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MATERNAL/INFANT CHARACTERISTICS AND BIRTH LOCATION IMPACT ON BREASTFEEDING INITIATION AND DURATION

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ABSTRACT

Purpose: Healthy People 2020 goals emphasize the importance of breast milk as the best source of nutrition for infants. Variability in breastfeeding outcomes (initiation and duration) is attributable to maternal/infant characteristics and healthcare practices. Studies in Australia and Sweden reported no significant differences in breastfeeding duration by location; however, no U.S. study has evaluated duration outcomes in relation to birth location.

Objective: This study investigates the influence of maternal/infant characteristics and birth location on breastfeeding outcomes.

Design: A descriptive, secondary analysis was conducted using the CDC's National Survey of Family Growth (NSFG) 2006-2010.

Participants: Data were obtained from in-person interviews. The sample (N=4,485) consists of women between the ages of 15 and 44 who reported their first live birth.

Data Analysis: *ANOVA, Chi-Square, t-tests,* and *Pearson (r)* were used to evaluate differences in breastfeeding outcomes among birth location and maternal/infant characteristics.

Results: Mothers who delivered in a birth center breastfed significantly ($p \leq .01$) longer (M=44.1 weeks) than mothers who delivered in a hospital (M=17.2 weeks). Full term infants were breastfed significantly ($p < .001$) longer (M=19.2 weeks) than preterm infants (M=14.7 weeks). Maternal demographic factors that strongly influenced breastfeeding initiation and duration included race, education, marital status, smoking status, and poverty level.

Conclusions: The results support that birth centers consistently practice care associated with longer breastfeeding duration. Improving access to birth centers for care and integrating Baby Friendly care practices into hospitals may enhance efforts to meet the Healthy People 2020 goals for breastfeeding.

INTRODUCTION

Breastfeeding is the best source of nutrition for infants, providing myriad short- and long-term benefits to both infants and to mothers who choose to breastfeed. In its Policy Statement, "Breastfeeding and the Use of Human Milk", the American Academy of Pediatrics (AAP) affirmed its support of breastfeeding, recommending "exclusive breastfeeding for about 6 months, followed by continued breastfeeding as complementary foods are introduced, with continuation of breastfeeding for 1 year or longer as mutually desired by mother and infant" (2012, p. e827). While any duration of breastfeeding is beneficial to infants, the benefits of extended breastfeeding are extensive and include notably lower risks of otitis media, respiratory tract infections, asthma, RSV bronchiolitis, atopic dermatitis, Celiac disease, type I diabetes, acute lymphocytic and myeloid leukemia, and sudden infant death syndrome (SIDS) (AAP, 2012).

Even though breastfeeding offers extensive and well-documented benefits, breastfeeding in the U.S. continues below ideal rates. The Centers for Disease Control and Prevention (CDC, 2013a) reported that for children in the U.S. in 2006, 74% were breastfeeding early postpartum, 43.5% at six months, and 22.7% at twelve months. These rates slightly increased in 2012, with 76.9%, 47.2%, and 25.2% of children breastfeeding at birth, six, and twelve months, respectively (CDC, 2012). The U.S. consistently has focused on increasing both breastfeeding initiation and duration as a priority. Healthy People 2010, a national initiative from several federal agencies collaborating to develop "science-based, ten-year national objectives for improving the health of all individuals" (U.S. Department of Health and Human Services [DHHS], 2012), sought to increase the proportion of mothers who breastfed their infants in early postpartum to 75% and to increase the proportion of

mothers who continue to breastfeed for at least six months and twelve months to 50% and 25%, respectively (CDC, 2013b). While the U.S. achieved the 2010 goal for breastfeeding initiation in 2007 and 2009 (CDC, 2013a), and the 2010 goal for breastfeeding infants at twelve months in 2012 (CDC, 2012), breastfeeding rates at six months still remain below the 2010 goal. The Healthy People 2020 goals increase the breastfeeding initiation rate target to 81.9%, and the goals for six and twelve months to 60.6% and 34.1%, respectively (U.S. DHHS, 2013). This increase from the 2010 goals reflects a pattern of relatively high breastfeeding initiation but a national deficiency in the continuation of breastfeeding, despite AAP recommendations for breastfeeding durations for one year or longer.

Beyond these efforts, the CDC also has determined that mothers belonging to certain demographics have much lower breastfeeding initiation and duration rates (CDC, 2013c). Improving outcomes for all infants will require targeting and supporting these at-risk demographics.

Though both initiation and duration of breastfeeding are complex and multifactorial processes, Kruse, Denk, Feldman-Winter, and Rotondo (2005) determined that about 60% of the variation in exclusive breastfeeding at discharge from the hospital is predictable from variations in socio-demographic characteristics. This suggests that while socio-demographic factors play a large part in determining breastfeeding outcomes, practices within the health-care setting also can be influential, perhaps affecting up to 40% of the unexplained variation in breastfeeding rates.

The World Health Organization (WHO) and United Nations Children's Fund (UNICEF) developed the Baby Friendly Hospital Initiative in 1991 that includes ten steps to

successful breastfeeding (see Figure 1). These practices have been shown to promote both initiation and extended duration of breastfeeding. The extent to which a birthing facility adopts these practices can have a direct effect on patients' breastfeeding outcomes (DiGirolamo, Grummer-Strawn, & Fein, 2008).

Although great variation in practice exists between all types of birthing facilities, birth centers are unique in their approach to caring for women and newborns. The American Association of Birth Centers (AABC, 2010a) characterizes birth centers as providing "family-centered care for healthy women through pregnancy, labor and birth" (para. 1). While birth center care is collaborative, midwives attend most births (Stapleton, Osborne, & Illuzzi, 2013) and practice a holistic approach to pregnancy, birth, and women's health care (AABC, 2010b). According to Rooks' midwifery model of care (1999), midwives provide expertise in "protecting, supporting, and enhancing the normal physiology of labor, delivery, and breastfeeding" (p. 370). Birth Centers provide unique experiences that promote both the initiation and extended duration of breastfeeding. Nevertheless, little research has examined the extended breastfeeding outcomes of mothers giving birth in birth centers.

For the purposes of this study, a *birth center* is a homelike facility existing within a healthcare system delivering a program of care that is designed using a wellness model of pregnancy and birth (AABC, 2010a). According to the CDC's National Vital Statistics Reports, 0.34% of 2010 U.S. births took place in a birth center (Martin et al., 2012).

In light of the unique, individualized care provided at birth centers and the continued emphasis in the U.S. on the importance of both initiation and extended duration of

breastfeeding, the aims of this study are to investigate the influence of both maternal and infant characteristics and location of birth on initiation and duration of breastfeeding. This study used the CDC's National Survey of Family Growth (NSFG) data. To our knowledge, no national study has evaluated breastfeeding duration outcomes in relation to location of birth, specifically birth centers, within the U.S.

LITERATURE REVIEW

Both demographic and situational factors influence breastfeeding outcomes. The CDC's 2004 National Immunization Survey found that breastfeeding outcomes varied by race, socioeconomic level, and other demographic factors (CDC, 2006). The CDC reported that 71.5% of non-Hispanic white children breastfed at least once compared to 50.1% of non-Hispanic black children. Of the breastfed infants in the study, 53.9% of non-Hispanic white children and 43.2% of non-Hispanic black children breastfed for at least six months. Several additional demographic factors positively influenced breastfeeding initiation: (a) children were not eligible for WIC, a food and nutrition service for low-income families; (b) children with mothers who were twenty years and older, married or had some college education; (c) children who lived in urban areas or in the Western U.S.; and (d) children who lived above the poverty level (CDC, 2006).

Although certain demographic factors have been associated with more positive breastfeeding initiation and duration outcomes, factors related to the birth setting played a significant role as well. In their 2008 study, DiGirolamo, Grummer-Strawn, and Fein evaluated the use of six Baby-Friendly practices (see Figure 1) in the hospital setting and determined if exposure to those steps influenced breastfeeding duration at six weeks for

mothers who intended to breastfeed for at least two months. Controlling for various demographic, attitudinal, and behavioral factors, the researchers found that breastfeeding initiation within one hour, only breast milk given, and no pacifiers given, were influencers of extended breastfeeding duration. In spite of its limited scope, this study reinforces the effectiveness of the Baby-Friendly practices.

Merewood and associates (2005) conducted a similar study that evaluated breastfeeding initiation and exclusivity in health facilities (n = 28) with the "Baby-Friendly" designation (i.e., those that demonstrated that the ten Baby-Friendly steps had been implemented). Baby-Friendly facilities had a mean breastfeeding initiation rate of 83.8% and an exclusive breastfeeding rate of 78.4%, compared to the national mean (general population) rates, 69.5% and 46.3%, respectively. Additionally, Baby Friendly facilities had high breastfeeding initiation rates among populations that normally have low breastfeeding rates, reinforcing that healthcare facility practices can greatly impact breastfeeding initiation outcomes, despite demographic factors. Six of the health facilities with birth center status reported almost 14% higher initiation rates than the other facilities (Merewood et al., 2005).

Maternity Practices in Infant Nutrition and Care (mPINC), a CDC biennial national survey that evaluates the infant feeding maternity care practices of every U.S. facility that routinely provides maternity care, demonstrates that birth centers provide care that supports breastfeeding (CDC, 2013d). Of the responding facilities, birth centers, when compared to the all facility average, demonstrated the greatest percent compliance in practicing the Baby-Friendly steps determined to have the most effect on breastfeeding

duration (DiGirolamo et al., 2008): (a) breastfeeding initiation within one hour (92% compared to 51%), (b) only breast milk given (79% compared to 22%), and (c) no pacifiers given (94% compared to 30%) (CDC, 2013d). The 2007 mPINC results were similar, demonstrating that birth centers overall consistently practice infant feeding maternity care associated with positive outcomes in breastfeeding initiation and duration through higher mean total scores, compared with hospitals, on seven subscales regarding maternity practices known to enhance breastfeeding (CDC, 2008).

Midwives attend most births in birth centers (Stapleton et al., 2013), and care by midwives has been associated with higher rates of breastfeeding initiation. A Cochrane review of the midwife-led model of care reported that women under midwife-care were more likely to initiate breastfeeding (Hatem, Sandall, Devane, Soltani, & Gates, 2008). The Birthplace in England Collaborative Group (2011) reinforced positive breastfeeding initiation outcomes for births attended by midwives; they found that for planned births at home and freestanding midwifery units, babies were more likely to breastfeed at least once compared with obstetric unit births.

An American study comparing traditional physician-based perinatal care to a collaborative care model, (i.e., midwives and obstetricians practice together with midwives managing the prenatal and intrapartum care of women with low perinatal risk), found better breastfeeding initiation outcomes in birth center births. Upon discharge, 91.8% of mothers in the collaborative care model were breastfeeding, as opposed to 82.6% of mothers in traditional care (Jackson et al., 2003). While all of these studies report positive

breastfeeding initiation rates with birth center care, none evaluated the breastfeeding duration in association with birth center care.

Two studies evaluated breastfeeding duration in relation to location of birth, but both took place in foreign birth centers attended by midwives: Stockholm, Sweden (Waldenstrom & Nilsson, 1994) or Adelaide, Australia (Byrne, Crowther, & Moss, 2000). In contrast to the results found by Merewood et al. (2005) both Byrne and colleagues (2000) and Waldenstrom and Nilsson (1994) found that birth center care had no effect on breastfeeding duration. Byrne et al.'s (2000) randomized controlled trial of birth center versus conventional hospital delivery care in Australia did not find any statistically significant differences in breastfeeding rates at discharge (88% and 90%, respectively) and at 6-weeks post-partum (31% and 36%, respectively). The only statistically significant differences reported were that 58% of women in the birth center group felt breastfeeding was encouraged immediately after birth compared to 36% of women in conventional hospital delivery care (Byrne et al., 2000). Waldenstrom and Nilsson's (1994) randomized controlled trial of birth center care in Sweden reported that two months after their expected delivery date, 93% of women in both the birth center care group and the standard obstetric care group were exclusively breastfeeding. Furthermore, the birth center group and the standard obstetric care group breastfed their infants for an average of 8.6 and 8.5 months, respectively.

While these studies do not support differences in breastfeeding duration outcomes based on location of care, it is notable that midwives managed all normal births for both birth center and standard obstetric care groups in the studies in Sweden and Australia, a

practice common outside of the U.S. In contrast, midwives only attended 8.4% of births in the U.S. in 2010 (Martin et al., 2012). Consequently, while these studies found no differences in breastfeeding outcomes, major similarities between the locations of birth may not be applicable in the U.S.

METHODS

DESIGN

This study is a secondary analysis of data from the CDC's National Survey of Family Growth (NSFG) 2006-2010 Female Pregnancy Files. The NSFG gathers information for statistical analysis and planning health services and education programs regarding pregnancy; medical care associated with reproduction; marriage, cohabitation, and adoption; and women's attitudes about reproduction and marriage (U.S. DHHS, 2011). Because all data were de-identifies the authors obtain IRB approval for non-human subject research from a Midwestern academic medical center prior to study initiation.

The aims of this study are to determine if there are differences in breastfeeding initiation and duration among location of birth and various maternal, infant, and demographic characteristics. The following research questions were explored: (a) Are there differences in breastfeeding initiation and duration based on location of birth (hospital, birth center, or other)?, and (b) Are there differences in breastfeeding initiation and duration for: prenatal information (i.e., *when prenatal care began*), delivery information (i.e., *infant birth weight, low birth weight*, *infant gender*, and *deliver method*); pregnancy outcomes (i.e., *duration of pregnancy* and *preterm delivery*); and demographic characteristics (i.e., *maternal age, race, marital status/family type, highest education, place*

of residence, mother born outside of the U.S., religion, smoking status, maternity leave, method of payment for delivery, and *poverty level*)?

SAMPLE AND SETTING

The NSFG sample for this study consists of 4,485 pregnancies for women between the ages of 15 and 44 who reported one or more pregnancy. The sample was determined using multi-stage area stratified probability samples drawn from 110 primary sample units. Over-sampled populations included blacks and Hispanics, but sampling weights were used to adjust for the sampling rates, so the sample is nationally representative (Lepkowski, Mosher, Davis, Groves, & Van Hoewyk, 2010). This survey sample includes longitudinal data for mothers, with some reporting more than one birth; thus, included in the analysis is the reported first live birth for each mother. Additional exclusion criteria were: (a) live births resulting in a reported adoption, (b) pregnancies that have not delivered, and (c) pregnancies resulting in multiple births.

PROCEDURES

Data were obtained from in-person interviews conducted in the respondents' homes between June 2006 through June 2010. Only one individual from each household was consented and interviewed. Following training, female interviewers conducted interviews using laptop computers. Respondents between the ages of 15 and 17 required signed consent from a parent before being asked for their signed assent (Lepkowski et al., 2010). The average interview length was 80 minutes, and all respondents were given $40 as a token of appreciation (U.S. DHHS, 2011). Most of the interview was conducted through a computer-assisted personal interview (CAPI) with one section conducted using audio

computer-assisted self interview (ACASI) due to the sensitive nature of some of the items on the survey (Lepkowski et al., 2010).

MEASURES

The NSFG Female Questionnaire containing nine sections was used to collect data regarding pregnancy and birth. Only questions from the first two sections of the questionnaire were included: (a) *background and demographic information,* and (b) *pregnancy and adoption-related information* (See U.S. DHHS, 2011, for information on the other sections). The Female Pregnancy File used for this analysis included the following variables: *(a) breastfeeding, (b) prenatal information, (c) delivery information, (d) pregnancy outcomes,* and *(e) demographic characteristics* (see Table 1 for variable operational definitions).

Breastfeeding. Breastfeeding initiation was coded as yes=1 and no=0. *Duration of breastfeeding,* the infant's age when the mother stopped breastfeeding, is the age of the infant in weeks. Never breastfed was coded as 0 and breastfed less than one week was coded as 0.5. *Duration of breastfeeding* ranged from 0 to 208 weeks.

Birth Location. Birth location, is operationalized as in a hospital=1, in a birthing center=2, or other=3.

Prenatal Information. When prenatal care began ranged from one to forty weeks or was categorized as no prenatal care (95).

Delivery information. *Infant birth weight* ranged from 1.0 to 16.0 pounds. *Low birth weight* (less than five and one-half pounds) was coded as yes=1 and no=0. *Infant gender*

was male=1 and female=2. *Delivery method* was live birth by vaginal delivery (1) or live birth by Cesarean section (2).

Pregnancy outcomes. Pregnancy outcomes provide data regarding the outcome of each pregnancy. *Duration of pregnancy,* the infant's gestational age when the pregnancy ended, ranged from 22 to 48 weeks. *Preterm delivery* was delivery that occurs at 36 weeks or earlier.

Demographic characteristics. Demographic variables were obtained through recodes or constructed variables from the Female Respondent File (U.S. DHHS, 2011). The selected variables were determined based on factors that have historically been associated with higher rates of breastfeeding*:* (a) *maternal age,* (b) *race,* (c) *marital status/family type*, (d) *highest education,* (e) *place of residence*, (f) *mother born outside of the U.S.*, (g) *religion*, (h) *smoking status*, (i) *maternity leave,* (j) *method of payment for delivery*, and (k) *poverty level.* (See Table 1 for operational definitions and citations).

DATA ANALYSIS

SPSS 20.0 was used for the analysis. Frequencies and descriptive statistics were used to examine each of the variables for missing data and apply exclusion criteria. Chi-Square (χ^2) and One-way Analysis of Variance (ANOVA) tests were used to answer the first research question: Are there differences in breastfeeding initiation and duration based on location of birth (hospital, birth center, or other)? ANOVA, *t*-test, Chi-square (χ^2), and Pearson (*r*) tests were used to explore the second research question: Are there differences in breastfeeding initiation and duration for prenatal information, delivery information, pregnancy outcomes, and demographic characteristics?

RESULTS

The final study sample consisted of 4,485 mothers reporting their first live birth; of these, 1,412 mothers reported birth location, of which 98 % occurred in the hospital setting. Table 2 depicts the means and frequencies for breastfeeding, birth location, prenatal information, delivery information, pregnancy outcomes, and demographic characteristics.

The first research question was to determine if differences exist in breastfeeding initiation and duration by birth location. Chi-square test results indicated no significant difference ($p \geq .01$) in breastfeeding initiation by location of birth. ANOVA test results revealed significant differences in breastfeeding duration between births that took place in a hospital (M=17.2 weeks; SD =25.2) and births that took place in a birth center (M=44.1 weeks; SD=39.6). Moreover, only 27% of mothers who delivered in the hospital breastfed for six months or longer, and 7.3% breastfed for twelve months or longer. In contrast, 59.1% of mothers who delivered in a birth center breastfed for six months or longer and 36.4% breastfed for twelve months or longer. Differences in breastfeeding duration for births at other sites (M=77.1 weeks, SD=74.9) were non-significant.

The second research question was to identify breastfeeding outcome differences by prenatal and delivery information, pregnancy outcomes, and demographic characteristics. When prenatal care began did not significantly affect how long mothers breastfed. Additionally, there were no significant differences in breastfeeding initiation or duration by infant gender or delivery method. Though there were no differences in breastfeeding initiation rates for mothers of low birth and normal weight infants, mothers of low birth

weight infants breastfed for a significantly shorter duration (*M*=14 weeks) than mothers of normal birth weight infants (*M*=19 weeks). Mothers of preterm infants had lower breastfeeding initiation rates (58%) than mothers of full term infants (64%) and breastfed for a significantly shorter duration (*M*=15 weeks) than mothers of full term infants (*M*=19 weeks) (see Table 3).

Demographic characteristics significant for breastfeeding outcomes include: maternal age, race/ethnicity, mother's highest education level, smoking status, and poverty level (see Table 4). Older mothers had higher breastfeeding duration than younger mothers (*r* = .19). Regarding race/ethnicity, Hispanic and non-Hispanic other mothers had significantly longer breastfeeding duration (*M*=25 weeks and *M*=29 weeks, respectively) than White (*M*=18 weeks) or Black (*M*=10 weeks) mothers. Mothers with some college or more had significantly higher breastfeeding initiation and duration (75% and *M*=23 weeks, respectively) than mothers with a high school diploma or less (54% and *M*=15 weeks, respectively). Mothers with incomes above the poverty level had significantly higher breastfeeding initiation and duration (69% and 20 weeks, respectively), than mothers with incomes at or below the poverty level (53% and 16 weeks, respectively). Mothers not smoking during pregnancy had higher breastfeeding initiation and duration (69% and *M*=19 weeks, respectively) than mothers who smoked at all once they knew they were pregnant (53% and *M*=9 weeks, respectively). Other demographic characteristics significant for breastfeeding outcomes include marital status, place of residence, mother born outside of the U.S., religion, maternity leave, and method of payment for delivery (see Table 4).

DISCUSSION

This study was the first to investigate both initiation and duration of breastfeeding in relation to location of birth. Findings from this study were inconsistent with Merewood et al. (2005), the Birthplace in England Collaborative Group (2011), and Jackson et al. (2003), who found significant differences in breastfeeding initiation rates between hospitals and birth centers. However, our findings indicate that mothers who gave birth in a birth center breastfed two and a half times longer on average than mothers who gave birth in a hospital. This outcome supports that birth centers support infant feeding practices associated with extended breastfeeding. Although the other delivery location was not delineated, this category could include home delivery or delivery in route to the hospital as examples.

Prenatal and delivery factors identified as impacting breastfeeding outcomes include preterm delivery and infant birth weight. Consistent with Radtke's (2011) findings, this study found that preterm delivery was associated with both lower breastfeeding initiation and duration. Though there are many speculations regarding the impact of analgesia on breastfeeding outcomes, delivery method (vaginal vs. cesarean delivery) did not significantly influence breastfeeding outcomes in this study. These findings are consistent with the findings of both DiGirolamo et al. (2008) and Murray, Ricketts, and Dellaport (2006).

As supported in the literature, multiple maternal demographic factors impacted breastfeeding outcomes in this study. Maternal factors strongly associated with initiation and longer breastfeeding duration are: (a) Hispanic and non-Hispanic other race, (b) some college education or more, (c) mother married or cohabitating, (d) mother born outside of

the U.S., (e) mother not smoking, (f) payment by own income or insurance, and (g) income above the poverty level. While maternal age was identified in the literature to strongly impact both initiation and duration (CDC, 2006; Dubois & Girard, 2003; Kruse et al., 2005; Murray et al., 2006), the differences were significant but relatively small for this sample. Catholic mothers and mothers of other religions had higher initiation rates and longer breastfeeding duration than Protestant mothers and mothers claiming no religion. This is different from Burdette and Pilkauska's (2012) results that revealed higher breastfeeding rates for mothers that were Conservative Protestant, Muslim, other Christian, or other religious faiths. However, religious preference was operationalized differently in each study.

Unlike Mandal and colleagues' (2010) results that indicated full-time employment was negatively correlated with initiation and duration, this study found that mothers who took maternity leave from their job or did not take maternity leave because it was not needed or not offered had higher rates of breastfeeding initiation and longer duration than mothers who were not employed during the pregnancy. The differences could be due to the mother's inability to find work, and the impact her unemployment may have on her income, a factor established in this study and others (AAP, 2012; CDC, 2006) that greatly impact breastfeeding outcomes.

LIMITATIONS AND RECOMMENDATIONS

Limitations of the study are use of secondary analysis of the NSFG data that does not include some variables known to influence breastfeeding outcomes. These variables include use of analgesia during labor (DiGirolamo et al. 2008), prenatal attitudes toward

breastfeeding and anticipated length of breastfeeding (Forster, McLachlan, & Lumley, 2006; O'Campo, Raden, Gielen, & Wang, 1992; Waldenstrom & Nilsson, 1994), and social factors, including peers and family who support breastfeeding or the mother was breastfed herself (Forster et al., 2006).

This study supports that birth centers consistently practice infant feeding maternity care known to support extended breastfeeding duration. In an effort to achieve Healthy People 2020 goals of increasing the proportion of infants who breastfed at six months and twelve months to 60.6% and 34.1%, respectively, the authors recommend improving access to birth centers. This could be achieved through advocating for enhanced insurance coverage of birth center care and promoting the use of birth centers for deliveries across the U.S. Additionally, as most births take place in a hospital, nurses have an obligation to encourage hospital administration to integrate Baby Friendly practices into their standards of care, promote a unit culture supporting these practices, and focus efforts on black mothers and mothers with low education and income to improve breastfeeding outcomes.

Lastly, there are a limited number of studies examining birth location impact on breastfeeding outcomes, especially breastfeeding duration. Further research is needed in this area. Although there have been studies that investigated the impact of Baby Friendly practices on breastfeeding initiation, few studies have evaluated the impact of these practices on duration, especially beyond the six weeks after delivery. We recommend extending research of the impact of Baby Friendly practices on breastfeeding duration beyond six weeks after delivery.

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TABLE 1 OPERATIONAL DEFINITIONS AND REFERENCES FOR DEMOGRAPHIC AND BACKGROUND VARIABLES

Variable	**Operational definition**	**Citation**
Maternal age at pregnancy outcome	Ranged from 12.8 to 42.4 years	CDC, 2006; Dubois & Girard, 2003; Kruse et al., 2005; Murray et al., 2007
Race	Hispanic=1, Non-Hispanic White=2, Non-Hispanic Black=3, Non-Hispanic Other=4	CDC, 2006; Kruse et al., 2005; Murray et al., 2007
Marital status/family type	Married/Cohabitating=1, Divorced/Separated/Widowed=2, Never married, not cohabitating=3	CDC, 2006; Dubois & Girard, 2003; DiGirolamo et al., 2008; Sparks, 2010
Highest Education	High school diploma or less=0, Some college or more=1	CDC, 2006; Kruse et al., 2005; Murray et al., 2007
Place of residence	Metropolitan Statistical Area (MSA), central city= 1; MSA, other= 2; Not MSA=3	CDC, 2006; Sparks, 2010
Mother born outside of the U.S.	Yes=1, No=5	Kruse et al., 2005; Sparks, 2010
Religion	No religion=1, Catholic=2, Protestant=3, Other religions=4	Burdette & Pilkauskas, 2012
Smoking status	No, mother did not smoke after she knew she was pregnant=0, Yes, mother smoked at all after she knew she was pregnant=1	DiGirolamo et al., 2008; Forster et al., 2006; Murray et al., 2007
Maternity leave	Not employed during this pregnancy=1, Took maternity leave from job held during this pregnancy=2, Did not take- not needed/other=3	DiGirolamo et al., 2008; Mandal et al., 2010; Sparks, 2010; O'Campo et al., 1992
Method of payment for delivery	Own income only=1, Insurance=2, Medicaid/ government assistance mentioned at all=3, All other combinations of payment methods=4	Weiner & Weiner, 2011
Income/Poverty Status	Above poverty level=0, Below or at poverty level (100%)=1	AAP, 2012; CDC, 2006; Dubois & Girard, 2003; Murray et al., 2007; Sparks, 2010; Weiner & Weiner, 2011

TABLE 2 MEANS AND FREQUENCIES FOR BREASTFEEDING, BIRTH LOCATION, PRENATAL INFORMATION, DELIVERY INFORMATION, PREGNANCY OUTCOMES, AND DEMOGRAPHIC CHARACTERISTICS.

Variable	***Statistic***	
Breastfeeding (*N*=4,485)	***n***	***%***
Initiation		
No (0)	1,652	36.8
Yes (1)	2,833	63.2
	M	***SD***
Duration (in weeks)	18.67	27.92
Birth Location (*n*=1,412)	***n***	***%***
In a hospital (1)	1,385	98.1
In a birthing center (2)	22	1.6
Other (3)	5	0.4
Prenatal Information (*n*=1,390)	***M***	***SD***
When prenatal care began (weeks gestation)	8.83	4.66
Delivery Information	***M***	***SD***
Infant birth weight (in pounds) (*n*=4,405)	7.19	1.30
	n	***%***
Low birth weight (*n*=4,405)		
No, 5.5 pounds or greater (0)	4,051	92.0
Yes, less than 5.5 pounds (1)	354	8.0
Infant Gender (*N*=4,485)		
Male	2,281	50.9
Female	2,204	49.1
Delivery method (*n*=4,482)		
Live birth by vaginal delivery (1)	3,429	76.5
Live birth by Cesarean section (2)	1,053	23.5
Pregnancy Outcomes (*n*=4,484)	***M***	***SD***
Duration of completed pregnancy (in weeks)	38.72	2.41
Preterm delivery (*N*=4,485)	***n***	***%***
Full term, ≥ 37 weeks (0)	3,929	87.6
Preterm, ≤ 36 weeks (1)	556	12.4
Demographic Variables (*N*=4,485)	***M***	***SD***
Maternal age at pregnancy outcome (in years)	22.87	5.16
	n	***%***
Race		
Hispanic (1)	1,271	28.3
Non-Hispanic White (2)	1,997	44.5
Non-Hispanic Black (3)	1,003	22.4
Non-Hispanic Other (4)	214	4.8
Marital status/family type	3,081	68.7
Married/Cohabitating (1)	51	1.1
Divorced/Separated/Widowed (2)	1,353	30.2
Never married, not cohabitating (3)		
Highest education		
High school diploma or less (0)	2,442	54.5
Some college or more (2)	2,043	45.5

Variable	***Statistic***	
Place of residence		
Metropolitan Statistical Area, Central City (1)	1,814	40.4
Metropolitan Statistical Area, Other (2)	1,953	43.5
Not Metropolitan Statistical Area (3)	718	16
Mother born outside of the U.S.		
No (0)	3,457	77.1
Yes (1)	1,027	22.9
Religion		
No religion (1)	766	17.1
Catholic (2)	1,240	27.6
Protestant (3)	2,157	48.1
Other religions (4)	322	7.2
Smoking status (*n*=1,412)		
No, mother did not smoke after she knew she was pregnant (0)	1,254	88.8
Yes, mother smoked at all after she knew she was pregnant (1)	158	11.2
Maternity leave (*n*=1,412)		
Not employed during this pregnancy (1)	420	29.7
Took maternity leave from job held during this pregnancy (2)	612	43.3
Did not take- not needed/not offered/other (3)	380	26.9
Method of payment for delivery (*n*=1,412)		
Own income only (1)	35	2.5
Insurance (2)	632	44.8
Medicaid/Government assistance mentioned at all (3)	712	50.4
All other combinations of payment methods (4)	33	2.3
Poverty Level		
Above poverty level (0)	2,978	66.4
Below or at poverty level (100%) (1)	1,507	33.6

TABLE 3 BREASTFEEDING INITIATION AND DURATION FOR MATERNAL/INFANT CHARACTERISTICS

	BREASTFEEDING				
	Initiation		***Test Statistic***	**Duration**	***Test Statistic***
	No (0)	**Yes (1)**	***p* ≤ .01**	**(weeks)**	***p* ≤ .01**
Prenatal Information (*n* =1,390)					
When prenatal care began (weeks gestation)	*M(SD)* 9.6(5.4)	*M(SD)* 8.5(4.2)	$t_{(741)}$ =3.875	--	*r* = -.04 *NS*
Delivery Information (*N*=4,485)					
Infant birth weight (in pounds) (*n*=4,405)	*M(SD)* 7.1(1.3)	*M(SD)* 7.2(1.3)	$t_{(4,403)}$ = -3.41	--	*r* = .05
Low birth weight (*n*=4,405)	*%*	*%*	$\chi^2_{(1)}$ = 3.97	*M(SD)*	$t_{(446)}$ =3.42
No, 5.5 pounds or greater (0)	36.8	63.2	*NS*	18.7(27.9)	
Yes, less than 5.5 pounds (1)	42.1	57.9		14.2(23.4)	
Infant Gender	*%*	*%*	$\chi^2_{(1)}$ = 0.01	*M(SD)*	$t_{(4,483)}$ =.24
Male (1)	36.8	63.2	*NS*	18.8(27.9)	*NS*
Female (2)	36.9	63.2		18.6(28.0)	
Delivery Method (*n*=4,482)	*%*	*%*	$\chi^2_{(1)}$ = 1.56	*M(SD)*	$t_{(1,888)}$= 2.06
Live birth by vaginal delivery (1)	36.3	63.7	*NS*	19.1(28.5)	*NS*
Live birth by Cesarean section (2)	38.5	61.5		17.2(26.0)	
Pregnancy Outcomes (*N*=4,485)					
Duration of completed pregnancy (in weeks) (*n*=4,484)	*M(SD)* 38.6(2.5)	*M(SD)* 38.8(2.4)	$t_{(3287)}$ = -3.66	--	*r* = .06
Preterm delivery	*%*	*%*	$\chi^2_{(1)}$ = 7.02	*M(SD)*	$t_{(831)}$ = 4.29
Full term, ≥ 37 weeks (0)	36.1	63.9		19.2(28.6)	
Preterm, ≤ 36 weeks (1)	41.9	58.1		14.7 (22.5)	

Note: NS = non-significant

Table 4.

BREASTFEEDING INITIATION AND DURATION BY DEMOGRAPHIC CHARACTERISTICS

	BREASTFEEDING (*N*=4,485)				
	Initiation		***Test Statistic***	**Duration**	***Test Statistic***
	No (0)	**Yes (1)**	***p* ≤ .01**	**(weeks)**	***p* ≤ .01**
Maternal age at delivery (in years)	*M(SD)* 21.3(4.5)	*M(SD)* 23.8(5.3)	$t_{(3906)}$= -17.1	--	*r* = .19
Race	*%*	*%*	$\chi^2_{(3)}$ = 328.0	*M(SD)*	$F_{(3,4481)}$= 67.2
Hispanic (1)	25.2	74.8		24.6(32.4)	1 vs 2; 1 vs 3
Non-Hispanic White (2)	34.2	65.8		18.3(25.9)	2 vs 3; 2 vs 4
Non-Hispanic Black (3)	59.9	40.1		9.6(19.8)	3 vs 4
Non-Hispanic Other (4)	22.9	77.1		29.2(36.7)	
Marital status/family type	*%*	*%*	$\chi^2_{(2)}$ = 298.4	*M(SD)*	$F_{(2,4482)}$=65.4
Married/Cohabitating (1)	28.5	71.5		21.8(28.9)	1 vs 3
Divorced/separated/ widowed (2)	41.2	58.8		16.8(23.8)	
Never married, not cohabitating (3)	55.7	44.3		11.6(24.4)	
Highest education	*%*	*%*	$\chi^2_{(1)}$ = 207.1	*M(SD)*	$t_{(4301)}$=-8.5
High school or less (0)	46.3	53.7		15.4(27.4)	
Some college or more (1)	25.5	74.5		22.5(28.1)	
Place of residence	*%*	*%*	$\chi^2_{(2)}$ = 59.1	*M(SD)*	$F_{(2,4482)}$=29.8
MSA, Central City (1)	37.9	62.1		18.6(28.8)	1 vs 3
MSA, Other (2)	31.8	68.2		21.2(28.8)	2 vs 3
Not MSA (3)	47.8	52.2		11.9(21.3)	
Mother born outside of the U.S.	*%*	*%*	$\chi^2_{(1)}$ = 224 .5	*M(SD)*	$t_{(1315)}$=-14.8
No (0)	42.7	57.3		14.7(23.9)	
Yes (1)	17.0	83.0		32.1(35.4)	
Religion	*%*	*%*	$\chi^2_{(3)}$ = 160.7	*M(SD)*	$F_{(3,4481)}$=45.8
No religion (1)	41.5	58.5		18.0(28.9)	1 vs 4
Catholic (2)	28.1	71.9		22.2(29.9)	2 vs 3
Protestant (3)	43.6	56.4		14.9(24.4)	2 vs 4
Other religions (4)	14.3	85.7		32.1(33.8)	3 vs 4
Smoking status (*n*=1,412)	*%*	*%*	$\chi^2_{(1)}$ = 16.3	*M(SD)*	$t_{(230)}$=5.4
No (0)	31.4	68.6		18.9(26.7)	
Yes (1)	47.5	52.5		9.3(20.5)	
Maternity leave (*n*=1,412)	*%*	*%*	$\chi^2_{(2)}$ = 29.9	*M(SD)*	$F_{(2,1409)}$=3.3
Not employed (1)	43.1	56.9		15.1(24.9)	*NS*
Maternity leave (2)	26.8	73.2		19.0(24.9)	
No maternity leave (3)	32.6	67.4		19.1(29.4)	
Method of payment for delivery (*n*=1,412)	*%*	*%*	$\chi^2_{(3)}$ = 105.6	*M(SD)*	$F_{(3,1408)}$=21.7 2 vs 3
Own income only (1)	25.7	74.3		31.6(39.1)	
Insurance (2)	19.3	80.7		23.0(27.5)	

	BREASTFEEDING (*N*=4,485)				
	Initiation		***Test Statistic***	**Duration**	***Test Statistic***
	No (0)	**Yes (1)**	***p* ≤ .01**	**(weeks)**	***p* ≤ .01**
Medicaid/Gov't assistance (3)	45.4	54.6		12.7(22.8)	
All other payment types (4)	45.5	54.5		16.1(29.1)	
Poverty Level	*%*	*%*	$\chi^2_{(1)} = 107.1$	*M(SD)*	$t_{(4483)}=4.97$
Above poverty level (0)	31.5	68.5		20.1(27.6)	
Poverty level or below (1)	47.3	52.7		15.8(28.3)	

FIGURE 1 THE TEN STEPS TO SUCCESSFUL BREASTFEEDING*

1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in the skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within one hour of birth.
5. Show mothers how to breastfeed and how to maintain lactation, even if they are separated from their infants.
6. Give infants no food or drink other than breast-milk, unless medically indicated.
7. Practice rooming in - allow mothers and infants to remain together 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no pacifiers or artificial nipples to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or birth center.

* World Health Organization (1989). *Protecting, promoting, and supporting breast-feeding: the special role of maternity services*. Switzerland: World Health Organization; Retrieved from http://whqlibdoc.who.int/publications/9241561300.pdf?ua=1.