups (conducted prior to the start of this project), the research team developed 4 handouts, each covering 1 of the main Baby Behavior topics (infant sleep, infant cues, infant crying, and physical activity). First, the research team identified the most important information for each topic. Next, the information was revised to a 6th-grade-reading level and organized to fit on one 8 ½ x 11 sheet of paper (double-sided and folded in the middle). Pictures and colors were added to enhance the presentation. The front pages of each handout are provided in Figure 3.

Low-literacy handouts containing the same information as the standard participant handouts were created, but were written at a 1st-2nd grade-reading level. The text was printed larger and the 8 ½ x 11 sheet of paper was not folded in half, so that they would be distinct from the standard handouts.

Figure 3: Final versions of the participant handouts





Testing

Draft versions of the handouts were tested in the same way as the calendar (described above), although 3 rounds of testing were conducted to produce the versions used in the study.

Post-intervention Revisions

At the end of the intervention period, 3 of the participant handouts, *Understanding Your Baby's Cues*, *Healthy Sleep: For You and Your Baby*, and *Coping with Crying*, were revised. The changes were based on suggestions from intervention clinic staff and participants in the focus groups. A list of changes made to each handout can be found in Table 4. The final versions of the participant handouts are available in Appendix B. The handout that covered infant physical activity was not revised due to the lack of interest in the handout.

Table 4: Revisions made to original participant handouts to create the final versions

Handout	Issues	Revisions
Understanding Your Baby's Cues	Text-heavy "Busy" design	• Eliminated unnecessary text • Reorganized information • Simplified the design by reducing the number of boxes and removing the borders • Changed the colors from pastel to bold colors
Coping with Crying	Title doesn't match content Text-heavy	• Changed the title to *Why do Babies Cry?* • Eliminated unnecessary text • Revised text to address the reasons why babies cry
Healthy Sleep: For You and Your Baby	Text-heavy	• Reorganized information • Reworded into clear, straightforward messages

Class Development

Review of Existing Class Outlines

Prior to the class development, each intervention clinic was asked to provide the research team with copies of all existing prenatal and early postpartum breastfeeding and infant-feeding classes. The class outlines were reviewed by the research team and it was determined that the majority of the existing classes were too long or contained too much information to accommodate the addition of the Baby Behavior messages. Given the amount of time it would take to revise all of the class outlines, the decision was made to create 2 new Baby Behavior classes instead. Each of the intervention sites had time available in their class schedule for at least 1 prenatal and 1 infant class, so 1 Baby Behavior class for prenatal women and 1 for postpartum women were created.

It was also decided that some of the Baby Behavior information would fit well in postpartum breastfeeding support groups. Since 2 of the intervention clinics already provided these groups to their participants, a postpartum breastfeeding support group script, that included Baby Behavior messages, was created. Unlike the class scripts, this outline followed a facilitated group discussion format.

Class Development

The classes were developed using Global Learning Partners' Learner-centered Principles of Design. (Vella, 2002) Comments from focus groups in an earlier study were used to determine appropriate class messages and content, and class activities were designed to be non-threatening for both participants and teachers. A variety of learning activities (writing, reading, sharing, group activities, and visuals) were included in each class.

Class content focused on the primary messages (developed from focus group results) with sections on infant cues, crying, and sleep patterns. Each class was designed to be 30 minutes long.

All of the Baby Behavior class outlines included the following sections:

- Welcome/Introduction
- Warm up activity
- Main class activities
- Closing activity

Because Power Point and overhead projectors are not available in all clinics and can be seen as a barrier between the teacher and learners in the classroom, the classes were taught using laminated posters instead of slides or transparencies. All of the posters and props for the activities were produced by the research team and provided to the intervention clinics. The class posters and activities were provided in English and Spanish, but the script was available only in English.

Prenatal Class – Understanding Your Baby: Infant Behavior
Prenatal class activities focused on the messages related to infant sleep, because it was determined that parents need the sleep messages before their babies are born. These messages are needed to discourage the use of foods and fluids to extend infants' sleep in the early postpartum period. In the clinics providing only 1 prenatal class, there were limitations to the amount of breastfeeding education available to participants. Since it was impossible to cover all breastfeeding and Baby Behavior messages in 1 class, the research team decided that offering 2 prenatal classes, 1 focused on breastfeeding and 1 on Baby Behavior, was ideal.

There were 2 primary messages in the prenatal class: *Babies need to dream and wake up at night to be healthy* and *Babies wake less often as they get older*. The class focused on teaching caregivers about why babies dream, the 2 types of infant sleep, and that waking is normal for infants. An introduction to infant cues was also included. Since the participants did not have their own babies yet to practice with, infant cues were not covered in detail.

Postpartum Class – Breastfeeding: The Gift of Love
The postpartum breastfeeding class was developed following a facilitated group discussion format where participants choose the topics discussed. Guidance was provided through a "Common Topics" poster with 5 common breastfeeding questions. Participants were asked to place a small star by the 2 topics that they wanted to learn more about. Baby Behavior and learner-centered activities were woven into each of the breastfeeding topics.

Infant Class- Secrets of Baby Behavior
The focus of the postpartum class was infant cues, which fit nicely with the infant nutrition information traditionally provided. Participants attending this class received information about recognizing and responding to infant cues, the many reasons why babies cry, and a quick review of normal infant sleep (covered in detail in the prenatal class). This class focused on the early postpartum period (≤ 2-months-old). Most of the information is important for caregivers to receive as early as possible, ideally within the first month, although many caregivers do not attend the infant-feeding class until their babies are a few months old. Since this class was designed to replace the current infant nutrition class, an introduction to solid foods section was included at the end of the class to ensure that caregivers attending the new class would not miss out on this information.

The class scripts are available in Appendix C.

Pilot Testing and Training

The final versions of all 3 classes were pilot tested at 1 of the intervention clinics. Each class was taught 3 times. The classes were successful, and the post-test results showed good knowledge transfer.

The Baby Behavior classes were introduced to the staff during the 4th intervention clinic training (Table 3). This training included a demonstration of 1 of the classes and suggestions for adding Baby Behavior messages to existing group classes. This single training session was not adequate to prepare staff to teach classes effectively, so the intervention sites were encouraged to provide more detailed training on each individual class and to allow team teaching while staff learned the new classes.

Social Marketing Materials

Posters

Four posters were created to be used as social marketing tools in the intervention clinics. The posters were designed to spark participants' interest in the Baby Behavior topics and inform them about the information that they could get from the WIC staff, classes, and handouts. The posters were provided in English and Spanish and were tested to ensure that the messages were clear and that they were visually appealing. Figure 4 are examples of the posters. All of the posters, in English and Spanish, are available in Appendix D.

Backpacks

Small backpacks with the study logo screen printed onto the front were provided to each of the clinics during the baseline data collection period. Like the posters, the backpacks were intended to be used as a social marketing tool, informing the participants about the new information available at the WIC clinic.

Figure 4: Examples of the social marketing posters

Implementation of the Intervention

The intervention period was scheduled to begin when the baseline data collection period was complete, in October 2007. During the data collection period, however, it became clear that some of the clinics would need more time to distribute the participant surveys and collect infant weights. Several factors affected the additional time needed to collect the data:

- Fires in Southern California forced the closure of 2 of the clinics and once the clinics reopened, the increased work load associated with the natural disaster interfered with the data collection process.
- Staff turnover, including loss of a clinic supervisor, delayed the start of data collection in 1 of the clinics.

Two clinic pairs (in the Northern California and the LA/Orange county areas) began the intervention on schedule, in October of 2007. The other 2 clinic pairs (in Oakland and San Diego) began the intervention in February 2008. Once each clinic had completed baseline data collection, the materials (handouts, posters, class materials, etc) were delivered to the clinic and they were instructed to begin the intervention.

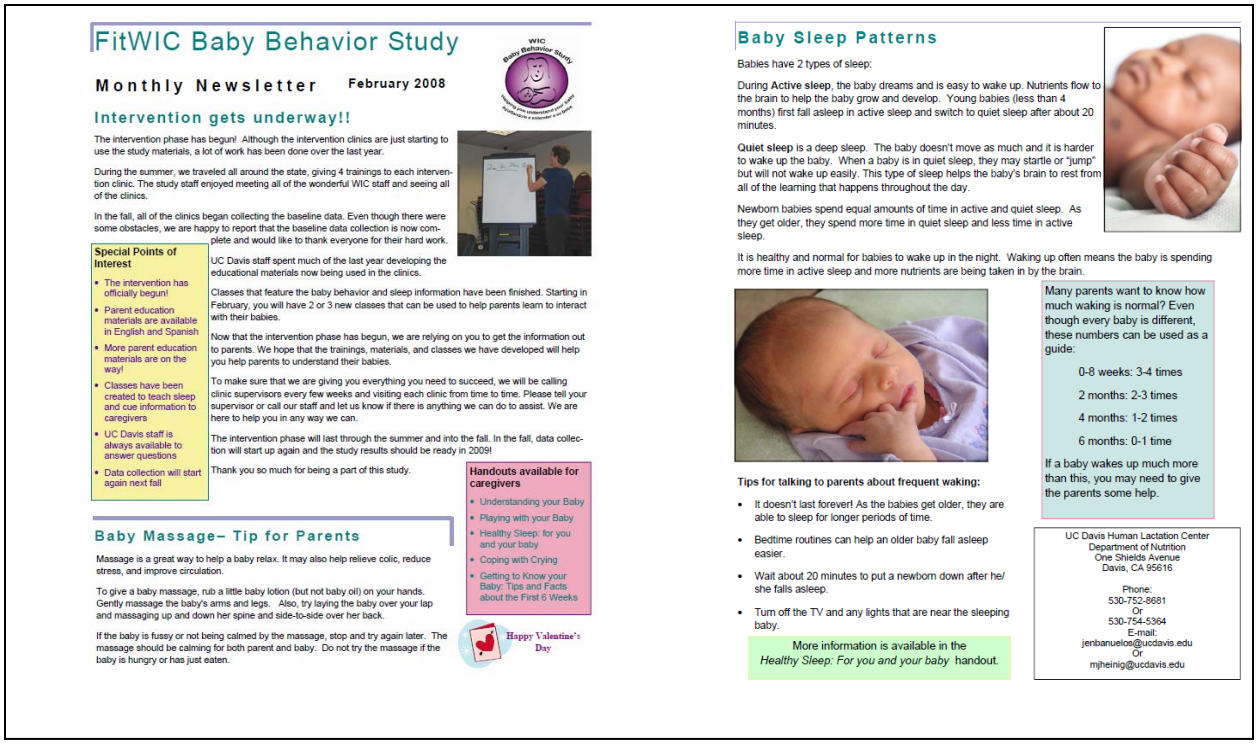
Follow-up and Monitoring

The research staff maintained contact with the intervention clinic supervisors and staff through monthly newsletters, monthly phone calls, and periodic site visits.

Newsletters

The newsletters were sent to intervention clinic supervisors by email and the supervisors were asked to distribute the newsletters to their staff. Newsletters were designed to provide support to frontline staff by providing a brief review of Baby Behavior messages and tips for delivering the messages. The newsletters were also used to provide contact information for the researchers and to share the answers to questions raised by clinic staff. An example is provided in Figure 5.

Figure 5: Example of monthly newsletter for intervention staff



FitWIC Baby Behavior Study

Monthly Newsletter February 2008

Intervention gets underway!!

The intervention phase has begun! Although the intervention clinics are just starting to use the study materials, a lot of work has been done over the last year.

During the summer, we traveled all around the state, giving 4 trainings to each intervention clinic. The study staff enjoyed meeting all of the wonderful WIC staff and seeing all of the clinics.

In the fall, all of the clinics began collecting the baseline data. Even though there were some obstacles, we are happy to report that the baseline data collection is now complete and would like to thank everyone for their hard work.

Special Points of Interest

- The intervention has officially begun!
- Parent education materials are available in English and Spanish
- More parent education materials are on the way!
- Classes have been created to teach sleep and cue information to caregivers
- UC Davis staff is always available to answer questions
- Data collection will start again next fall

UC Davis staff spent much of the last year developing the educational materials now being used in the clinics.

Classes that feature the baby behavior and sleep information have been finished. Starting in February, you will have 2 or 3 new classes that can be used to help parents learn to interact with their babies.

Now that the intervention phase has begun, we are relying on you to get the information out to parents. We hope that the trainings, materials, and classes we have developed will help you help parents to understand their babies.

To make sure that we are giving you everything you need to succeed, we will be calling clinic supervisors every few weeks and visiting each clinic from time to time. Please tell your supervisor or call our staff and let us know if there is anything we can do to assist. We are here to help you in any way we can.

The intervention phase will last through the summer and into the fall. In the fall, data collection will start up again and the study results should be ready in 2009!

Thank you so much for being a part of this study.

Handouts available for caregivers

- Understanding your Baby
- Playing with your Baby
- Healthy Sleep: for you and your baby
- Coping with Crying
- Getting to Know your Baby: Tips and Facts about the First 6 Weeks

Baby Massage– Tip for Parents

Massage is a great way to help a baby relax. It may also help relieve colic, reduce stress, and improve circulation.

To give a baby massage, rub a little baby lotion (but not baby oil) on your hands. Gently massage the baby's arms and legs. Also, try laying the baby over your lap and massaging up and down her spine and side-to-side over her back.

If the baby is fussy or not being calmed by the massage, stop and try again later. The massage should be calming for both parent and baby. Do not try the massage if the baby is hungry or has just eaten.

Happy Valentine's Day

Baby Sleep Patterns

Babies have 2 types of sleep:

During **Active sleep**, the baby dreams and is easy to wake up. Nutrients flow to the brain to help the baby grow and develop. Young babies (less than 4 months) first fall asleep in active sleep and switch to quiet sleep after about 20 minutes.

Quiet sleep is a deep sleep. The baby doesn't move as much and it is harder to wake up the baby. When a baby is in quiet sleep, they may startle or "jump" but will not wake up easily. This type of sleep helps the baby's brain to rest from all of the learning that happens throughout the day.

Newborn babies spend equal amounts of time in active and quiet sleep. As they get older, they spend more time in quiet sleep and less time in active sleep.

It is healthy and normal for babies to wake up in the night. Waking up often means the baby is spending more time in active sleep and more nutrients are being taken in by the brain.

Many parents want to know how much waking is normal? Even though every baby is different, these numbers can be used as a guide:

0-8 weeks: 3-4 times

2 months: 2-3 times

4 months: 1-2 times

6 months: 0-1 time

If a baby wakes up much more than this, you may need to give the parents some help.

Tips for talking to parents about frequent waking:

- It doesn't last forever! As the babies get older, they are able to sleep for longer periods of time.
- Bedtime routines can help an older baby fall asleep easier.
- Wait about 20 minutes to put a newborn down after he/she falls asleep.
- Turn off the TV and any lights that are near the sleeping baby.

More information is available in the *Healthy Sleep: For you and your baby* handout.

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Phone Calls

Monthly phone calls were made to the intervention clinic supervisors to monitor progress, answer questions, and provide support. Standardized forms were used for each call, but

calls were not always made by the same member of the research team. The phone call form is available in Appendix F.

Site Visits
The research team conducted site visits at the intervention clinics every few months during the intervention period. Visits were scheduled in advance and included clinic observations, class and counseling observations, and staff and supervisor interviews. A copy of the form used during the site visits is provided in Appendix F.

Additional Support and Resources

During the phone calls and site visits, clinic staff and supervisors requested additional support that was not included in the original study design. Below are the descriptions of the resources created by the research staff after the intervention had already begun.

Mini Classes
In clinics that teach classes continuously throughout the day and where participants are required to attend a class at every visit, it took only a few months before participants started repeating the classes. To address this issue, modules were created to be added onto the end of regular classes. This way, clinics could change their group class topic monthly and still provide Baby Behavior education to participants. The full-length classes were divided into 7 short (3-5 minute) activities to deliver the main Baby Behavior messages.

Self Learning Modules
Several clinics expressed concern about poor class attendance. To address this concern, Self Learning Modules (SLMs) were designed to be used when classes are poorly attended or staffing is short. The SLMs were designed for participants who are able to read either English or Spanish at an 8th-grade-reading level or higher and have comprehension skills to complete a quiz related to the information they read in the booklet.

Using the class scripts as guides, 2 SLMs were created to cover the infant cues, crying, and sleep concepts. The prenatal module includes messages covered in the prenatal class, *Understanding Your Baby: Infant Behavior*. The second module was designed for postpartum moms using the *Secrets of Baby Behavior* class. Each SLM is 5-7 pages long and contains graphics and lists of concepts to enhance comprehension. A 5-6 question quiz was developed to assess knowledge transfer of the main messages in each module. Completion of each module (reading the booklet, taking the quiz, and discussing quiz answers with a staff member) usually takes 15-20 minutes and counts as a nutrition education contact, as approved by each agency's nutrition education staff. The SLMs are provided in Appendix E.

Baby Behavior Week
About halfway through the intervention period, the research staff developed a special event called "Baby Behavior Week" was intended to encourage clinic staff to continue talking to caregivers about Baby Behavior and to increase WIC participants' exposure to the Baby Behavior messages. The event included:

- Baby Behavior Week banners posted at the front desk.
- Coloring sheets with simple Baby Behavior messages for the clinic waiting rooms.
- A scavenger hunt game for participants to complete while in the waiting room. Simple Baby Behavior questions and answers were posted around the clinic waiting room for participants to review.
- Certificates were also provided to recognize 1 staff member as an outstanding "Baby Behavior Expert" at each clinic.

Data Collection and Analysis

Staff Surveys

Baseline

Staff surveys were developed, tested, and revised by the research team prior to administering the first staff training. All staff (from both intervention and control clinics) were given the survey to complete upon arrival to the first staff training (Training 1 for intervention clinics and Control Training for control clinics). Completed surveys were collected prior to starting the training. Supervisors were asked to give the survey to all absent staff members and to mail the completed surveys to UC Davis. A copy of the baseline staff survey is available in Appendix F.

Post-intervention

The post-intervention survey was created by revising the baseline staff survey. Questions with less than 5% variability in responses at baseline (for example "Childhood overweight is a major health problem in California") and questions about general WIC trainings and classes were removed and replaced with questions about the intervention messages, materials, and dissemination. The post-intervention surveys were sent to the clinics by mail and distributed by the clinic supervisors. Staff were instructed to place completed surveys into sealed envelopes, to ensure confidentiality, and return them to their supervisors, who mailed all of the surveys back to the research team. All clinic staff were asked to complete the survey, even if they had not attended the Baby Behavior Trainings. A copy of the post-intervention staff survey is available in Appendix F.

Training Post-Tests

A post-test was administered immediately following each of the 4 staff trainings. The clinic staff were asked to complete the 2-page test and return it before leaving the training. The multiple-choice questions were designed to assess the knowledge gained during the training and to identify the topics that needed further attention at the next training. It also included a training evaluation section. No identifying information was collected. The training post-tests are included with the training materials in Appendix A.

Participant Surveys

Participant surveys were designed to assess the attitudes, beliefs, and infant-feeding practices of the WIC participants at the intervention and control clinics. Two surveys were developed, 1 for prenatal participants and 1 for participants with children less than 1 year of age. The surveys were developed, tested using cognitive interviews, and revised by the research team. The English versions of the surveys were translated into Spanish and then tested again. The surveys did not collect any identifying information. The surveys were distributed at 2 different time points – at baseline, prior to intervention implementation, and again after the intervention period was complete. Minor changes, to fix typos and grammatical errors, were made to the surveys between the baseline and post-intervention periods.

Clinic staff were trained to distribute the surveys and were provided with detailed instructions. More information about who was eligible and how they were approached are given in the instructions that were provided to the clinic staff (Text box 1).

Survey distribution continued until the quota of 50 prenatal and 100 postnatal (half in English and half in Spanish) was reached. A ballot box was provided to each clinic so that

participants could return the surveys anonymously. Staff were instructed to return all surveys to the research team so that there would be a record of refusals. To thank participants for completing the survey, they were entered into a raffle for a Target gift card. Each clinic held a raffle every 2 weeks until their quota was reached. The gift cards, valued at $50, were not purchased using SPG funds. The final versions of the participant surveys are available in Appendix F.

Text Box 1: Survey Distribution Instructions Provided to Staff in Both Intervention and Control Clinics.

Survey Instructions

Whom to ask:

- Any caregiver of a healthy infant less than 1 year of age who has been to this WIC clinic before.
- Pregnant women who have been to this WIC clinic before.
- All participants must be English or Spanish speaking.
- Please do not ask caregivers who are at the clinic to enroll. Infant enrollment appointments are ok, if the mother was enrolled prenatally.

Number of completed surveys needed:

- 25 Prenatal in English
- 25 Prenatal in Spanish
- 50 Postpartum in English
- 50 Postpartum in Spanish

How to ask:

- If a participant is eligible based on the above criteria, fill out the "For study use only" section at the top of the survey (see example below) before asking the person to participate.
  - Fill in today's date and the baby's date of birth (postpartum surveys) or mother's weeks gestation (prenatal surveys)
  - Circle the baby's gender (postpartum surveys), the appointment type, and the food package chosen at the last appointment.
  - **PLEASE DO NOT PUT ANY NAMES OR ID NUMBERS ON THE SURVEYS.**
- Next, ask the participant if he/she would like to take a short survey and be entered in a raffle to receive a Target gift card.
  - If the participant agrees, circle Accept in the box at the top and give him/her the survey and a pen. Once the survey is finished, the participant can put it directly in the box or folder.
  - If the participant declines, circle Decline and nicely ask the participant why he/she doesn't want to participate. Circle the appropriate response and put the survey in the box. **PLEASE DO NOT THROW ANY SURVEYS AWAY.**
- When the survey has been completed and turned in, give the participant a raffle ticket and have them write their name and phone number on the back. Let them know that you will be picking a winner that week and don't forget to thank them for participating.
- The raffles will be once a week for 4 weeks. Once a name has been drawn, please discard the remaining tickets and start collecting new raffle tickets for the next week.

Example:

FOR STUDY USE ONLY:

Date: 1/1/10	Baby's DOB: 12/1/09	Baby's Gender: Male Female	
Appointment type: Class Baby Enroll Voucher Recert BF Support	FP: B BE BC1 BC2 N IB IF IC IT		Accept Decline
Reason for Decline:	Too busy Not interested Too difficult Other children Privacy Refuse to answer Too tired Other:_____		

Unexpected delays occurred during both the baseline and post-intervention data collection periods. The reasons for the delays during the baseline data collection have been described (see page 22). Just as at baseline, several clinics had staffing problems that affected post-intervention data collection. In addition to staffing issues, the burden of distributing and collecting the surveys during baseline collection negatively influenced staffs' motivation to collect data after the intervention was complete.

Infant Weights

Clinic staff were asked to weigh all 5-7-month-old infants who came into the clinic during the data collection periods (baseline and post-intervention). Digital scales (Tanita BD-585) were purchased and provided to all of the clinics during the first training. Staff were trained to use the scales and were given the instructions provided in Text Box 2.

Text Box 2: Instructions for staff about recording infant weights

Recording Weights

As part of the Fit WIC Baby Behavior study your clinic will need to weigh approximately 55 6-month-old babies (± 2 weeks) and complete the weight records provided. Each sheet contains 3 weight records. Please use the following steps:

1. Tell the caregiver that your clinic is participating in the Fit WIC Baby Behavior study. As part of the study, all 6-month-old babies are being weighed. The weights are confidential and no personal information is being recorded. After weighing the baby, the caregiver will receive a certificate of participation to take home.
2. Ask the caregiver to undress the baby down to just a diaper. If the caregiver is uncomfortable with this request, the baby may be undressed to just a diaper and onsie/T-shirt.
3. As the caregiver is undressing the baby, begin filling out the weight record. Fill in the date of the visit, circle the baby's gender and the primary language of the caregiver, and the check off the clothing the baby will wear while being weighed. Ask the caregiver to provide the date of birth, birth weight, if it is her first visit to this WIC clinic, and the current feeding method.
4. Turn the scale on, place the drape over the scale, and set it to zero. Once the scale is set to zero, place the baby in the middle of the scale. Once the weight has stabilized (it will be flashing on the scale) record the weight on the form where it says "current weight."
5. After weighing the baby, thank the caregiver for participating. While the caregiver is dressing the baby, record the date and the baby's current weight on the certificate and give it to the caregiver to take home.

If you have any questions or concerns, please let us know. You can call us at XXX-XXX-XXXX or send us an email at xxxx@xxxx.

Figure 6 depicts the weight record form. Each clinic was given 25 forms (enough for 75 infant weights) and a clipboard with the instructions taped to it. The weight record form was designed to be quick and easy for staff to use, with check boxes and circling options whenever possible. Weights were to be obtained of infants dressed only in diapers. However, staff were concerned that many mothers would refuse to undress their infants. Therefore, the clothing description was included so that weights could be adjusted for the additional weight of the clothing.

Figure 7 shows the certificate that was provided to participants whose infants were weighed for the study. Although the certificate includes a space for the infant's name, no identifying information was included on the weight record form, which was the only item returned to the research team. The instructions, weight record, and certificate are available in Appendix F.

Figure 6: Infant weight record form

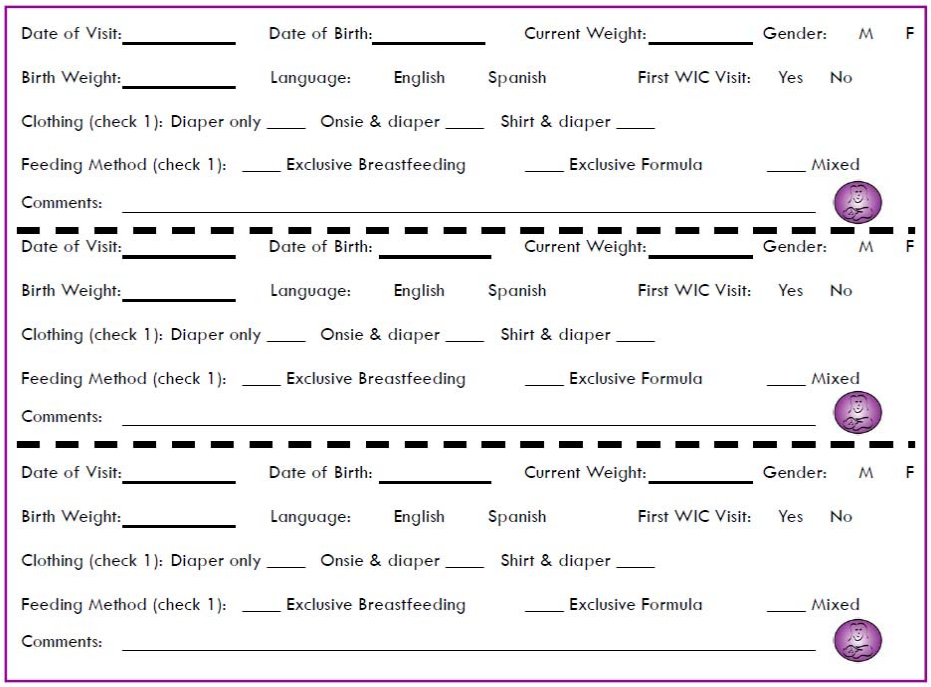


Figure 7: Infant weight certificates

Clinic Data

Class Evaluations

For each of the 3 Baby Behavior classes designed for WIC participants, a post-test was developed to assess knowledge transfer of the main class messages. The post-tests were available in English and Spanish and were administered at the end of each class. Upon completion, the post-tests were returned to the instructor and the participant was excused from class. The post-tests were only 1 page long (7-8 questions), and included both

multiple-choice and open-ended questions. The multiple-choice questions asked about specific concepts taught in the class and the open-ended questions assessed class satisfaction and asked what class information was new to the participant. Post-tests were used by each clinic until clinic staff felt that the classes were being taught in a consistent and effective manner. The post-tests are included with the class materials in Appendix C.

Site Visits and Phone Calls

During the intervention period, research staff conducted site visits and phone calls at each intervention clinic. These visits and calls were designed to monitor the intervention progress and provide support to the clinic supervisors and staff. Standardized forms were created and used during each visit and call to ensure consistent data collection. The forms included the following sections:

- General Clinic Information – to record the number of staff working, number of participants scheduled, number of classes taught, number of handouts needed, etc
- Clinic Environment Observation – to specify if the posters are visible, if the handouts are available to participants, etc
- Supervisor Interview – to identify significant changes to clinic staffing, additional resources needed for delivery of messages/classes, feedback received from staff and participants, barriers to delivery of the intervention, and other factors affecting breastfeeding rates
- Staff/Participant Observations – to monitor use of Baby Behavior information, use of handouts during counseling, participants' reactions to the information, modeling of behaviors, and use of conversation starters
- Staff interview – to identify how often the Baby Behavior information is used, how it was used, staffs' impressions of participant responses, problems with the intervention, and additional resources needed

The form was completed by hand during each visit/call, and then typed into the computer upon completion of the visit/call. The research team discussed the completed forms shortly after the visit/call to identify ways to address the concerns of the clinic supervisors and staff. Copies of the forms are available in Appendix F.

Staff Interviews

Staff interview forms were developed by modifying questions from the intervention site visit form and post-intervention staff surveys. New questions were also added. Questions were asked about the Baby Behavior staff trainings (beginning of intervention), Baby Behavior classes, Baby Behavior materials (handouts, poster, etc.), and data collection. Intervention site supervisors were contacted by email or phone and asked to choose 1 staff member to complete a 20-minute interview by phone. The staff member selected needed to have attended all of the Baby Behavior trainings, taught the Baby Behavior classes to participants, and counseled WIC participants about Baby Behavior using the study materials. After staff members were chosen by supervisors, the interviewees were contacted by phone to set-up a time for the phone interview. Phone interviews were conducted by a single member of the research team. Answers to interview questions were recorded either by hand onto the interview form or typed directly into the computer. The staff interview form is provided in Appendix F.

Supervisor Interviews

After the intervention period was complete, interviews were conducted with each intervention clinic supervisor. All of the interviews were conducted over the phone by a single member of the research staff. The interview included questions about the clinic environment (staffing, etc), training and preparation, intervention characteristics, classes

and materials, and study characteristics. The supervisor interview script is available in Appendix F.

Cost Surveys

Cost surveys were sent to each intervention clinic supervisor prior to the supervisor interview. During the interview, supervisors were asked whether they had any questions about the survey and were instructed to complete and return the form within 2 weeks. The survey was 2 pages long and included 3 sections – staff positions and salaries, increased workload, and additional costs related to the intervention. The supervisors were asked to provide the salaries for all of their current employees, but were not asked to give any identifying information for individual employees. The research team used the salary information and estimated increased workload to calculate the staffing costs associated with the intervention. All other costs (printing of materials, etc) incurred by the research team were factored in to provide the estimated total cost of implementation per clinic. A copy of the cost survey is available in Appendix F.

Focus Groups

Focus groups were conducted at each of the intervention clinics at the end of the intervention period. Facilitators were experienced in conducting focus groups among low-income women and bilingual facilitators led the Spanish-speaking groups. Questions for the focus groups were reviewed by 3 researchers from UC Davis and were also tested at a local WIC agency (not participating in the study). The questions for the Spanish groups were translated and back translated by a separate, independent translator, to ensure consistency and accuracy.

The focus groups were held in the WIC clinics, during regular class times. WIC participants were eligible to attend the groups if they were pregnant or had a child less than 1 year-of-age. All participants attending a regular class were invited to participate in the groups. There were no refusals. Raffle tickets were given to each participant and 1 ticket from each group was randomly chosen to receive a pack of disposable diapers. The diapers were not purchased using SPG funds.

All focus group sessions were recorded and transcribed by the facilitator for accuracy and supplemented with field notes taken by a second researcher. The facilitator also took notes immediately after the sessions. Transcripts of the Spanish sessions were translated into English. Transcriptions were reviewed and independently coded by 3 researchers for recurrent themes. Any coding differences were resolved by consensus.

Computerized Breastfeeding Data

California WIC's Integrated Statewide Information System (ISIS) is the computerized database that is used by all WIC clinics in California. The database is maintained by the California State WIC Branch, includes all relevant information collected during contacts with participants, and is the primary source of WIC breastfeeding rates in the state. The food package data used in this report were obtained from this database. Summary data for each participating clinic were provided by the State WIC Branch to the UC Davis Human Lactation Center for data analysis. No identifying information was included in any of the reports provided to UC Davis.

Data Analysis Methods

Quantitative Data

All of the survey data were entered separately by 2 different individuals. Subsequently, the electronic files were matched and discrepancies were resolved by review of the original survey forms. Out-of-range values were recoded as missing. Statistical analysis was performed using SPSS version 17 for Windows (Chicago, IL., 2008). Data were analyzed on an "intention-to-treat" basis unless otherwise noted.

Infant feeding outcomes were collected through the participant surveys but also obtained from the monthly ISIS reports. Special reports were requested to include data, listed separately by the age of the baby, for infants up to 6 months old.

Satisfaction with education, knowledge, and participant characteristics were obtained through the participant surveys. Comparisons were made between study groups, between language groups, and over time. Differences between groups were first compared via independent t-tests or by Chi-square. Multivariate analyses were completed using ANOVA, logistic regression, loglinear analysis and survival analysis as appropriate.

Qualitative Data

Transcripts of focus groups were augmented by field notes. Information was categorized by 2 researchers independently. After that point, differences in coding were addressed and resolved by consensus. Because of the very specific nature of the questions asked in the focus groups, thematic analysis was not necessary.

Results

Participant Characteristics

Baseline Surveys

Three hundred seventy eight prenatal and 778 postpartum surveys were collected at baseline, of which 7 prenatal (2%) and 66 postpartum (8.5%) were incomplete due to refusal to participate. Refusals were primarily from Spanish-speaking participants (68%) and the most common reasons for refusals were *not interested* (52%), *too busy* (22%), and *too tired* (8%). The final number of completed surveys (prenatal and postnatal combined) used in baseline data analysis was 1083 (371 prenatal and 712 postpartum).

Post-Intervention Surveys

During the post-intervention data collection, 429 prenatal surveys were collected and 384 were included in the data analysis. Thirty five were ineligible due to maternal age or being new to WIC. Ten (2.3%) were incomplete due to refusal to participate, 5 because the participants were not interested, and 5 for other reasons. Nine hundred eighty seven postpartum surveys were collected, 52 of which were ineligible due to infant age, maternal age, or being new to WIC. Twenty two (2.4%) were incomplete due to refusal to participate. The most common reason for refusal to participate was *not interested* (64%). The number of postpartum surveys included in the data analyses was 913.

Demographic Characteristics

No significant differences were found between the prenatal baseline and post-intervention demographic characteristics in either the intervention or control groups. Therefore, the following descriptive table (Table 5) includes the combined demographics. Only 2 significant differences were found between the intervention and control groups; the intervention sites included significantly greater proportions of Latino and foreign-born respondents.

Table 5: Demographic characteristics – Prenatal survey respondents *

Characteristic	Intervention X ± SD	Control X ± SD	P-Value
Respondent age, yrs	25.83 ± 6.02	25.97 ± 5.66	NS
Children in home, n	1.92 ± 1.43	2.17 ± 5.19	NS
Gestation, wks	24.13 ± 8.96	24.87 ± 8.71	NS
Planned BF duration, wks	42.23 ± 22.68	40.57 ± 22.23	NS
	n (%)	**n (%)**	
Primiparous	143 (37.8%)	145 (37.3%)	NS
Latino Ethnicity/Race	316 (82.9)	271 (69.3)	< .001
Foreign-born	242 (63.5%)	210 (54.8%)	.015
Education, less than high school	126 (33.6%)	122 (31.5%)	NS
Feeding Plan			
Breast milk only	128 (33.6%)	115 (29.5%)	NS
Formula only	25 (6.6%)	32 (8.2%)	NS
Combination	205 (53.8%)	217 (55.6%)	NS
Unsure	23 (6.0%)	25 (6.4%)	NS
Will return to work	205 (55.6%)	216 (57.3%)	NS
Spanish Survey	54.8%	48.3%	NS

* Baseline and post-intervention combined

Significant differences were found between the postnatal baseline and post-intervention demographic characteristics. Therefore, the following descriptive table (Table 6) describes the postnatal baseline and post-intervention demographics separately. At both time points, a greater percentage of respondents in the intervention group were Latino and significantly more respondents in the control group were Latino during the post-intervention data collection period as compared to baseline. Fewer respondents in the control group were working outside the home during the post-intervention time point as compared to those responding at baseline.

Table 6: Demographic characteristics – Postpartum survey respondents

Characteristic	Intervention		Control	
	Baseline X ± SD	Post X ± SD	Baseline X ± SD	Post X ± SD
Respondent age, yrs	26.9 ± 6.3	30.6 ± 17.7	26.8 ± 6.2	31.2 ± 17.7
Children in home, n	2.4 ± 1.3	2.6 ± 5.5	2.3 ± 1.2	2.4 ± 1.3
	n (%)	n (%)	n (%)	n (%)
Relation, Mother	346 (97.5)	348 (99.4)	342 (98.0)	519 (98.5)
Education, less than high school	115 (32.6)	106 (30.5)	100 (29.0)	138 (27.4)
Latino Ethnicity/Race	291 (82.7) [a]	292 (84.1) [a]	228 (65.9) [b]	365 (72.6) [c]
Employed outside of the home	102 (29.7)	101 (30.2)	110 (33.6) [a]	131 (27.3) [b]

Note: Letters that differ from each other indicate significant differences P<.05

Clinic Characteristics

Nearly 220 staff members were trained in the intervention and control clinics. Intervention staff members who were unavailable during the initial training were offered a follow-up one-day training during the study period so that all intervention staff received the bulk of the training. Demographic characteristics of the staff are listed in Table 7. Staff members in the intervention group were more likely to be Hispanic and be Spanish-speaking than those in the control group. Intervention staff had worked an average of 2 ½ years longer at WIC than those in the control sites.

Table 7: Staff demographics from post-intervention staff surveys

Characteristics	Intervention (N=102)	Control (N=117)
Average age, y	41.3 ± 11.9	41.4 ± 12.6
No. children in household	1.4 ± 1.5	1.2 ± 1.3
Time working at WIC, y	11.2 ± 8.4*	8.8 ± 7.1
Female	97%	93%
Hispanic	66.0%*	48.2%
College Graduate	46.1%	53.0%
Spanish Speaking	40.2%*	29.1%

*Significant differences between groups, P<.05

During the intervention periods, all intervention sites received phone calls and visits in order to support staff efforts to implement the intervention. During those visits and phone calls, interviews and observations were used to determine the degree of each clinic's compliance with the study protocol and implementation guidelines. While all of the intervention sites met the criteria for implementation, the sites did differ in some key environmental

characteristics. Figure 8 describes those differences. While 2 clinics taught Baby Behavior classes at least weekly, displayed all of the handouts and social marketing materials, and distributed staff newsletters, 3 of the clinics did not accomplish all of these goals. Because of differences between clinics in populations served, size, and location, it was not possible to examine if these differences in environmental characteristics influenced the study outcomes.

Figure 8: Clinic environmental characteristics

	Clinic 1	Clinic 2	Clinic 3a	Clinic 3b	Clinic 4
Taught classes at least 1 time per week		♦		♦	♦
Posters Displayed	♦	♦	♦	♦	♦
Handouts Displayed				♦	♦
Supervisors shared newsletters with staff	♦	♦		♦	♦

Objective 1.1

Will staff and educators' satisfaction with infant nutrition education be greater among intervention versus control site staff?

At baseline, more than 92% of staff members in both the control and intervention groups believed that infant-feeding education offered by their sites was useful to participants and that the current educational materials were effective. Therefore, after the intervention, we asked each group different questions about their training and interactions with participants in order to obtain more detailed information about the use of the new concepts and materials within the intervention sites. Through structured interviews with supervisors and staff members, we also were able to obtain qualitative data related to staff members' experience with the intervention.

Staff Training

Staff members in both groups were asked to complete surveys prior to receiving the training and again at the end of the intervention period. The post-intervention surveys differed slightly between the 2 groups; intervention staff members were asked specific questions about the intervention. Within the intervention group, 92% of the staff taking the post-intervention survey had attended the Baby Behavior trainings. Slightly more than half (52%) had attended all 4 trainings and only 3% had attended only 1 of the trainings. Nearly 96% reported that the trainings prepared them to speak with participants about Baby Behavior.

Results from the staff interviews showed that WIC staff enjoyed the Baby Behavior trainings. One staff member exclaimed:

> "I enjoyed everything! I remember I was excited about the information; it was all useful and interesting."

They particularly enjoyed the interactive parts of the training, including the practice case studies:

> "I like the part where we interacted and practiced using some of the Baby Behavior handouts in groups. I liked the class demonstration as well."

Supervisors also described the positive impact the Baby Behavior intervention had on their staff.

> "It empowered the counselors by giving answers to the parents' questions and concerns. Baby Behavior messages can now be discussed, where as before the staff just glazed over concerns because they weren't qualified to answer."

> "Giving good information makes staff more credible. We are a small clinic so there is a good relationship with clients. Having good information is useful."

> "Staff felt good about sharing the information. They felt confident sharing the materials and were excited about the information. They were more enthusiastic about interacting with moms. Adding Baby Behavior information to breastfeeding made it all come together – the complete package."

> "The staff believes in the intervention and saw the need for it everyday in their participants. Moms don't look at their babies, they feed but the baby still cries, so it was an everyday reminder. It is very important and we need to help parents interact with their children better."

> "At first it seemed harder than it really was. It took practice and when it worked once they [the staff] got comfortable. They recently had a meeting with other clinics and one of our staff members answered a question about crying and the other clinics were impressed."

Staff members also agreed that a refresher or review training would be useful at specific intervals (quarterly to every 6 months was suggested).

Educators: Class Satisfaction

About half (48%) of the respondents in the intervention group reported that they had taught Baby Behavior classes during the intervention period. All of these staff members reported that they had received enough training to teach the classes. More detailed information about the experience of teaching the classes was obtained through the staff and supervisor interviews.

Most staff members liked the Baby Behavior classes and found the class activities engaging and educational. They enjoyed teaching participants something new.

> "For some people, it was new and it was very informative because sometimes they [participants] don't know some of the things in the class. That's my satisfaction; that they learned something new."

Staff members enjoyed teaching parents about infant sleep the most. When asked what they liked most about the classes, one staff member shared her favorite part of one of the classes:

> "The baby dreaming poster [Sweet Dreams] activity: I like the 'show the person next to you' a certain cue. Healthy Sleep—I really liked that it's normal to wake-up, to dream, participants were very interested in this part. I liked the information on sleep the most and the different activities you had for that. It seemed to get the participants involved when you're writing on the poster and you're putting the cards on the poster. The participants seemed to really like that information and that they really learned something. It was really hands on."

Staff found the Baby Behavior classes to be too long. They reported that some participants lost interest or classes went over the scheduled amount of time and had to be modified or cut short. For the postpartum classes (Breastfeeding: The Gift of Love and Understanding Your Baby: Infant Behavior), a few of the clinics shortened the sleep story while still covering the main points. Other modifications to the classes were recommended to keep them within a 30 minute timeslot.

Staff: Satisfaction with Educational Materials

About 83% of the staff in the intervention group reported on the post-intervention staff survey that they used the Baby Behavior materials either daily or weekly. Most of the respondents (88%) found the handouts to be useful for teaching Baby Behavior messages to participants. Far fewer (36%) believed that the posters were useful and less than a quarter of respondents believed that the other materials were useful by themselves for teaching messages (Table 8). Given that the poster and the 6-week calendar were intended as social marketing materials, this finding is not surprising. Two of the clinics did not distribute all of the 6-week calendars given to them. When asked, staff at these clinics reported that they thought that the calendars were very useful. However, they were concerned that the calendars would be lost if given to participants prenatally.

Table 8: Intervention staff perception of usefulness of Baby Behavior materials (N = 42)

Education Material	Staff Reporting Materials to be Useful N (%)
Handouts	37 (88.1%)
Posters	15 (35.7%)
Self learning modules	9 (21.4%)
6-week calendar only	9 (21.4%)
Low-literacy handouts	7 (16.7%)

During the qualitative interviews, staff members reported that the Baby Behavior materials were useful and well accepted by participants.

> "I give them to 85-90% of all moms I see [and to] new parents 100% of the time."

> "This information is so important that it's something that should come from the hospital at first when the baby is born, for every mom!"

> "Having the baby there and sharing this information and what is normal gives them the support that they need to continue breastfeeding."

> "The calendar is like a gift for moms!"

> "Everybody's really open to get this information about their babies. I haven't had anybody tell me anything negative."

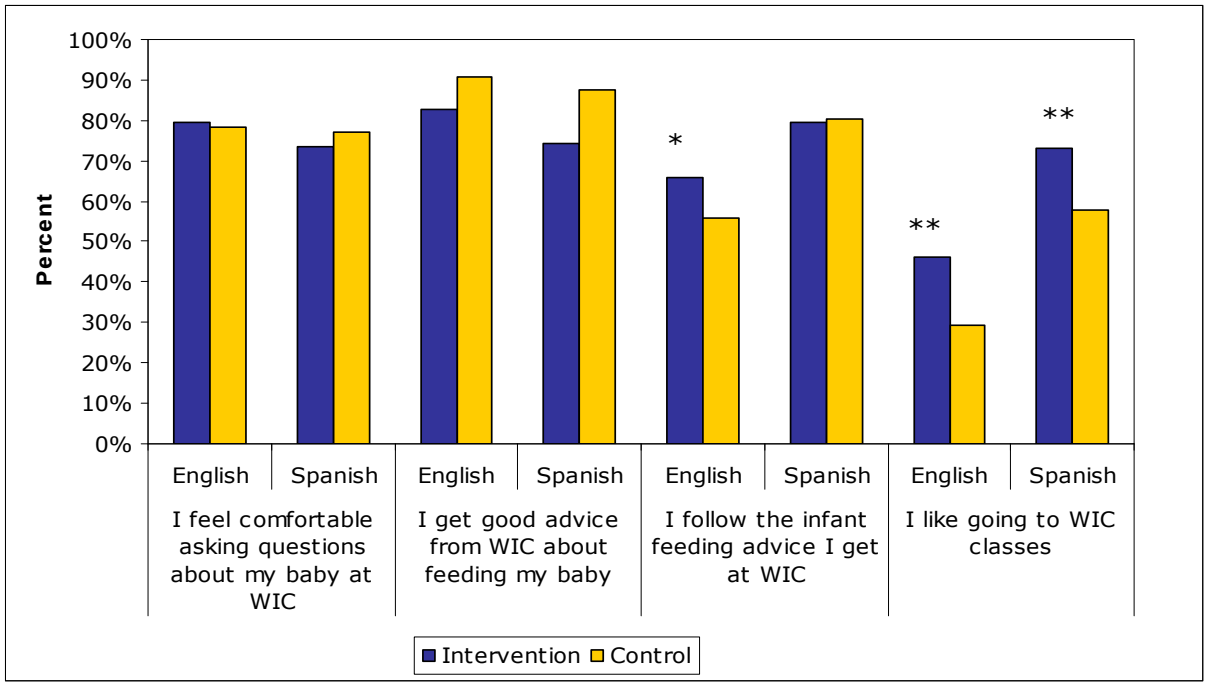
> "The materials are cute, handy, and hands-on. People can relate to them, which made staff more likely to use them. They were so easy to use."

Objective 1.2

Will participant satisfaction with infant nutrition education be greater at intervention versus control sites?

A series of questions about satisfaction with infant nutrition education were included in the participant surveys. Participants were asked about the likelihood that they would ask WIC staff for advice, the value of that advice, the frequency with which they follow WIC advice, and whether or not they liked WIC classes. The majority of participants in both the English- and Spanish-speaking groups listened to, valued, and followed WIC advice both at baseline and at the end of the study period. At the end of the study period, there was a significant difference in the proportion of postpartum participants reporting following WIC advice within the English-speaking intervention group versus the control group (Figure 9) but not among the Spanish-speaking participants. Significantly more postpartum participants in the intervention group reported that they liked going to WIC classes as compared to the control group in both language groups. Differences in attitudes toward WIC advice and classes were not found in the prenatal groups except that a greater percentage of prenatal respondents preferred going to classes within the intervention group at both time points (P<.05).

Figure 9: Percentage of postpartum survey respondents answering "Always" to the questions regarding satisfaction with WIC



* P < .05; ** P ≤ .001; significant difference between groups

Focus groups were conducted in the intervention sites during July of 2008 (6 to 9 months after the beginning of the intervention). In order to minimize self-selection of participants to participate in the groups, the sites agreed to hold the groups during regular class times. Class attendance varied widely from site to site and participants' children's ages varied from 2 weeks to more than 1 year of age. Less than 1/3 of the participants in the groups were able to recall any of the Baby Behavior messages or recall that they had seen any of the related handouts or educational materials. Therefore, they were unable to comment on their

satisfaction with the new messages. It is apparent that the focus groups were conducted too early in the intervention period to be of use.

During the staff interviews, staff reported that they received positive feedback from the participants about the key Baby Behavior messages.

> "It was more interesting for moms because they were talking about their babies. Moms were more open and it was such a neat subject to talk about their own babies. The topic itself is so interesting to them."
>
> "Moms were surprised, especially that waking is normal and that frequent feeding is normal. They're like "OH OK!" and are relieved that it's normal."
>
> "When we were doing the intervention, the participants automatically connected it to breastfeeding. Participants called the classes 'the breastfeeding class.'"
>
> "I remember that the messages do resonate because with previous children participants didn't think this way. There is a point where the light goes on in parent's minds and you know they are inspired."

Objective 1.3

What costs are associated with using the modified materials compared with the traditional approach?

Intervention Materials

Participant Handouts

The largest portion of the materials cost is for the printing of the participant handouts. The actual costs vary by vendor and quantity ordered (the higher the quantity, the lower the cost per unit).

For the initial study, 5000 copies of the 4 handouts (*Why do Babies Cry?, Understanding Your Baby's Cues, Healthy Sleep: For You and Your Baby, and Playing with your Baby*) were ordered in each language (English and Spanish). The cost was $.14 per copy for a total of $5132. Upon completion of the study, California State WIC ordered 168,000 copies of 3 of the handouts (all except *Playing with Your Baby*), in English and Spanish, at a price of $.05 per copy (total cost $50,400).

The Getting to Know Your Baby calendars were more expensive because they were printed on heavier paper, contained 6 inside pages, and included a cover and saddle staple. Six thousand copies of each language were ordered for the study at $.75 per copy, for a total cost of $9734. The state ordered 168,000 of each language at $.46 per copy, for a total cost of $154,560.

Environmental Materials

The social marketing posters were printed at a chain copy and print center for $34 each. Four posters, each in English and Spanish, were printed for each intervention clinic, totaling $272 per clinic.

One thousand four hundred fifty backpacks with the study logo were ordered at the price of $4.55 each. The total cost, with shipping and tax, was $7242. The backpacks were used at all 8 clinics (intervention and control), so the cost per clinic was $905.

A button maker was purchased for $374.31, which included the materials to make enough buttons for all of the staff in the intervention clinics.

Class Materials

The class posters were printed and laminated at the California State WIC office, using the in-house poster printer and laminating machine. The exact cost is unknown. Since these posters are slightly bigger than the social marketing posters, 25x36 versus 18x22, it can be assumed that the printing cost would be slightly higher. With lamination, it is estimated that each class poster would cost $60. In addition to the posters, each class includes several laminated activity materials. Laminating the posters and activities allows them to last longer, reducing the cost associated with replacing worn out materials. The estimated cost associated with each class is provided in Table 9. It is important to note that many of the clinics reported that the class posters were too big for the space they had available. Costs would be reduced if the posters were smaller.

Table 9: Class material costs

Class	Materials	Quantity	Price*	Total Cost
Understanding Your Baby	Posters	4	$240	$269
	Activities	19	$29	
Secrets of Baby Behavior	Posters	8	$480	$501
	Activities	14	$21	
Breastfeeding: The Gift of Love	Posters	7	$420	$459
	Activities	26	$39	

*Activity material prices based on the price print and laminate 8.5x11 color copies at a chain copy and print center.

Additional costs incurred by clinics

Over the course of the intervention, additional costs, not included in the original study design, were incurred by the clinics. Clinic supervisors reported additional costs ranging from $0 to about $885. The money was spent on a wide range of items, including T-shirts with the Baby Behavior logo for clinic staff, boxes of crayons, markers, and pens, and an easel used to display class posters. None of the additional items purchased were required for the intervention implementation and the decision to purchase additional materials was made independently by each clinic.

Staff time

Training

The time needed to attend all 4 staff trainings is approximately 9 hours per person. The average hourly wage of staff at the intervention clinics is $19.78. The total wage cost for each person attending the training is $178.

Increased workload

Both supervisors and staff were asked how use of the intervention messages and materials affected their workload. All respondents explained that the increase in workload was minimal. During one-on-one counseling, the messages tended to be used in place of, rather than in addition to, other topics that were previously discussed.

> "Not much additional time [was spent]. In the beginning they thought it would, but it didn't. It was not a burden; we just substituted other materials with the new handouts."

> "It did add a little more time, but it didn't hurt caseload or waiting time for participants. More time was spent on breastfeeding and behavior and less time on

maternal diet, which is fine because time should be spent on what participants want to discuss."

Sample Cost

Text box 3 is an example of the estimated cost for 1 clinic, with a caseload of 5000 and 12 staff members, to implement the intervention for 1 year. For this example, it is assumed that handouts will be purchased in English and Spanish for 25% of the caseload (the average proportion of infant participants) and that all 3 classes will be used in each language (requiring 2 sets of materials for each class). The costs of the additional items purchased by the clinics, the buttons, and the backpacks are not included. Please note that this is just an estimate, the actual cost of staff time and material production varies by location. There may also be additional costs associated with hiring a trainer or allotting a staff member time to prepare to give the training.

Text Box 3: Estimated cost of implementing the Baby Behavior intervention for 1 year.

Staff Training Time	178	x $12	=	$2136
Participant Handouts	6000	x $.14	=	$840
Calendar	2000	x $.75	=	$1500
Class materials	2	x $269	=	$538
	2	x $501	=	$1002
	2	x $459	=	$918
Posters	8	x $34	=	$272
Total Cost per clinic				**$7206**
Total Cost per participant				**$1.44**

Objective 2.1

Will there be improvement in staff knowledge, attitudes, and beliefs about infant nutrition and behavior in intervention versus control sites?

During the late spring and summer of 2007, 53 staff members were trained at the 4 intervention sites and 59 received a different training at the control sites (descriptions of the trainings are provided on pages 16 & 17). The trainings were well accepted by all staff. We received an overall evaluation score of 9.4 (out of 10) on all 4 trainings. Pre- and post-tests were used during the first 3 intervention group trainings to determine if the messages were understood. Increases in staff knowledge were significant at all time points. The following reflects the overall mean percent correct answers on the tests.

- Training 1: Pretests = 46%, Post-tests = 77%
- Training 2: Pretests = 53%, Post-tests = 72%
- Training 3: Pretests = 55%, Post-tests = 70%

The proportion of correct responses on individual questions varied from 37% to 100%. Using these proportions, we were able to identify messages that were the most challenging to convey. Attempts were made to improve the explanation of these messages at the next training. For example, very few staff understood that the quiet alert state requires effort for infants to control. We changed the message to state that quiet alert was tiring for infants and responses improved. Staff members were also initially confused about the changes in infant sleep cycles. We created graphics to illustrate these differences and the responses

improved. Due to time restrictions, similar pre- and post-tests were not used when the control sites were trained after the intervention period had ended. At the end of the study, intervention group staff members were asked 3 "knowledge" questions on their survey. While 86% were able to correctly identify how to soothe a crying baby, only 60% were able to correctly respond that newborns fall asleep dreaming, and 44% were able to correctly describe the "quiet alert" state. More than half of the incorrect replies on the survey came from 1 clinic. It is not known why this clinic had so many incorrect answers.

Staff members reported in the staff interviews that they believed that the trainings prepared them to discuss Baby Behavior topics (sleep, cues, crying) with participants.

> "Sleep cycles and patterns for newborns and younger babies helped explain why babies were waking up and crying even though they had eaten their fill. It helped me explain to participants what was appropriate."

In the post-intervention staff surveys, 90% of the intervention group staff members and 93.7% of control group staff members reported talking to participants about infant feeding. Nearly 84% of intervention group and 60.3% control group staff members reported talking to parents about infant behavior.

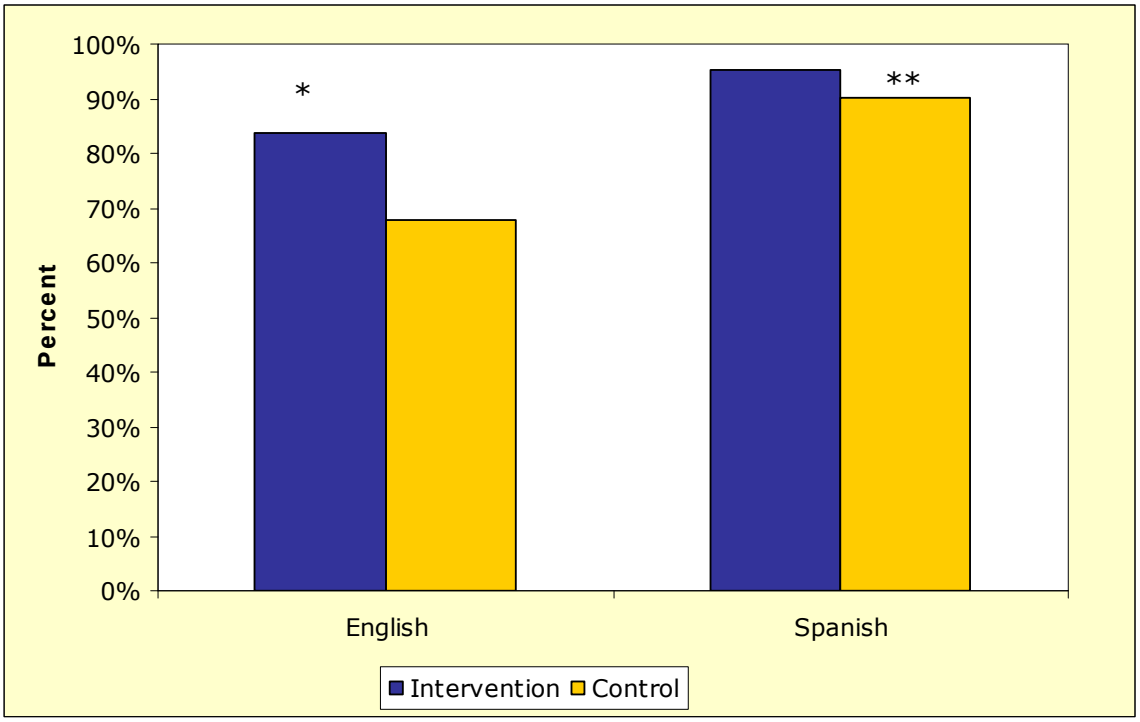
Objective 2.2

Will there be improvement in caregivers' knowledge, attitudes, and beliefs about infant nutrition and behavior in intervention versus control sites?

Participants (pregnant women and caregivers of infants up to 1 year of age) were asked a series of questions about their attitudes and beliefs on the surveys obtained at baseline and after the end of the intervention period. Additional questions about the study messages were asked during focus groups conducted at each of the intervention clinics.

While our intention was to compare participant knowledge between groups both at baseline and post-intervention, we discovered that many of the control group participants had apparently already learned about Baby Behavior messages at the time they took the post-intervention survey. We became aware of some sharing of the study messages during the intervention because we received requests to our office for materials from non-participating clinics. We do not know the extent of message sharing that may have occurred with control clinics during the study period. Because the control group staff members were eager to receive the training, we offered the first of 4 trainings to the control sites during the post-intervention data collection period. This first training provided only basic information about infant behavior and no information about how to teach messages to participants. Although control group staff members were asked not to share Baby Behavior messages with participants until they had received the last training, 79% of postpartum respondents in the control group sites reported that they had learned about Baby Behavior at WIC as compared to 90.3% of participants in the intervention sites (Figure 10). Three-quarters of the prenatal respondents in the control group and 80% of those in the intervention group reported hearing about Baby Behavior messages at WIC. Accordingly, few differences in caregiver knowledge were found (Figures 11 and 12).

Figure 10: Percentage of postpartum survey respondents answering "Yes" when asked "Have you learned anything about your baby's behavior from WIC?"



* P≤ .001; ** P≤ .05; significant difference between groups

Prenatal Survey Results

A series of questions were asked about infant feeding and activity. There were no significant differences between groups at baseline or after the intervention in the responses to these questions (Figure 11). Significant differences over time were found in the proportion of respondents in both groups who believed babies should sleep through the night before they are 6 months of age (Figure 12). Fewer prenatal participants in the intervention group believed that they would always feed their babies to sleep after the intervention as compared to before the intervention (Figure 12). A similar difference was found between the intervention and control groups during the post-intervention survey period with fewer respondents in the intervention group reporting that they would always feed their infants to sleep.

Postnatal Survey Results

Table 10 provides a summary of the responses obtained from the postpartum surveys. Increases over time in correct answers were seen in nearly all of the knowledge questions in the intervention group though only one of these increases was significant. Significantly more intervention respondents believe they could tell what their babies needed. Significantly more respondents in the control believed that babies should be physically active after the intervention period as compared to the baseline period. Similar differences were not found in the intervention group. Significantly more respondents in the intervention group correctly answered the question about infant dreaming. Nearly all respondents in both group reported wanting to learn more about baby behavior.

Figure 11: Comparison of pre- and post-intervention prenatal survey responses: participant beliefs

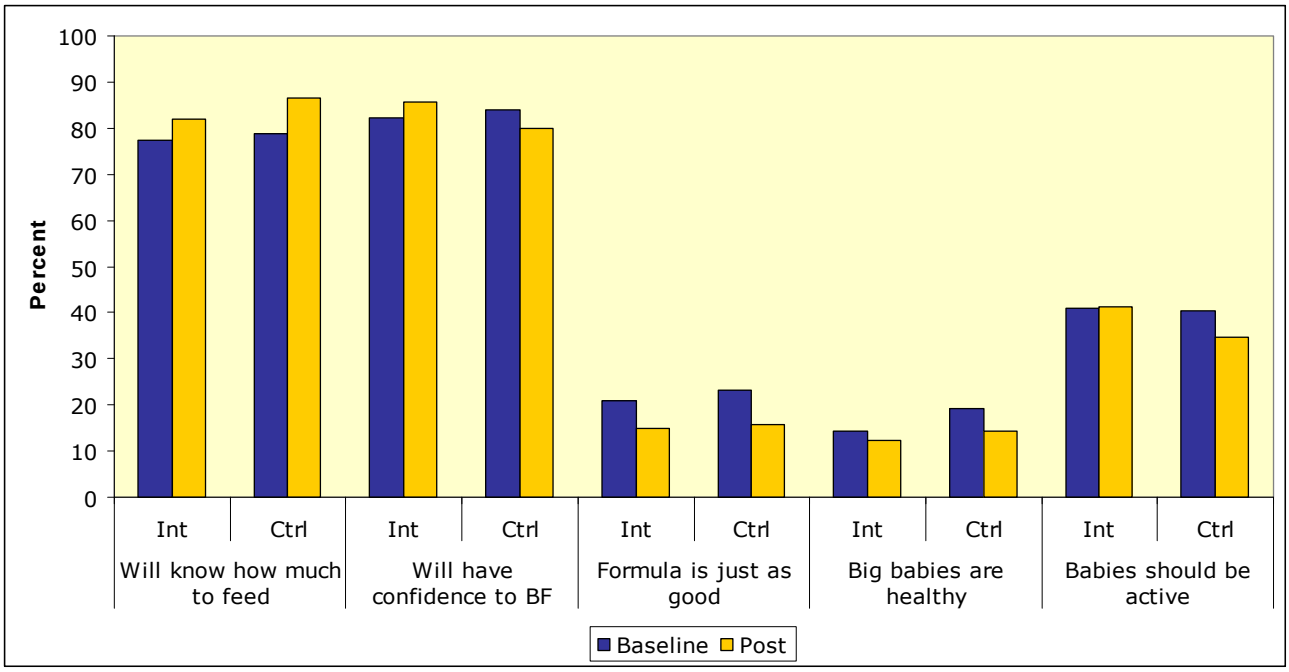
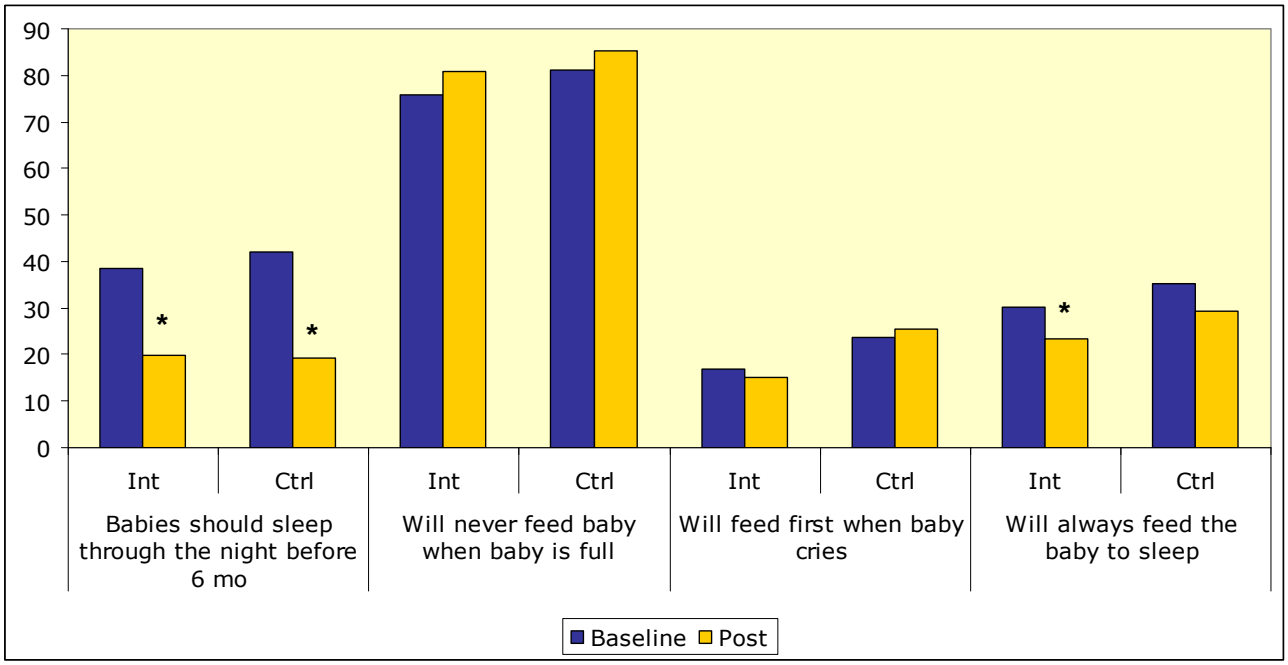


Figure 12: Comparison of pre- and post-intervention prenatal survey responses: Baby Behavior questions



* Significant differences between baseline and post-intervention; P<.05

Table 10: Postpartum Baby Behavior survey questions

Postpartum Survey Questions	Intervention		Control	
	Baseline %	Post %	Baseline %	Post %
Can always tell what baby needs	42.7[a]	47.7[b]	46.1	46.3
Can always tell why my baby cries	52.1	55.8	52.9	51.6
Babies should be active	45.0	49.3	40.4[a]	50.1[b]
Big babies are healthier babies	14.0	16.9	15.0	18.0
Will always feed first when baby cries	14.2	14.6	12.6	15.8
Will always feed my baby to sleep	22.6	24.6	19.0	20.3
Babies are calmed by repeated sounds	--	79.0	--	78.4
Infants dream more than adults	--	36.5[a]	--	27.8[b]
Interested in learning about Baby Behavior	88.2	92.6	88.4	92.0

Note: Letters that differ from each other indicate significant differences P<.05

Focus Groups

Participants in the focus groups who had been exposed to the intervention (only about 1/3 of those participating) were able to articulate many of the key Baby Behavior messages. Most reported learning about breastfeeding or solid food introduction in the WIC classes that they had recently attended. The following are examples of the responses when participants were asked to rephrase Baby Behavior messages they had learned.

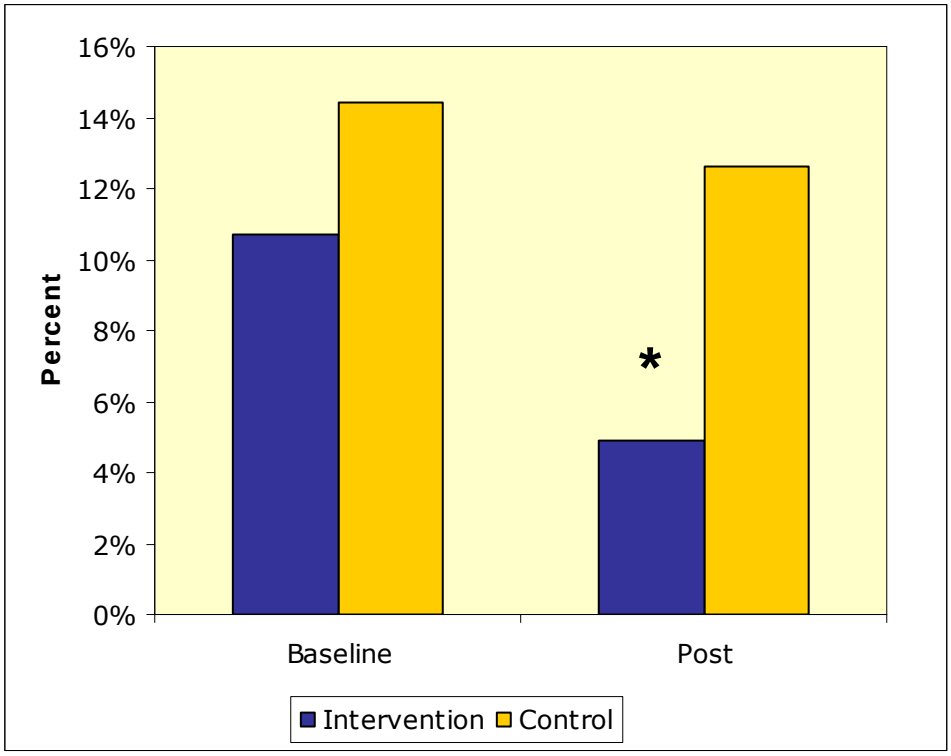
> "Sometimes you think the baby is crying and you think he wants a bottle but it might be something else."
>
> "When they are crying, babies can have a wet diaper, be hungry, tired, bored or hot."
>
> "And sometimes they cry because they are irritated and angry and want something to be different. Maybe they want a bath or want us to talk or sing to them."
>
> "They say that when infants smile in their sleep it means they are dreaming. They dream in their sleep."
>
> "When babies sleep, they are dreaming which is healthier for them because with the formula they get full and sleep deeper. But by breastfeeding they are able to dream more and sleep healthier."
>
> "The last class I was here I learned about the expressions of babies…and it's true…I mean sometimes babies start crying but we don't know why they're crying we just think oh, they're hungry…it could be many different things."

Infant Weights

Although infant weights were not part of the original funding request, agencies were asked to weight infants brought in for the 6-month recertification visit. The infants ranged in age from 5 to 7 months. These weights were challenging to obtain. Our goal was to obtain complete data on 440 infants both at baseline and after the intervention. A total of 427 weights were taken at baseline and 517 weights were taken during the post-intervention data collection. However, missing data made 21% of the original weights unusable at each

time point. Because many of the mothers refused to have their babies weighed in only a diaper, clothing was noted and assumptions were made to adjust the weights for the clothing worn. These assumptions were based on an average of weights of clothing of similar size and type. Infant lengths were not obtained so weight-for-length was not assessed. Significant differences were found between groups during the post-intervention data collection period (Figure 13) with a smaller percentage of infants in the intervention group exceeding the 95th percentile for weight-for-age (4.9% vs. 12.6%, intervention and control, respectively; P<.05).

Figure 13: Percent of infants $\geq$ 95th percentile weight-for-age from 5-7 months by group



*Significant difference between groups at post-intervention; P<.05

Objective 2.3

Will a greater proportion of women in the intervention sites breastfeed for 4 and 6 months as compared to control sites?

Infant-feeding practices were obtained from 2 sources. Several questions about infant-feeding practices were asked on the postpartum surveys. Food package data were also obtained from ISIS data collected during participant interactions during normal clinic activities. Table 11 summarizes the survey data collected from the postpartum respondents. While increases in breastfeeding at 4 and 6 months were found over time in the intervention group, the differences reached significance only for any breastfeeding at 4 months. Differences in exclusive breastfeeding at 4 months were marginal (P<.10). There were insufficient numbers of infants who were exclusively breastfeeding at 6 months to allow for any kind of analysis. Group comparisons using survival analysis indicated that group differences in time to introduction of daily formula were marginal (P<.10) (not shown).

Table 11: Summary of the postpartum survey infant-feeding responses

	Intervention		Control	
Breastfeeding	Baseline %	Post %	Baseline %	Post %
Any BF at 4 mo	44.3[a]	55.8[b]	48.0[a]	43.5[a]
Exclusive BF at 4 mo	12.3	18.1	16.6	13.7
Any BF at 6 mo	39.4	49.5	37.4	45.9
Exclusive BF at 6 mo	--	--	--	--

Note: Letters that differ from each other indicate significant differences P<.05

Food package data from the participating clinics also indicated that greater numbers of participants in the intervention group chose the exclusive breastfeeding package in the first 4 months as compared to the control group (Figure 14). Figure 15 shows the *change* from baseline to the post-intervention period in the selection of the exclusive breastfeeding package in the *first 4 months* for each clinic pair. Increases in the food package among intervention participants ranged from about 5 to 7%; these increases were larger than those seen in the control group. Figures 16 through 19 compare the distribution of exclusive breastfeeding food packages *(0-6 months)* by calendar month for each pair of study clinics from October 2007 to December 2008 (the intervention period ended on September 30, 2008). All intervention clinics increased their rates of exclusive breastfeeding during the study period, though the pattern of increase varied by clinic. Some of the clinics had immediate increases in rates and others took some time before the rates increased.

Figure 14: Distribution of exclusive breastfeeding food package (ISIS) for each month (0-6) by group

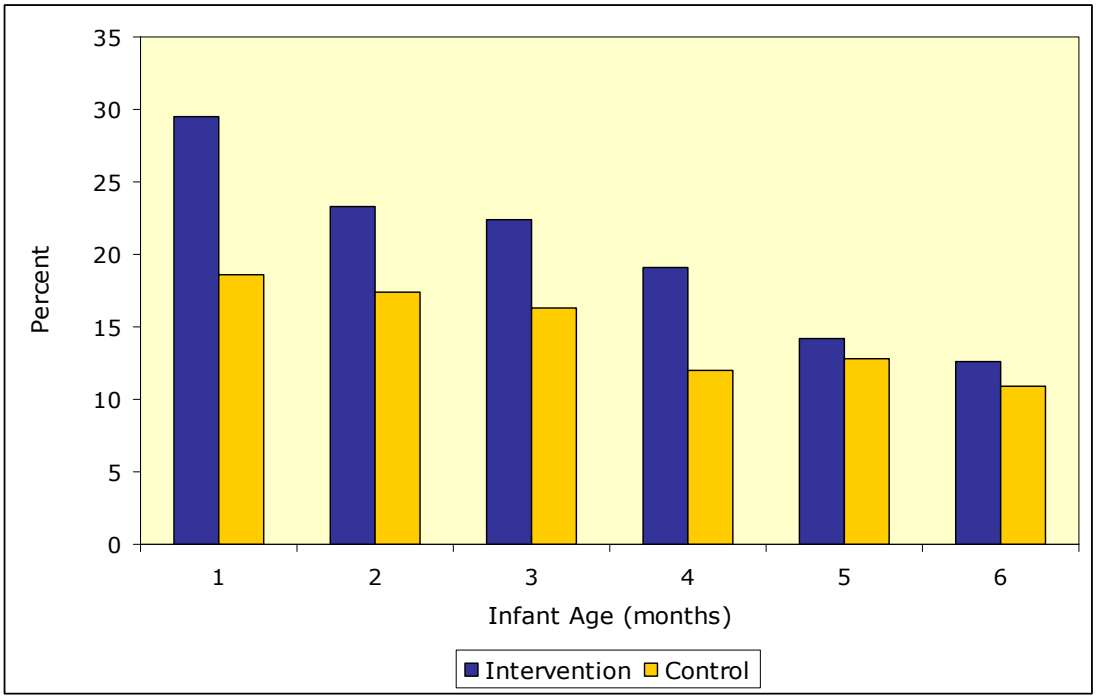


Figure 15: Change over time in exclusive breastfeeding food package from ISIS for 0-4 month, by region and group

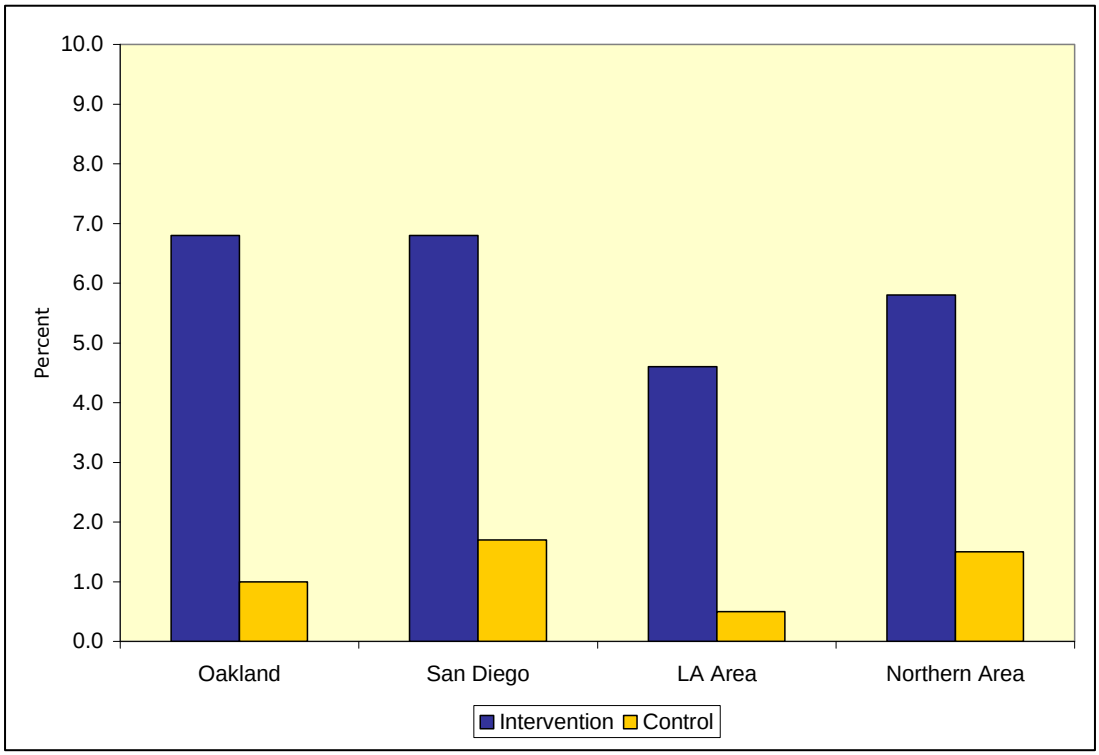


Figure 16: Exclusive breastfeeding 0-6 mo from ISIS – Northern Area

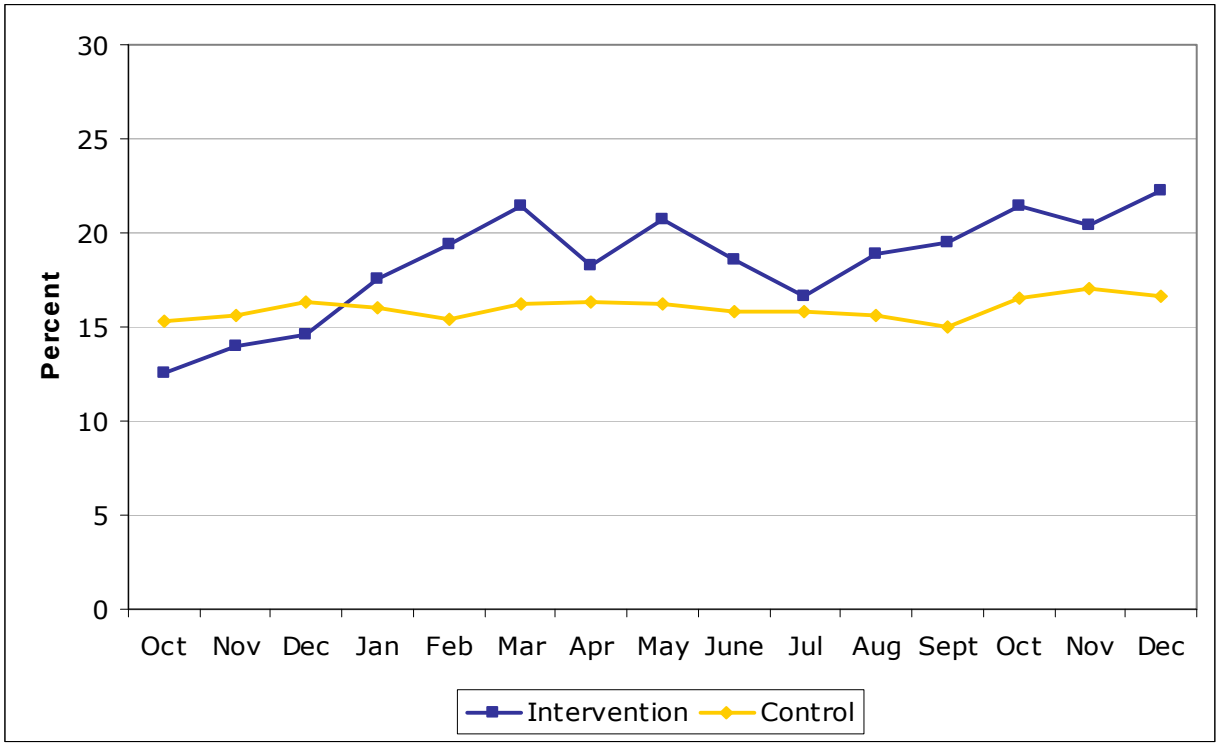


Figure 17: Exclusive breastfeeding 0-6 mo from ISIS – Los Angeles Area

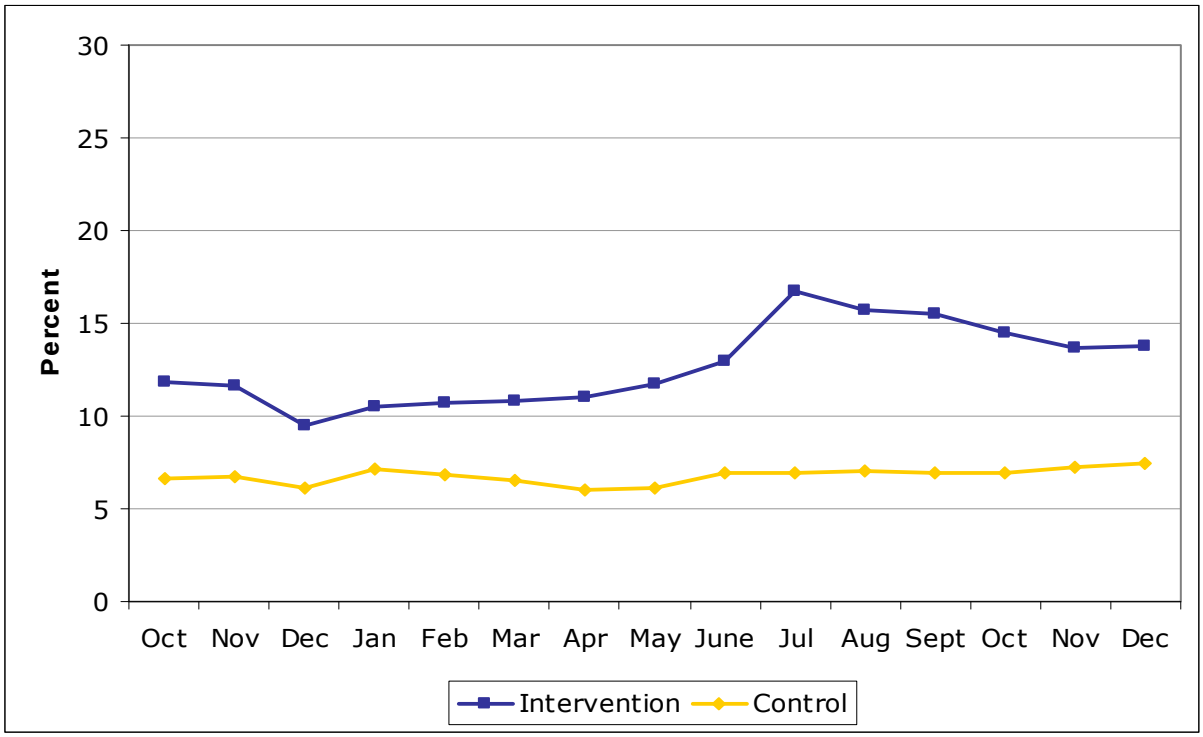


Figure 18: Exclusive breastfeeding 0-6 mo from ISIS – Oakland

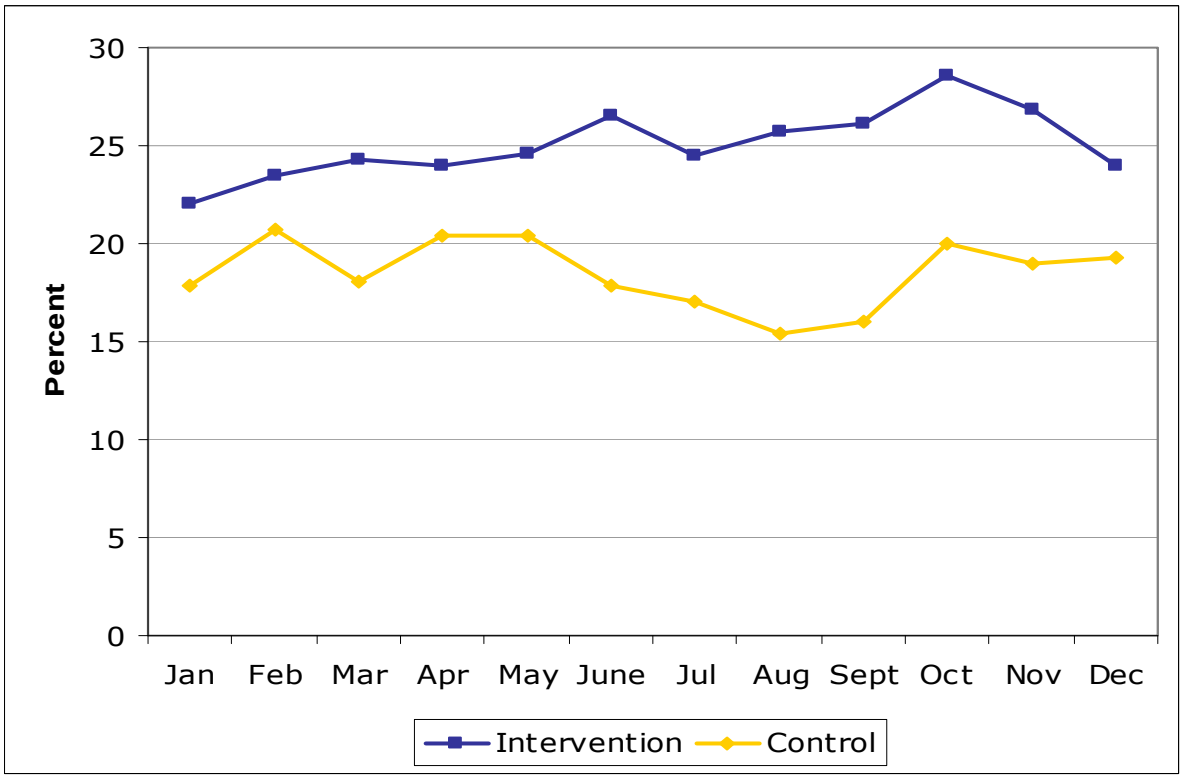
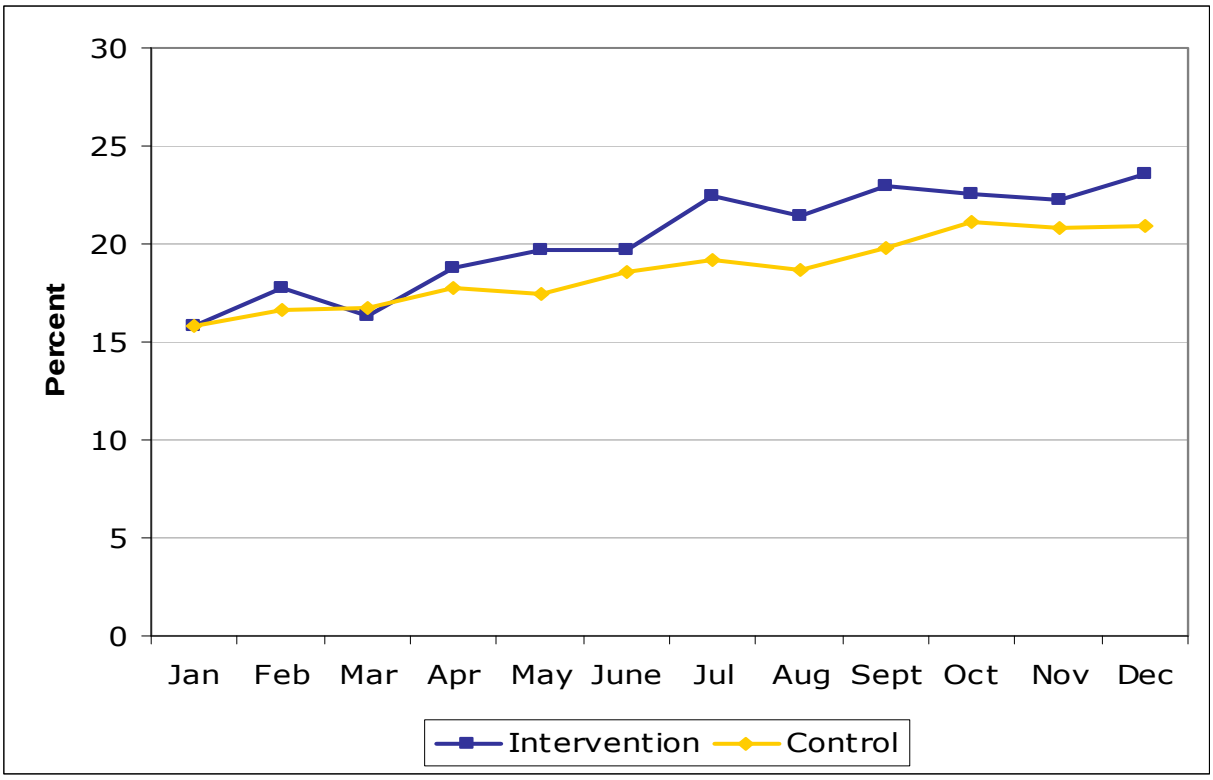


Figure 19: Exclusive breastfeeding 0-6 mo from ISIS – San Diego



Objective 2.4

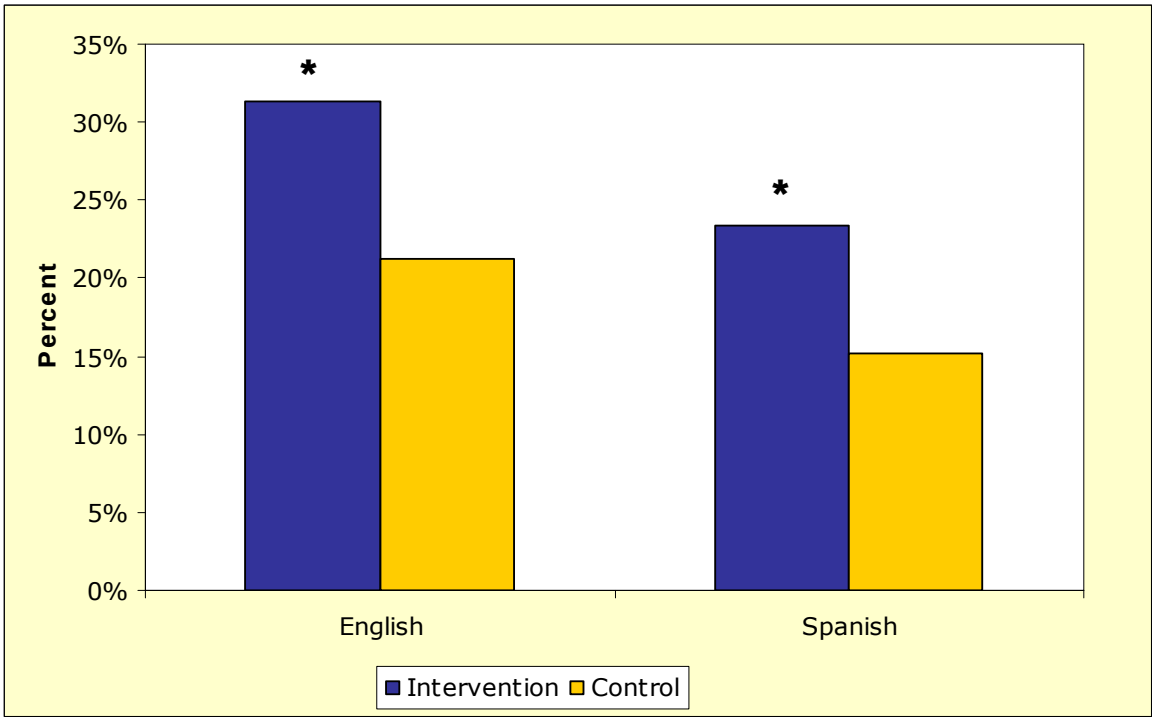
Will formula requests be fewer at intervention versus control sites?

Formula use was assessed through the postpartum surveys as well as the ISIS food package data. In general, there was less formula use in the intervention group versus the control group. However, these differences were small and did not consistently reach statistical significance. There were no significant differences between groups or over time in the number of women who were self-identified as exclusively formula feeding mothers.

Mothers in the intervention group were more likely than those in the control group to breastfeed their infants without supplementary formula in the first 30 days. This was true for both English- and Spanish-speaking mothers (Figure 20).

On October 1, 2009, California implemented changes in the food package in accordance with recommendations by the IOM committee. These changes included restricting the distribution of formula in the first month postpartum to participants who self-identify as breastfeeding mothers. Given the group differences in formula use in the first month, it is possible that the Baby Behavior messages may be of use in supporting this food package change.

Figure 20: Percentage of postnatal survey respondents reporting that their infants were *not fed formula* in the first 30 days by survey language and group.



*Significant differences between groups, P<.05; Infants of mothers reporting early clinical breastfeeding problems were excluded from this comparison

Small differences over time were found in the selection of the combination feeding food package. These differences are shown in Figure 21. Exclusive formula feeding food packages for the same time period remained relatively unchanged (Figure 22).

Figure 23 illustrates the reported reasons why postpartum survey respondents started using formula among those using formula. Significant differences were found only over time in the control group. Mothers in the control group were more likely to report that they started formula because of breastfeeding problems, illness, or their perception that their babies were not satisfied with breastfeeding during the post-intervention data collection as compared to baseline. This analysis included only those who had started formula at the time of the survey.

Additional ISIS data were examined to determine if there was an association between the intervention and the distribution of cans of formula by the participating sites. Because there were fluctuations in caseload during the intervention period, the distribution values are expressed as cans per infant from 0- to 6-months. Modest decreases in cans per participant occurred in all of the intervention clinics except for Southern California (Table 12). In contrast, the only decrease in cans per participant in the control group occurred in the Los Angeles area control agency.

Figure 21: Change over time in combination breastfeeding food package (from ISIS) for 0-4 mo by region and group

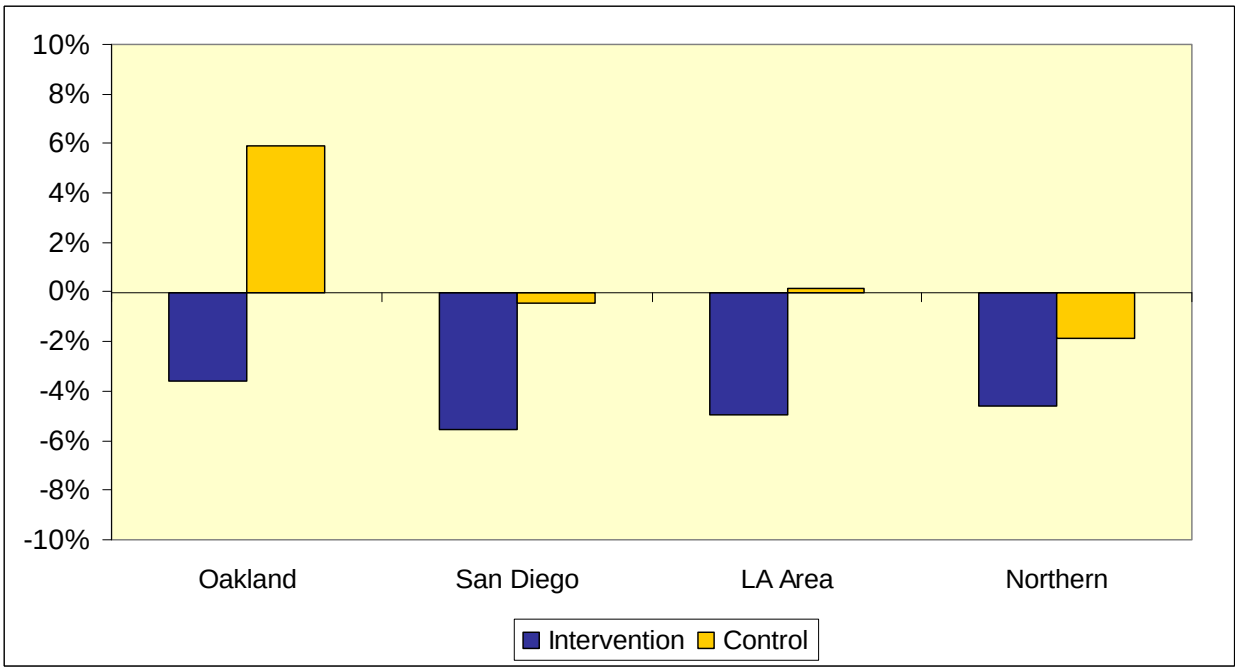


Figure 22: Change over time in exclusive formula feeding food package (from ISIS) for 0-4 mo by region and group

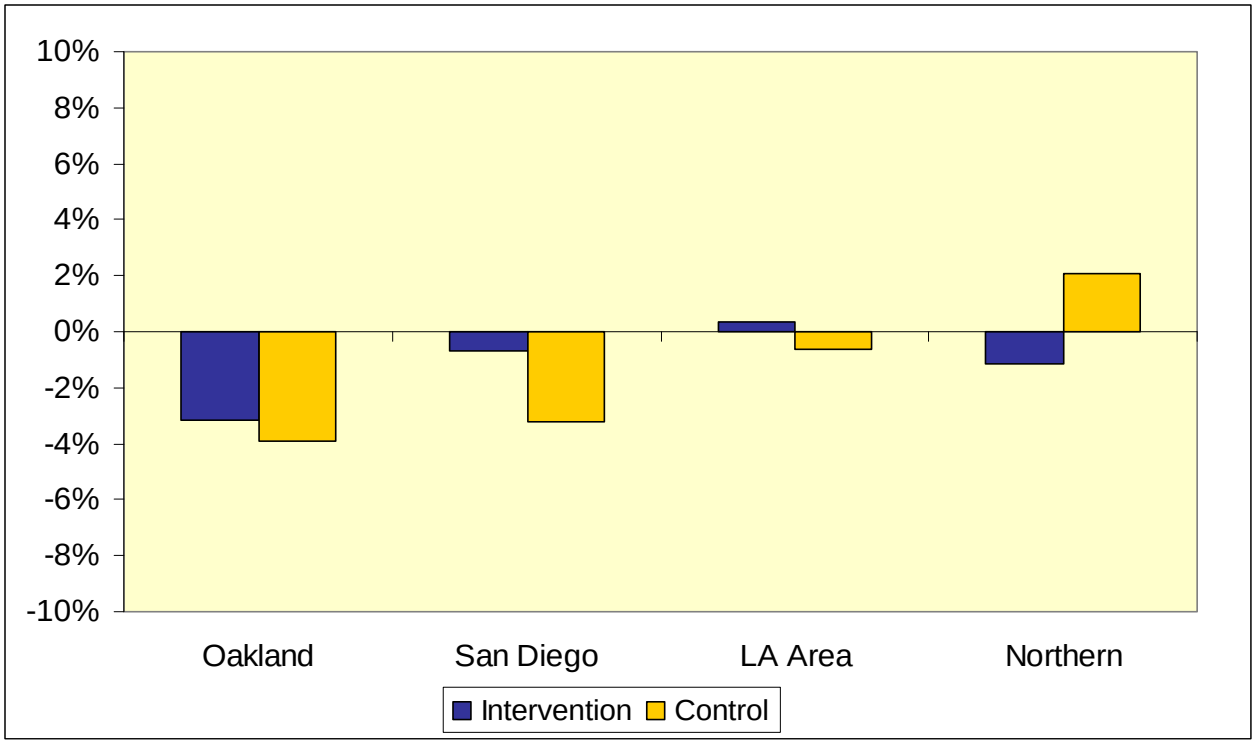
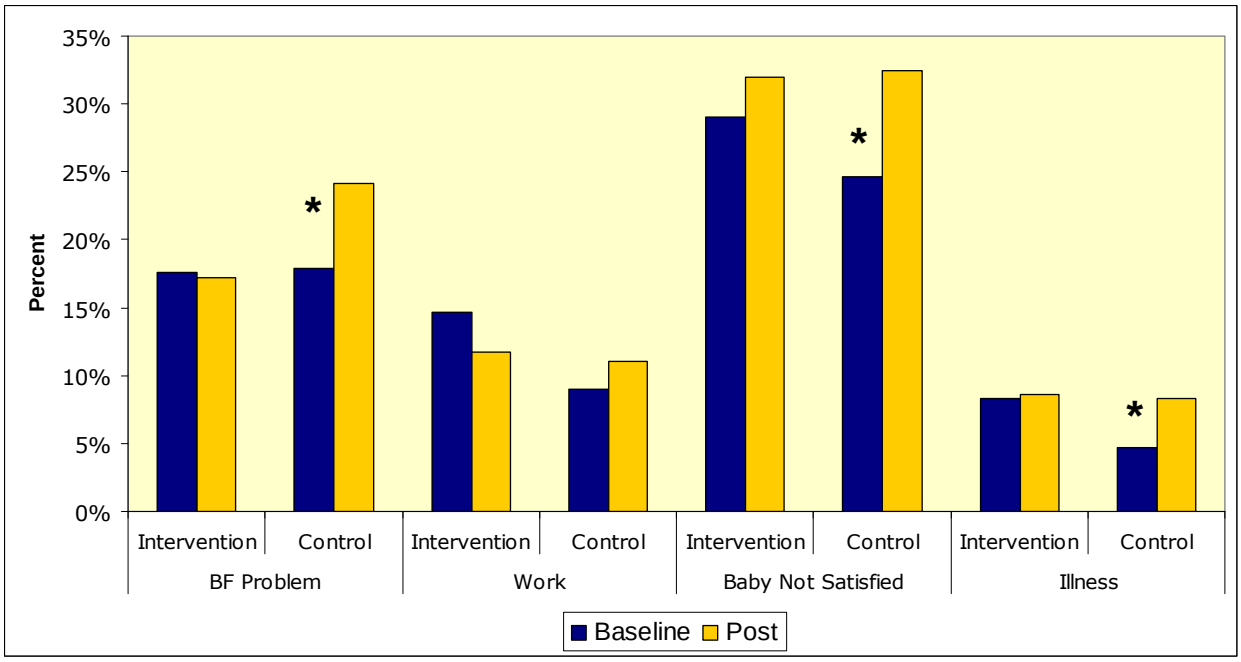


Figure 23: Comparison of reasons why postpartum respondents decided to start using formula by group and over time (among those using formula)



*P<.05, significant differences between baseline and post-intervention

Table 12: Formula distribution over time by group

Formula Cans per participant	Intervention		Control	
	Baseline	**Post**	**Baseline**	**Post**
Northern Area	1.42	1.00	0.61	0.64
Oakland	1.20	1.03	0.95	1.05
Los Angeles Area	0.75	0.87	2.20	1.87
San Diego	1.60	1.23	1.51	1.53

Objective 2.5

Will adherence to current solid food guidelines be greater at intervention versus control sites?

While there were significant differences in both intention and actual feeding of solid foods to infants over time, there were no significant differences between study groups at either time point (Figures 24 and 25). The apparent changes in feeding practices that took place between the baseline and post-intervention data collection periods may have resulted from an initiative to teach participants about the new American Academy of Pediatrics (AAP) guidelines to delay the introduction of solid foods to 6 months. This initiative began in 2006. However, it is possible that the changes were still being implemented in the participating agencies at the time that the study began. Therefore, this change in beliefs and practices may have had nothing to do with our intervention.

Figure 24: Percentage of prenatal survey respondents reporting that infants should be fed something other than formula or breast milk before 4 months

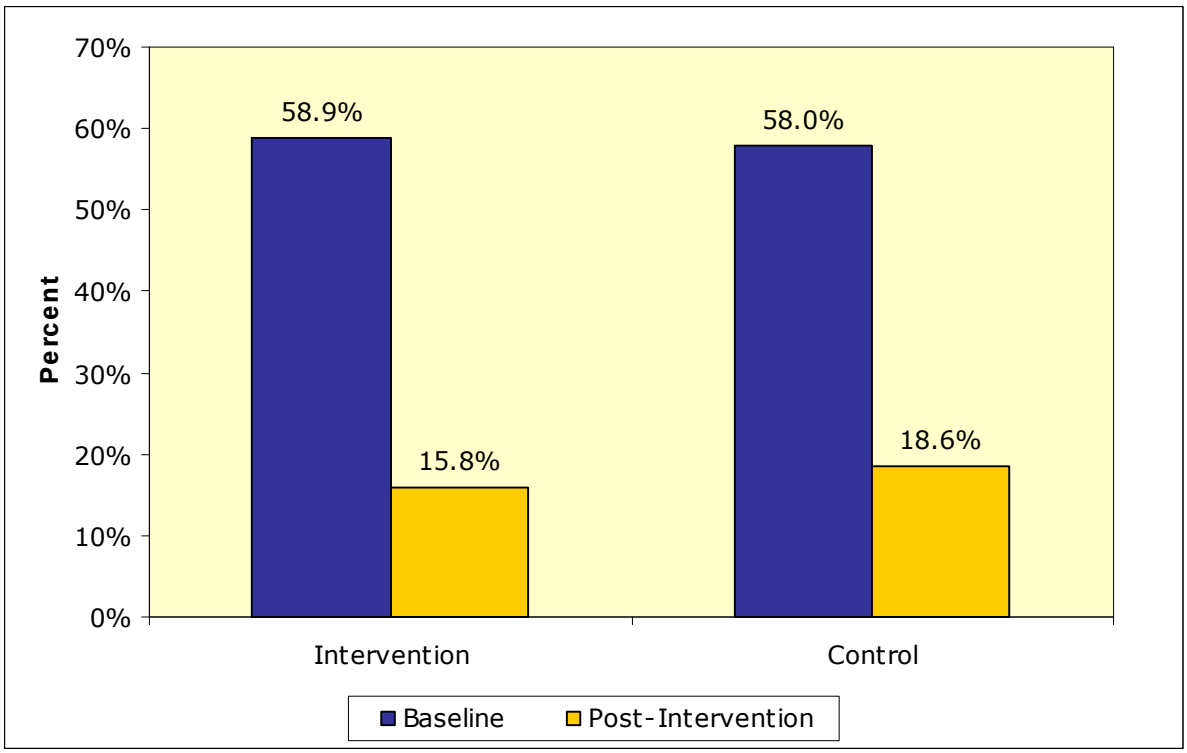
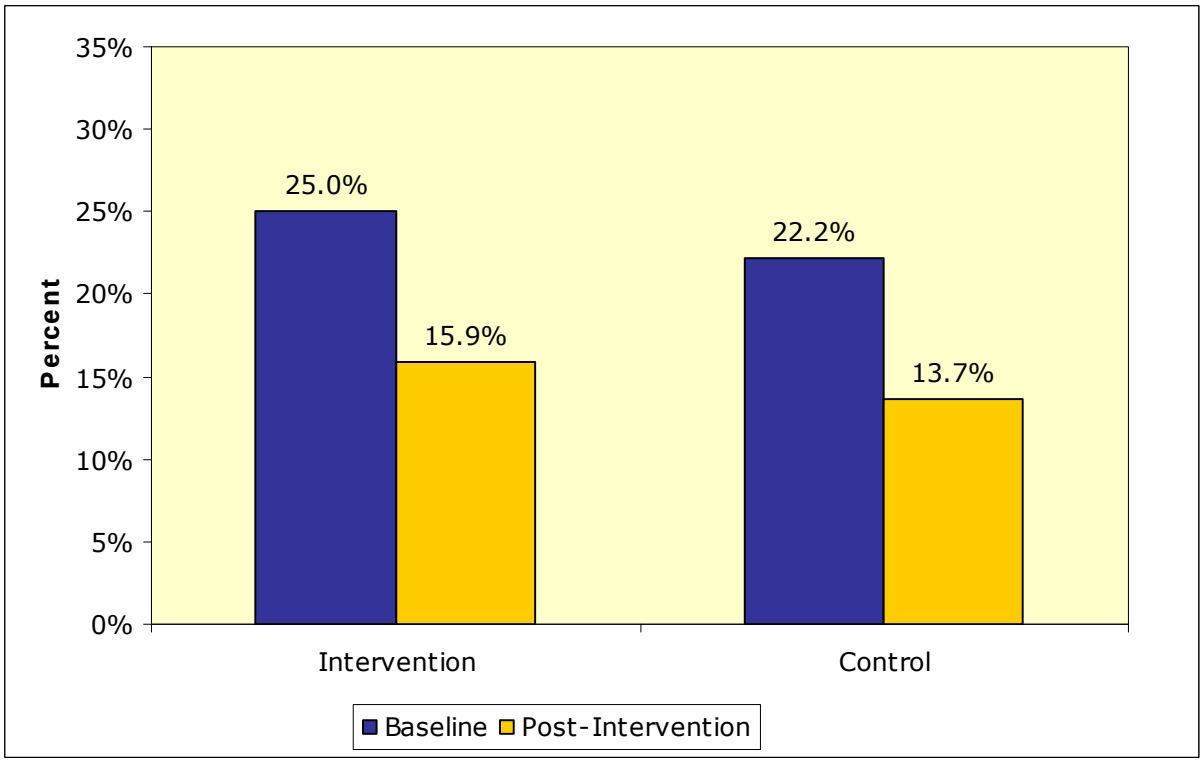


Figure 25: Percentage of postpartum survey respondents reporting that infants received something other than formula or breast milk before 4 months



Limitations

This study involved only self-selected WIC agencies. Administrators and staff at these agencies were likely to be highly motivated to participate in the study and interested in educational research and the topics covered. It is not known if this intervention would be effective in other WIC agencies.

The Baby Behavior messages were tested only among English- and Spanish-speaking participants, so it is unknown how the intervention will work in other groups. It is not known if similar concerns about infant behavior exist in other populations. Additional qualitative research is needed to determine how best to modify the messages and materials to meet the needs of other cultural groups.

The intervention is targeted to caregivers of 0 to 6 month old infants and does not address the behaviors that may affect inappropriate- and overfeeding of older infants and toddlers. Additional research is needed to expand this intervention for older infants and toddlers.

In California, where breastfeeding initiation rates are high, there is no need to convince mothers that breastfeeding is best. This intervention does not directly address barriers that have been associated in other studies with breastfeeding initiation such as going back to work or fear of embarrassment. We do not know if this intervention would be associated with increased breastfeeding in populations who had to be persuaded that breastfeeding was the optimal infant-feeding method.

Lessons Learned

Planning/Intervention Design

- Administrators preferred that all staff attend the trainings even when the training topics were not relevant to all WIC positions. For example, 1 of the trainings was designed only for the class instructors, but was attended by all staff. Therefore, it was important to ensure that all trainings included information that was relevant to staff members in a variety of positions.

- Agencies with more than 1 clinic may find it difficult to implement the intervention in only 1 clinic, especially when staff works at multiple locations. Budgets should include costs of material distribution to multiple clinics or administrators should be fully aware that only 1 site is eligible for participation.

- When an intervention introduces new information, people who have worked in the field for a long period of time may find it difficult to change their ways. Techniques and tips for easing the information into their routines are necessary to help those who may resist change. Allowing some time between trainings can be particularly useful to encourage staff to observe participants and to practice new skills.

- "Refresher Trainings" should be worked into the schedule. In addition to providing an opportunity to address any issues that may arise, refresher trainings allow research staff to boost clinic staff confidence.

- It is important to address staff issues related to workload. Clinic staff members were concerned that they would not have time to talk to participants about Baby Behavior in addition to the required education topics. After staff had time to practice counseling, most determined that the information was easy to deliver quickly.

- Engaging, emotion-based messages and materials can be highly successful in delivering messages to WIC participants

- Taglines and conversation starters were important in reducing staff fears about how to deliver the study information to participants

- The intervention timeline needs to be flexible to account for outside factors that could affect implementation.

Monitoring and Communication

- It would be useful to designate a contact person, other than the director or supervisor, for each clinic because supervisors can be difficult to contact and may not be in the clinic everyday.

- A system is needed to ensure that intervention materials are delivered and distributed efficiently to participating clinics.

- When staff members believe that materials and messages are useful, they will want to share them with other WIC staff members. This can be challenging when attempting to use a controlled design to evaluate a project.

- Although phone calls are useful, staff appreciated when research staff visited the clinics. Frequent contact with the clinic staff, both in person and by phone or email, is crucial to:
    - Ensure that staff feel supported
    - Answer questions and address staff concerns
    - Identify barriers to delivery of the messages and materials
    - Identify additional materials and methods that may enhance the intervention

Classes and Materials

- Meeting with supervisors and/or staff prior to implementation is important to ensure that the classes and materials will fit into each clinic environment. For example:
    - One clinic ran daily classes every 30 minutes and other clinics only offered a few classes a month
    - Some clinics use more handouts and materials than others
    - Clinics varied in the amount and types of trainings their staff has received

- When designing classes, the teaching time needs to be shorter than the time allotted. For example, clinics who had requested a 45-minute class found that a class with 30 minutes of teaching time was more appropriate for the 45 minute time slot.

- The time needed to teach each class varied from the time determined during pilot testing. Further pilot testing, with different instructors, would have been useful to get a more accurate class length.

- Classes are not always well attended. In clinics where participants do not attend classes, Self Learning Modules (SLMs) are one way to provide the education.

- Participants questioned the Baby Behavior information when it differed from what they had been told by their doctors. Collaboration and coordination of messages among health care and social service providers would greatly enhance the effect of the Baby Behavior intervention.

- It may be difficult for staff members to teach new information in a group setting. Before teaching classes, staff members need to feel comfortable with the subject and with answering questions about the subject. It may be helpful to provide a "Frequently Asked Questions" study sheet for teachers.

- Not all staff was comfortable with learner-centered style teaching. The participant interaction that results from this style of learning can increase class length because participants generally talk more. Providing group facilitation training may be useful for teachers who will teach learner-centered classes.

- The learner-centered activities included in the classes required more materials than a lecture style class.
    - Printing can be expensive. The cost of printing and laminating colored posters and other materials was significant and the process of printing and assembling was time consuming.
    - Not all sites have the storage space for all of the posters and props.
    - Teaching space varies from clinic to clinic, making it hard to find the perfect poster size. Posters need to be designed so that they can be displayed in a professional manner, even in very small teaching spaces.
    - Even with all of the drawbacks to the material-intensive classes, participants provided positive feedback about the posters and activities.

  - Monitoring class material inventory every month or so will ensure that all materials are available and in good condition.

- Class scripts need to be provided in Spanish. Staff teaching the classes in Spanish found it difficult to use an English script while speaking in Spanish.

- Final Spanish translations of class materials were controversial in our diverse state. Spanish-speakers come from many different regions and countries and each dialect is different. Panels of translators may be necessary to ensure readability of translated materials

Data Collection

- Data collection was difficult for many of the clinics.
  - Completing a survey can be difficult for participants who have their newborn babies or multiple children with them
  - When clinics are busy, data collection can be pushed aside

- Data collection should be designed so that it takes very little staff time. When data collection results in increased workload, providing incentives to staff may be beneficial.

- Data collection is easier when incentives are available for participation.

- Asking clinic staff to weigh infants of a specific age was challenging for several reasons:
  - Some participants did not bring their infants to their 6-month mid-certification appointments
  - Some parents objected to having their infants undressed down to only a diaper
  - Clinic staff did not always have time to weigh the infants and record the data

- Trainings for control staff were started as post-intervention data collection began. Given that the trainings were split, we had anticipated that the staff would wait to use the Baby Behavior messages until after the completion of the trainings. It is likely however, that personnel in the control sites may have begun to use the messages right away. In order to prevent this kind of "contamination" across groups from occurring during data collection, it is important to delay any training of control groups until after data collection is over.

Summary and Conclusion

Summary

Staff satisfaction with infant nutrition education

- The Baby Behavior information was new to most of the WIC staff as well as to participants. Ongoing support was important to build staff confidence.
- Clinic staff enjoyed the Baby Behavior trainings; the overall evaluation score for the 4 trainings was 9.4 out of 10. Ninety-six percent of staff members reported that the trainings prepared them to deliver the Baby Behavior messages. Although the original trainings were effective in building staff confidence, they were extremely time-consuming (14-16 hours over 4 days). The revised training is shorter (8-10 hours) and has tested well in terms of knowledge transfer and staff satisfaction (data available upon request).
- Clinic supervisors reported that the Baby Behavior intervention has a positive effect on their staff and resulted in improved relationships with their participants.
- Clinic staff found the Baby Behavior handouts useful, 83% reported using the handouts either daily or weekly, and the class activities to be engaging and educational.

Participant satisfaction with infant nutrition education

- The Baby Behavior intervention messages were well received by participants. Despite the obvious ties to parenting skills, none of the messages was found by participants to be offensive or challenging. The inoffensive approach was a key element of the intervention. Also key was the fact that "overfeeding" was only rarely mentioned in any of the classes and not at all on the handouts. While counterintuitive, this approach was necessary because participants in the preliminary qualitative research did not believe that they were overfeeding their infants. They believed they were responding appropriately to "hunger cues."
- The majority of participants listened to, valued, and followed WIC advice both at baseline and at the end of the study period. Modest increases in willingness to follow WIC advice were seen in both language groups. However, group (intervention vs. control) differences after the intervention were only significant among English-speaking participants.
- Significantly more postpartum participants in the intervention group reported that they liked going to WIC classes as compared to the control group in both language groups.

Cost of the intervention

- Although it varies by location and clinic, the estimated cost of the intervention, including all staff training, educational, and promotional materials, is approximately $1.44 per participant (based on a caseload of 5000).

Staff knowledge, attitudes, and beliefs

- A key message during the staff training was related to the concept of participant "coping skills." When participants can imagine a solution to their infant-feeding problems (clinic, behavioral, or otherwise), they are more likely to listen to WIC staff advice and comply with infant-feeding guidelines. When participants believe that there are no solutions to their challenges, they are more likely to reject advice and may become disengaged or defensive. This concept was well accepted by administrators and staff and its use helped them understand why some of the participants seemed to resist WIC education.

- Results from the pre- and post-tests distributed at the intervention staff trainings indicated significant increases in staff knowledge. However, post-intervention staff survey results indicate that there may have been some knowledge loss over time. Clinic supervisors and staff agreed that refresher trainings would be useful to ensure messages are being delivered correctly.

Participant knowledge, attitudes, and beliefs

- Among focus group participants who had been exposed to the Baby Behavior messages, the majority were able to adequately explain the main messages.
- Few differences between groups were found in participant knowledge and beliefs at the end of the study. However, changes over time in participant outcomes were found in both groups. Given that control site trainings were initiated during the data collection period, it is possible that control site personnel were already using the Baby Behavior messages at that time. This "contamination" across groups may have been responsible for the changes over time in participant knowledge and beliefs. Some evidence for this hypothesis is provided by the number of participants in both groups reporting that they had learned about "Baby Behavior" at WIC and the fact that we continually received requests for materials from non-participating WIC clinics throughout the state during the study period. It was clear that WIC staff members were discussing the study with staff from other clinics and agencies.

Infant-Feeding Practices

- Distribution of exclusive breastfeeding food packages (0 to 6 months) increased an average of 6.3% across all intervention sites during the study period. Some clinics, particularly larger clinics, required more time than others to see changes in food package distribution.
- Differences between study groups in the distribution of exclusive breastfeeding food packages were largest in the first 3 to 4 months. After 4 months, other infant behaviors may need to be addressed to encourage continued breastfeeding. Alternatively, there may be other influences on food package selection after 4 months such as returning to work.
- According to the participant surveys, a higher percentage of participants in the intervention group breastfed their infants in the first month without feeding supplementary formula.
- Based on participant surveys, there were no differences between study groups in the duration of "any" breastfeeding at 4 and 6 months.
- Exclusive formula feeding rates were relatively unchanged by the intervention though the number of cans distributed to formula feeding mothers was modestly reduced.
- While there were no differences between groups in age at first solid food introduction, caregivers in both groups were less likely to introduce solid foods prior to 4 months after the study period. A new infant-feeding pamphlet was introduced in February of 2007 to all California WIC agencies that addressed the AAP recommendations that solid foods should be delayed until 6 months. The implementation of the education related to the handout likely occurred during our study period and likely resulted in changes to participant beliefs about the appropriate age of solid food introduction.

Weights

- Infants in the intervention group were less likely than those in the control group to exceed the 95th percentile for weight-for-age at 5 to 7 months of age.
- Infant weights were difficult to obtain and 21% of the records in both groups were incomplete and unusable. Assumptions were made to adjust weights in both groups for

infant clothing. Therefore, further work is needed to verify if infant weight is influenced by caregiver education about Baby Behavior.

Conclusion

The Fit WIC Baby Behavior project was highly successful in transforming WIC environments in order to help caregivers to understand and accept biologically normal baby behaviors. As caregivers became better able to differentiate hunger cues from other cues that infants provide, they were more likely to continue exclusive breastfeeding and less likely to use excessive amounts of formula. Although further work is needed to verify our findings, the intervention may have resulted in a decrease in the proportion of infants exceeding the 95th percentile for weight-for-age around 6 months. These outcomes potentially have implications for efforts toward the prevention of childhood obesity.

Much of the information shared in the trainings was new to the WIC staff as well as participants. While some of the staff required time to readjust their thinking about caregiver and infant interactions, the majority found the Baby Behavior messages immediately useful as additional tools to promote optimal infant feeding within their clinics. Staff enthusiasm about the program has been quite high and many of the methods and messages have been shared with WIC staff outside of the participating agencies.

Given that the promotion of positive interactions between caregivers and infants has implications in other areas of maternal and infant health, it is likely that modified Baby Behavior messages may be of use to other public health programs such as Early Head Start. Interest in our intervention concept as a means to promote breastfeeding has already been expanding to other environments, particularly hospital environments. It would be of great interest to expand the program to address parents' concerns about behaviors among older infants and toddlers.

Implications for Practice

- This project utilized traditional "marketing" techniques to identify 1) common triggers among participants for inappropriate feeding practices; 2) key messages and optimal forms of message delivery; and 3) staff barriers for implementation of the project. Obtaining detailed information directly from the target population ensured that the Baby Behavior intervention would address the specific barriers caregivers face rather than the barriers that staff perceived to be most important. Infant-feeding interventions often rely on motivational messages to promote compliance with guidelines, explaining why certain behaviors are "good" or "bad." The Baby Behavior project focused on removing barriers rather than increasing motivation. In California, where most women intend to breastfeed, this approach worked well. By teaching caregivers why their babies behave the way they do and providing tools that promote positive interactions without over- or inappropriate-feeding; the Baby Behavior intervention enhanced motivation-focused breastfeeding support services. Focusing on motivation may be more useful among populations who do not value breastfeeding.

- Before the Baby Behavior materials are translated into other languages, it will be essential to use similar "marketing" techniques to ensure that the current messages are relevant and accepted by other cultural groups. Research may indicate that alternative messages are needed for other populations.

- Although the purpose of this study was to reduce over- and inappropriate feeding, overfeeding is never directly mentioned in the intervention messages or materials. Our previous research (Heinig, Follett et al. 2006) indicated that most WIC caregivers did not consider themselves to be overfeeding because their infants' behavior (crying and waking) was perceived as indicators that their babies were hungry. By addressing these behaviors, staff members were able to reduce barriers to optimal feeding. While this intervention may appear to be a "parenting skills intervention," the approach was geared primarily to address feeding issues.

- The Baby Behavior staff training has been designed to provide WIC staff with the knowledge, skills, and confidence to deliver the Baby Behavior messages to participants in a way that is well-accepted. In the beginning, there were concerns about asking WIC staff to discuss potentially sensitive topics, such as parenting. These concerns were addressed by providing staff with "taglines" and an approach that was not offensive to any participant.

- A key element in the training was the concept of participant "coping skills." Briefly, this refers to the fact that participants are only likely to request and accept advice when they perceive that there are solutions to challenges that they face. If participants do not believe there are solutions to their challenges they will disengage and reject advice. We believe that this concept is useful for all WIC staff, especially those who may become discouraged when participants seem to ignore or reject counseling.

- Unrealistic expectations about infant behavior are common throughout society, not only among the WIC-eligible population. Because infant behaviors are universal, the Baby Behavior intervention should have broad application outside of WIC. The results of this intervention have sparked interest from a variety of health and social service professions. Expanding the intervention into different settings so that consistent messages are repeated by various providers has the potential to result in even better outcomes.

- Although this study focused on young infants, misunderstandings about infant behavior continue well beyond 6 months of age. Additional research is needed to identify the barriers to appropriate feeding among infants older than 6 months of age before interventions can be developed for these older, more behaviorally complex infants.

- The FitWIC Baby Behavior study began in 2006 and final data collection was completed in late 2008, prior to implementation of the new food package. Given that the project provides additional tools to address common early infant-feeding challenges, we believe that the program messages remain highly useful within the "new WIC" environment.

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