



Contents lists available at ScienceDirect

Health Policy

journal homepage: [www.elsevier.com/locate/healthpol](http://www.elsevier.com/locate/healthpol)

# The differential effects of full-time and part-time work status on breastfeeding

Bidisha Mandal<sup>a,\*</sup>, Brian Eric Roe<sup>c</sup>, Sara Beck Fein<sup>b</sup>

<sup>a</sup> Washington State University, School of Economic Sciences, United States

<sup>b</sup> Food and Drug Administration, Center for Food Safety and Applied Nutrition, United States

<sup>c</sup> Ohio State University, Department of Agricultural, Environmental and Development Economics, United States

## ARTICLE INFO

### Keywords:

Full-time work  
Part-time work  
Breastfeeding initiation  
Breastfeeding duration

## ABSTRACT

**Objectives:** Return to work is associated with diminished breastfeeding. Although more mothers breastfeed after returning to work compared to a decade ago, research has not documented the variations in breastfeeding initiation and duration based on full-time and part-time (less than 35 h/week) work status. In this study, we clarify these differences.

**Methods:** Longitudinal data from the Infant Feeding Practices Study II, collected between 2005 and 2007, for over 1400 mothers are used. In analyzing initiation, mother's work status was categorized by the expected number of hours she planned to work postpartum. In the duration model, work status was categorized based on the actual number of hours worked upon mother's return to employment after controlling for baby's age when she returned to work. Covariates in logistic and censored regressions included demographics, maternity leave, parity, past breastfeeding experience, hospital experience, and social support.

**Results:** Compared with expecting not to work, expecting to work <35 h/week was not associated with breastfeeding initiation while expecting to work full-time decreased breastfeeding initiation. Compared with breastfeeding mothers who did not work, returning to work within 12 weeks regardless of work status and returning to work after 12 weeks while working more than 34 h/week were associated with significantly shorter breastfeeding duration.

**Conclusion:** Part-time work and increased amount of leave taken promote breastfeeding initiation and duration.

© 2010 Elsevier Ireland Ltd. All rights reserved.

## 1. Introduction

In the United States, lower rates of initiation and shorter duration of breastfeeding are generally observed among mothers who return to work after a child's birth than among mothers who do not return to market work [1–11]. However, one large study of U.S. mothers finds statistically similar initiation rates among mothers who were not work-

ing after the birth of their child compared with mothers who were working for pay part-time [12]. More U.S. mothers of infants are participating in the workforce [13]; the 2001–2003 estimate was that 67% of mothers of first children worked during the pregnancy, and most of this work was full-time employment [14]. Even as maternal workforce participation grows, the importance of breastfeeding in developed countries is increasingly emphasized. In 1997, the American Academy of Pediatrics increased their recommendation for the minimum duration of breastfeeding from 6 to 12 months based on diverse research showing health benefits in developed countries, and the policy was reaffirmed in 2005 [15,16]. National U.S. health objectives call for exclusive breastfeeding for 6 months and breast-

\* Corresponding author at: School of Economic Sciences, PO Box 646210, Hulbert Hall 103F, Washington State University, Pullman, WA 99164, United States. Tel.: +1 509 335 7553; fax: +1 509 335 1173.

E-mail address: [bmandal@wsu.edu](mailto:bmandal@wsu.edu) (B. Mandal).

feeding duration for at least 12 months [17,18]. A series of meta-analyses concluded that breastfeeding is associated with a reduced risk of many undesirable health outcomes in both mothers and infants in developed countries [19]. Although the Centers for Disease Control and Prevention estimates that breastfeeding initiation has increased in recent years, and that 73.9% of new mothers initiated breastfeeding in 2006 [20], this is slightly below the Healthy People 2010 target of 75% [17].

Previous work has investigated the relation between employment and breastfeeding, but the focus has primarily been on full-time vs. non-working groups [2,4–8,10–12]. A notable exception is the analysis from the first Infant Feeding Practices Study (IFPS I) [3], which is replicated with new data in this paper. Variables from several domains have been found to affect breastfeeding initiation or duration and may confound the relation between breastfeeding and work status. These include demographic and economic [21–23], medical [22–24], and social context variables [22–24]; parity [23,24]; positive feelings toward the act of breastfeeding [23,24]; and ability to follow health recommendations [22–24].

Rates of maternal labor force participation, maternity leave policies, breastfeeding initiation and duration, and the availability of portable breast pumps, which enable a mother to pump milk for her infant during the work day, have changed considerably since the period of the cited literature. We use variables from the above domains as control variables to clarify the effect of full-time and part-time employment on breastfeeding initiation and duration.

## 2. Methods

### 2.1. Sample

The Infant Feeding Practices Study II (IFPS II), conducted by the Food and Drug Administration in collaboration with the Centers for Disease Control and Prevention (CDC) from May 2005 to June 2007, is a longitudinal study of women from late pregnancy through their infant's first year of life. Following IFPS I (1992–1993), the new study collected data on infant feeding practices used by women in the U.S. to better understand the effect of significant changes in products, policies, and education since the original research.

The sampling frame for the IFPS II was a national consumer panel that was nationally distributed but not representative of the U.S. population. All women on the panel who reached the third trimester of pregnancy during the intake period of the study were asked to participate. Twelve surveys were administered primarily by mail—a prenatal questionnaire, a telephone interview near the time of the infant's birth, a neonatal questionnaire at infant age 1 month, and nine questionnaires sent about every 4 weeks during infant ages 2–7 months and then approximately every 7 weeks until infant age 12 months. Qualification criteria included that the infant was a singleton (not one of a multiple birth), weighed at least 5 pounds at birth, did not have a neonatal intensive care unit stay of more than 3 days, was born no more than 36 days before the due date, and had no medical condi-

tion that would be likely to affect feeding, such as Down syndrome, cleft palate, Duarte galactosemia, or other conditions or illnesses [25]. In addition, respondents were excluded if the mother had a medical problem that would affect her ability to feed the infant for more than a week and if they lived in a zip code to which the U.S. Postal Service stopped delivering mail as a result of the 2005 Gulf Coast hurricanes. Of the 4902 qualified pregnant women who completed the prenatal questionnaire, 1023 were disqualified from the postpartum study. The 3033 mothers that completed the neonatal questionnaire and qualified for the study represented a response rate of 76.9%. Those who qualified at the neonatal stage were sent all remaining questionnaires in the study, unless they were subsequently disqualified for medical reasons or they asked to leave the study. We conducted a comparison between our sample and a nationally representative sample of new mothers. The IFPS II mothers were significantly older, more highly educated, more likely to be white, less likely to have low income, more likely to be employed, and more likely to take longer maternity leaves. Details of study methods are available elsewhere [25]. We also eliminated 105 respondents because their due dates were more than 3 months away when they completed the prenatal questionnaire. In the first part of the analysis, we examine breastfeeding initiation, based on 1964 mothers who had complete data for the variables used. In the second part, we study breastfeeding duration, based on 1470 respondents who initiated breastfeeding and provided complete data for the multivariate analysis.

### 2.2. Data collection and variables

We primarily used demographic information and data from prenatal and neonatal surveys. We also analyzed employment variables from later questionnaires, including number of weekly work hours upon rejoining the labor market and actual leave taken after the birth, both obtained from the first questionnaire on which the mother reported she had returned to work. Length of leave after the birth was measured by a question that asked how old the baby was when the mother began working after her delivery. We used two dependent variables, breastfeeding initiation and breastfeeding duration. A mother was categorized as initiating breastfeeding if she answered “yes” to a direct question on whether she ever breastfed or tried to breastfeed her infant or if she reported on any questionnaire that her infant received breast milk, which included expressed milk. Duration was the infant's age in weeks when the mother completely stopped breastfeeding, which was determined from a direct question asking how old the infant was when the mother completely stopped breastfeeding and pumping milk. If the mother was breastfeeding on the last questionnaire she returned (which may not have been the month 12 questionnaire because of sample attrition), breastfeeding duration was set to the infant age on the last questionnaire returned and was flagged as censored.

For both the initiation and the duration analyses, we used four paid work status categories: none, <20 h, 20–34 h, and  $\geq 35$  h/week. The question about maternity leave,

appearing on the prenatal questionnaire, asked the mother how many weeks of leave she had that could be used for maternity leave if she had no complications. She was asked for the number of weeks of leave in three categories: fully paid, partially paid, and unpaid. For this analysis, we used five categories for total available maternity leave (summing amount of paid, partially paid and unpaid leave): no leave,  $\leq 6$  weeks, 7–12 weeks,  $>12$  weeks and not working. For both analyses, we examined maternity leave available and amount of leave taken, indicated by the age of the infant when the mother returned to work. For the initiation analysis, we measured work status by the hours per week the mother expected to work postpartum, and for the duration model, we used the hours/week when the mother first returned to work. We used seven interaction categories to combine leave taken and weekly hours of work upon return to work:  $\leq 12$  weeks and  $\geq 35$  h,  $\leq 12$  weeks and 20–34 h,  $\leq 12$  weeks and  $<20$  h,  $>12$  weeks and  $\geq 35$  h,  $>12$  weeks and 20–34 h,  $>12$  weeks and  $<20$  h, and did not return to work by the end of the study.

As covariates, we used several variables to capture parity and previous breastfeeding experience, health variables (such as baby's feeding schedule and mother's smoking habit), social support variables (such as number of friends who breastfed and if the mother attended any class that discussed breastfeeding). We also included neonatal comfort with breastfeeding around close women friends in the duration model.

### 2.3. Analysis

We estimated the effect of work status on breastfeeding initiation and duration via SAS's Logistic and LIFEREG procedures respectively (SAS Institute, Inc., Cary, NC). LIFEREG adjusts for censored breastfeeding duration values. For comparability of results, we considered all available variables that were included in similar models that analyzed the IFPS I responses on these same issues [3]. Differences in the models are mostly due to modifications made to survey questions between IFPS I and IFPS II. If two or more variables were highly correlated, we either combined the variables to form a single measure or used only the variable that had a stronger relation to the breastfeeding measures. Data were not weighted because the sample is not a probability sample.

## 3. Results

Mean values of model variables are shown in Table 1. The percentages of mothers who had any amount of leave of each type are not shown; these are 27.2% for fully paid leave, 17.9% for partially paid leave, and 54.9% for unpaid leave. We also present the descriptive statistics and regression results from IFPS I for comparison purposes [3]. In addition to using the interaction categories between leave taken and work status, we crossed the collinear variables of parity and previous breastfeeding behavior. Several variables suggested by the literature were excluded after preliminary analyses found them to be unrelated to initiation or duration after controlling for other variables in this analysis. Some of these variables might have shown no

effect because they varied little across our sample: race and father's employment status. Others varied sufficiently but still showed no effect: prenatal work status, father's education, if father was ever breastfed when he was an infant, region, type of delivery, minutes from birth to first breastfeeding, and mother's chronic health problems. Although available maternity leave, number of nights in the hospital and number of friends who breastfed were not significant in either model, they were retained in the analysis for comparability with IFPS I results. Participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) was found to be strongly correlated with household income, age and marital status and was not used in either model to avoid collinearity.

### 3.1. Breastfeeding Initiation

In our subsample of 1964 mothers, 86.5% initiated breastfeeding. This is an increase of 10.5% points from the IFPS I sample. The breastfeeding initiation model is presented in Table 1. The effect of expected work status is shown by the odds ratios for initiating breastfeeding in each work status category, adjusted for the other variables in the full model.

Only expecting to work full-time (35 h/week or more) was significantly associated with decreased odds of initiation. Adjusted initiation rates provide a practical interpretation of the effects of expected work status. These were 81.9% for full-time work, 83.1% for 20–34 h/week, 88.8% for 1–19 h/week and 87.5% for non-working mothers.<sup>1</sup> The adjusted initiation rate for the full-time work category was significantly lower than for non-working mothers ( $P < 0.05$ ) and marginally lower than for mothers working 1–19 h/week ( $P = 0.08$ )<sup>2</sup>; no other pair-wise comparisons of adjusted initiation rates between expected work status categories revealed statistically significant differences.

Available maternity leave did not affect initiation in the unadjusted or adjusted analysis. In IFPS I, mothers with  $>6$  weeks of available maternity leave were significantly more likely to initiate breastfeeding compared with non-working mothers. We also did not find the amount of leave actually taken to be significant in explaining initiation. Our analysis confirmed most relations reported in the literature between the covariates and breastfeeding initiation. Positively related were the mother having been breastfed as infant and attending a class that discussed breastfeeding, while number of cigarettes smoked daily during pregnancy was negatively related. In contrast to other studies, mother's age, education level, marital status, number of friends who breastfed, number of nights she spent in the hospital and whether a physician was present at birth did not show significant association with initiation. Household income was marginally and positively related to initiation, a result different from IFPS I.

<sup>1</sup> The adjusted initiation rates are not shown in Table 1.

<sup>2</sup> We consider an independent variable to be significantly associated to a dependent variable if the  $P$ -value for the corresponding coefficient is  $<0.05$ . We state that the relation is marginally significant if the  $P$ -value is  $>0.05$  but  $<0.10$ , and insignificant if the  $P > 0.10$ .

**Table 1**Mean values of variables, Adjusted Odds Ratios (ORs) or elasticity for breast-feeding initiation, and adjusted coefficients for breast-feeding duration<sup>a,b</sup>.

Variable	Sample mean or %		Initiation model Adjusted OR or elasticity <sup>c</sup>		Duration model coefficient	
	IFPS II	IFPS I	IFPS II	IFPS I	IFPS II	IFPS I
Initiation of breastfeeding, %	86.5	76.0				
No. of weeks of breastfeeding, mean	31.6	24.1				
Prenatal expectation of postpartum work status, %						
Expect to work $\geq 35$ h	29	36	0.68**	0.47***	–	–
Expect to work 20–34 h	22	16	0.89	0.83	–	–
Expect to work 1–19 h	11	10	1.18	0.89	–	–
Expect not to work	37	38	–	–	–	–
Maternity leave available (prenatal), %						
No leave	11	22	1.47	1.10	–0.38	0.70
$\leq 6$ week	13	20	0.76	1.27	0.76	–4.95**
$>6$ but $\leq 12$ week	20	29	0.90	1.74*	1.73	–4.16**
$>12$ week <sup>d</sup>	7	NC	1.21	NC	3.58	NC
Not working	49	29	–	–	–	–
Amount of leave taken after delivery (including those not working), %						
$\leq 12$ week	40	NR	0.95	NR	–	–
$>12$ week	60	NR	–	NR	–	–
Amount of leave taken after delivery $\times$ work status, %						
$\leq 12$ week, $\geq 35$ h	19	NR	–	–	–13.85***	NR
$\leq 12$ week, 20–34 h	9	NR	–	–	–9.93***	NR
$\leq 12$ week, 1–19 h	12	NR	–	–	–3.85*	NR
$>12$ week, $\geq 35$ h	5	NR	–	–	–13.21***	NR
$>12$ week, 20–34 h	4	NR	–	–	–5.71	NR
$>12$ week, 1–19 h	7	NR	–	–	–4.31	NR
Not working	44	NR	–	–	–	–
Demographics						
Mother's education, %						
$\leq$ High school	21	32	0.83	–	–11.90***	–
Some college	40	36	1.12	1.45**	–9.30***	5.87***
College or higher	39	32	–	2.60***	–	8.71***
Mother's age, y (continuous)	28	29	–0.03	0.32***	0.42***	0.93***
Household income, US\$ 1000 (continuous)	44	40	0.03*	–0.04*	–0.24	–0.03
Married, %	79	NR	0.86	NR	4.97***	NR
Parity $\times$ previous breastfeeding experience, %						
No children	32	36	–	–	–	–
1 child, no previous breastfeeding	8	11	0.20***	0.13***	–6.91	–4.00
$\geq 2$ children, no previous breastfeeding	5	5	0.17***	0.05***	–0.16	–5.98
1 child, previous breastfeeding	31	27	4.16***	0.98	5.26***	1.48
$\geq 2$ children, previous breastfeeding	24	21	3.82***	0.64	8.10***	5.99***
Medical and health variables						
# nights in hospital (continuous)	3	3	–0.03	–0.19***	–0.87	–3.00***
Physician as birth attendant, %	89	95	0.81	0.44*	–7.23***	–3.77
# cigarettes/day during pregnancy (continuous)	1.1	0.2	–0.07***	–0.01***	–0.64***	–3.63***
Feeding, %						
Baby fed on schedule	8	7	–	–	–	–
Baby fed on demand	52	63	–	–	6.10**	2.60***
Baby fed sometimes on demand, sometimes on schedule	40	30	–	–	1.27	3.43
Social support for breastfeeding						
No. of friends who breastfed (continuous)	3	2	–0.04	0.05**	0.16	1.73***
Mother was breastfed, %	49	29	1.75***	2.01***	4.48***	2.23*
Did not attend any class which discussed breastfeeding, %	60	NR	0.66***	NR	–4.96***	NR
Comfortable nursing around close women friends (neonatal), %						
Comfortable	72	NC	–	–	11.12***	NC
Uncomfortable	28	NC	–	–	–	NC

Table 1 (Continued)

Variable	Sample mean or %		Initiation model Adjusted OR or elasticity <sup>c</sup>		Duration model coefficient	
	IFPS II	IFPS I	IFPS II	IFPS I	IFPS II	IFPS I
No. of observations			1964	1488	1470	1105
% Correct predictions			91.5	87.4	–	–
Model fit $\chi^2$ <sup>e</sup>			6.6	NR	177.2 <sup>***</sup>	281 <sup>***</sup>
Pseudo- $R^2$			0.22	NR	–	–

<sup>a</sup> NC means the model reported for IFPS I in [3] is not comparable to the model for IFPS II for this data category.

<sup>b</sup> NR means this data category was not reported in the IFPS I model in [3].

<sup>c</sup> Adjusted OR is the adjusted odds ratio. Elasticity is the percentage change in the probability of breast-feeding due to a 1% increase in the continuous explanatory variable when all explanatory variables are evaluated at mean values (e.g., a 1% increase in the number of cigarettes smoked per day decreased the probability of initiation by 0.07%). Unlike the adjusted odds ratio, negative relationships are indicated by negative values.

<sup>d</sup> In the IFPS I, data for maternity leave available (prenatal) was collapsed across the last two categories into a single '>6 weeks' category.

<sup>e</sup> For the initiation model we used the Hosmer and Lemeshow goodness-of-fit criterion. It tests the null hypothesis that there is no difference between the observed and predicted values of the response variable. Thus, the model fits the data well when the null hypothesis cannot be rejected. For the duration model we used the Likelihood ratio test to check model fit. The null hypothesis is that all explanatory variables equal zero; larger test statistics imply better statistical fit by the model.

\*  $p < 0.1$ .

\*\*  $p < 0.05$ .

\*\*\*  $p < 0.01$ .

Higher parity negatively affected initiation, but past breastfeeding had a positive and stronger effect, as shown by the odds ratios for the interaction categories between parity and previous breastfeeding. Mothers with other children who had not previously breastfed were much less likely than new mothers to initiate breastfeeding, while mothers with other children who had previously breastfed were much more likely to initiate.

### 3.2. Breastfeeding duration

The average censored duration of breastfeeding among the 1470 mothers in the duration model was 31.6 weeks, 7.5 weeks longer than that observed in IFPS I. Results for leave taken by work status show that among mothers who returned to work in the first 12 weeks postpartum, working  $\geq 20$  h/week had a strong negative effect on duration relative to not working, but working less than 20 h/week had only a marginal negative effect (Table 1). Among mothers who returned to work after 12 weeks, working full-time decreased duration but working any type of part-time schedule did not. The adjusted conditional mean duration among nonworking mothers was 43.2 weeks.<sup>3</sup> Compared with nonworking mothers, the conditional mean duration for mothers who returned to work within the first 12 weeks was 40.0 weeks for those working 1–19 h/week ( $P > 0.05$ ), 32.0 weeks for those working 20–34 h/week ( $P < 0.05$ ) and 28.3 weeks for those working 35 h/week or more ( $P < 0.05$ ). Among mothers who returned to work after 12 weeks, the adjusted conditional mean duration among the mothers who worked full-time was significantly less than non-working mothers (24.8 weeks,  $P < 0.05$ ) while not significantly different among part-time (less than 35 h/week) workers compared with non-working mothers (35.6 weeks,  $P > 0.05$ ). In addition, for mothers who returned to work before 12 weeks, full-time work was associated with shorter duration than part-time work ( $< 35$  h/week) (28.3 weeks vs. 36 weeks,  $P < 0.05$ ). Sim-

ilarly, for those who returned to work after 12 weeks, part-time workers spent an average 40.9 weeks breast-feeding compared with a significantly shorter duration of 32.7 weeks among full-time workers ( $P < 0.05$ ). In IFPS I, the adjusted mean duration was 16.5 weeks for full-time working mothers. In the unadjusted analysis, having  $< 6$  weeks of leave was significantly ( $P < 0.05$ ) and negatively associated with duration and having no leave was marginally ( $P = 0.06$ ) and positively associated with breastfeeding duration, but the other leave categories were not. After adjusting for covariates, available maternity leave was not significantly associated with duration in the IFPS II sample, in contrast to IFPS I results, perhaps because the duration model for IFPS I did not include actual leave taken.

Mother's age, education level, marital status, and whether a physician was present at birth were significant in the duration model in the direction consistent with the literature, while household income ceased to be significant. As in the initiation model, not attending a breastfeeding class and number of cigarettes smoked per day were associated with shorter duration. A comparison of breastfeeding duration among parity and previous breastfeeding categories showed that mothers who had not previously breastfed had significantly shorter durations than those who had breastfed before. In addition, mothers who breastfed on demand had longer duration than those who breastfed on schedule. Finally, mothers who reported being comfortable nursing around close women friends breastfed longer than those who reported not being comfortable in the neonatal survey. This variable was not included in the initiation model because it is missing for all those who had reported not intending to breastfeed in the prenatal survey.

## 4. Discussion

In this sample, 86.5% of mothers initiated breastfeeding, which is higher than the 2006 estimate of 73.9% from the CDC for U.S. mothers based on a nationally representative sample. The increase of 10.5% points in breastfeeding

<sup>3</sup> The adjusted conditional mean durations are not shown in Table 1.

initiation from the IFPS I, conducted in 1992–1993, is consistent with an increase in initiation rates of 5.6% points reported by CDC since they began collecting breastfeeding statistics in 1999 and an increase in initiation rates of 10.1% points reported by Ross Labs between 1993 and 2003 [25,26]. Thus, although our sample (obtained from a national consumer panel, as was IFPS I) was more likely to breastfeed than a nationally representative sample, the trend in breastfeeding rates is consistent with national trends.

Full-time employment decreased both breastfeeding initiation and duration relative to not working. Part-time employment expectations of less than 20 h/week marginally increased initiation relative to full-time work expectations, while any level of part-time employment upon return to work (<35 h/week) increased breastfeeding duration relative to full-time employment, whether the mother returned to work before or after 12 weeks. Although generalizations must be limited to the population covered by our sample, our extensive range of control variables that include measures from virtually every domain known to affect breastfeeding reduces the amount of unobserved and uncontrolled heterogeneity, thereby minimizing the possibility that relations were caused by correlated characteristics of mothers who made certain decisions. In addition, frequent, longitudinal collection of time-sensitive measures minimized the potential for recall bias. Our sample included only mothers of healthy singleton infants; the effect of full-time employment on mothers of multiple infants or sick infants is likely to be much greater. Our sample also included women who are more advantaged on average, and the effect of full-time employment on breastfeeding behaviors for mothers with less education and income would almost certainly be greater.

Our results are consistent with the literature on the effect of employment on breastfeeding initiation, which shows that part-time employment does not decrease breastfeeding initiation while full-time work does [2,3,12]. A comparison of reduction of initiation for full-time working mothers between IFPS I and IFPS II shows that the effect of full-time work may have declined. In IFPS I, mothers who expected to work full-time had an adjusted initiation rate 14.3% points lower than that of mothers who did not expect to work, but the gap shrank to 5.6% points in IFPS II.

The IFPS II results disagree with the literature about whether part-time work has a negative effect on duration relative to not working, but they agree with the literature concerning the effect of part-time versus full-time employment on duration. Lindberg showed a significant decrease in duration for part-time employed mothers relative to those not working, while results from IFPS I, which collected data of similar vintage as Lindberg, showed no significant difference [3,23]. Berger et al. found that compared with full-time work, part-time work for mothers who return to work prior to 12 weeks was associated with longer breastfeeding durations for women in the National Longitudinal Study-Youth who gave birth between 1988 and 1996 [10]. Ryan et al. found that part-time work versus full-time work at 6 months post-partum was associated

with higher breastfeeding rates for a sample of more than 200,000 women in 2003 [2]. By interacting work status and leave duration in our analysis, we were better able to study the role of part-time employment. We found that if mothers returned to work before 12 weeks, even working 20–34 h/week had a detrimental effect on duration compared with not working. If mothers returned after 12 weeks, part-time work did not affect duration relative to not working. More interestingly, part-time work regardless of amount of leave taken was associated with longer duration than full-time work.

Part-time work is not seen as an option by many working mothers and may be impossible in some jobs. But because this and other research consistently shows that part-time work facilitates breastfeeding initiation and increases duration relative to full-time work, part-time work early in the infant's life should be discussed as one option to support employed breastfeeding mothers. Also, mothers might be encouraged to try to arrange for reduced hours, especially if they return to work before 12 weeks postpartum. Because we found that duration was most decreased if the mother returned full-time before 12 weeks, it is likely that even a short period of reduced work hours will benefit breastfeeding for mothers who return to work before 12 weeks.

The change between IFPS I and IFPS II in the impact of working full-time on initiation and duration may indicate that the greater availability of effective portable breast pumps, changes in breastfeeding laws, and greater support for breastfeeding by some employers have reduced the breastfeeding barriers in some workplaces. Currently most U.S. employers do not have formal breastfeeding support programs [27–29], but evaluations of such programs suggest that, with formal breastfeeding support, employed mothers can have similar initiation and duration rates as not working mothers [30–32]. Previous analysis of the IFPS II data indicates that 84% of breastfeeding mothers continued breastfeeding after returning to work, most often by pumping milk at work [33].

We also found that available maternity leave did not affect initiation or duration of breastfeeding when actual amount of leave taken was controlled, a result consistent with another recent study [34]. This is distinct from IFPS I initiation results, where >6 weeks of available maternity leave (paid, partially paid plus unpaid) was significantly associated with higher initiation. It is also distinct from IFPS I duration results where working mothers with available leave had significantly shorter duration than nonworking mothers and working mothers with no available leave had a similar level of duration as nonworking mothers. This complex result could be because mothers with no leave available are less likely to return to work during the first postpartum year [35], or these mothers may take a relatively long leave after birth and then return to work with a different employer. However, a data limitation of both IFPS I and IFPS II is that we do not know whether mothers return to the same employer after delivery. Given this finding in IFPS II on the lack of effect of available leave, it is likely that paid maternity leave could benefit breastfeeding initiation and duration by enabling more mothers to take available leave.

Currently, the Family and Medical Leave Act (FMLA), which offers 12 weeks of unpaid leave, is the only guaranteed nationally available leave that can be used for maternity leave, but the restrictions on covered workers are so significant that only an estimated 56% of women with children younger than 18 months old are covered [36]. Lower wage, seasonal, and part-time workers are less likely to qualify for FMLA benefits.

After controlling for employment, medical, social, attitudinal and demographic variables, household income had a positive effect on initiation but no effect on duration. In IFPS I, household income was not a determinant of duration either, but it was negatively related to initiation. It is important to consider the interaction between parity and previous breastfeeding experience instead of separately examining the effect of each on initiation and duration. How previous children affect breastfeeding depends greatly on whether the mother breastfed them. If she breastfed previous children, having additional children increased breastfeeding rates, but if not, she was unlikely to breastfeed the infant in this study. This finding emphasizes the importance of educating and supporting first-time mothers in infant feeding decisions, and it points to the increased support needed by mothers with other children who wish to breastfeed for the first time.

## 5. Conclusions

The overwhelming health benefits of breastfeeding, including long-term effects, are well-known [37]. While it is a national goal of the U.S. Department of Health and Human Services to increase the proportion of mothers who breastfeed their babies in the early postpartum period to 75% by the year 2010, more U.S. mothers of infants are participating in the workforce and facing difficulties in combining paid work with breastfeeding [18]. Not surprisingly, the U.S. still remains below the Healthy People 2010 goal of 50% of women breastfeeding at 6 months and 25% of women breastfeeding at 1 year, with 43% and 21% doing so currently [38]. In this study, we find that full-time employment status is negatively correlated with breastfeeding initiation and duration, suggesting that full-time employment remains a significant barrier to breastfeeding. On the other hand we find part-time work to have weaker or no significant correlations with these breastfeeding measures, suggesting that part-time work has much less impact, particularly if the mother does not return to work until after 12 weeks postpartum. We conclude that workplace support for breastfeeding will be more effective if it includes adequate leave for all mothers, enables them to take the leave for which they are eligible, and includes viable options for part-time work when the mother first returns to work. The International Labor Organization (ILO) recommends that countries provide 18 weeks of paid leave for new mothers and that this leave be paid for by a wider base than only employers [39]. ILO also recommends that the paid leave cover the full wage or the earnings used for the purpose of computing benefits. In practice, the few states in the U.S. that provide paid leave cover a percentage of the wage and generally have an upper limit on the amount that

can be paid. An upper limit is less likely to disadvantage lower wage workers than is partial wage replacement, but even partial wage replacement will enable more mothers to take leave. An essential feature for maternity leave is that it cover all employed new mothers without restriction on size of the company, hours per week worked, or long length of work history with the employer.

## References

- [1] Johnston ML, Esposito N. Barriers and facilitators for breastfeeding among working women in the United States. *Journal of Obstetrics, Gynecologic, and Neonatal Nursing* 2007;36(1):9–20.
- [2] Schwartz K, D'Arcy HJS, Gillespie B, Bobo J, Longeway M, Foxman B. Factors associated with weaning in the first 3 months postpartum. *The Journal of Family Practice* 2002;51(5):439–44.
- [3] Fein SB, Roe B. The effect of work status on initiation and duration of breast-feeding. *American Journal of Public Health* 1998;88(7):1042–6.
- [4] Kimbro RT. On-the-job moms: work and breastfeeding initiation and duration for a sample of low-income women. *Maternal and Child Health Journal* 2006;10(1):19–26.
- [5] Lewallen LP, Dick MJ, Flowers J, Powell W, Zickefoose KT, Wall YG, et al. Breastfeeding support and early cessation. *Journal of Obstetrics, Gynecologic, and Neonatal Nursing* 2006;35(2):166–72.
- [6] Taveras EM, Capra AM, Braveman PA, Jensvold NG, Escobar GJ, Lieu TA. Clinician support and psychosocial risk factors associated with breastfeeding discontinuation. *Pediatrics* 2003;112(1):108–15.
- [7] Hurley KM, Black MM, Papas MA, Quigg AM. Variation in breastfeeding behaviours, perceptions, and experiences by race/ethnicity among a low-income statewide sample of Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) participants in the United States. *Maternal and Child Nutrition* 2008;4(2):95–105.
- [8] Flower KB, Willoughby M, Cadigan RJ, Perrin EM, Randolph G, Family Life Project Investigative Team. Understanding breastfeeding initiation and continuation in rural communities: a combined qualitative/quantitative approach. *Maternal and Child Health Journal* 2008;12(3):402–14.
- [9] Thulier D, Mercer J. Variables associated with breastfeeding duration. *Journal of Obstetrics, Gynecologic, and Neonatal Nursing* 2009;38(3):259–68.
- [10] Berger LM, Hill J, Waldfogel J. Maternity leave, early maternal employment and child health and development in the US. *The Economic Journal* 2005;115(501):F29–47.
- [11] Arora S, McJunkin C, Wehrer J, Kuhn P. Major factors influencing breastfeeding rates: mother's perception of father's attitude and milk supply. *Pediatrics* 2000;106(5).
- [12] Ryan AS, Zhou WJ, Arensberg MB. The effect of employment status on breastfeeding in the United States. *Womens Health Issues* 2006;16(5):243–51.
- [13] Dye J. Fertility of American women: June 2004. In: *Current population reports*. Washington, DC: US Census Bureau; 2005.
- [14] Johnson T. Maternity leave and employment patterns of first time mothers: 1961–2003. *Current Population Reports* 2008:1–19. P70–113.
- [15] Gartner LM, Black LS. Breastfeeding and the use of human milk. *Pediatrics* 1997;100(6):1035–9.
- [16] Gartner LM, Morton J, Lawrence RA, Naylor AJ, O'Hare D, Schanler RJ, et al. Breastfeeding and the use of human milk. *Pediatrics* 2005;115(2):496–506.
- [17] Services UDoHaH. *Healthy people 2010: conference ed., vols. I and II*. Washington, DC: U.S. Department of Health and Human Services, Public Health Service, Office of the Assistant Secretary for Health; 2000.
- [18] Services UDoHaH. *HHS blueprint for action on breastfeeding*. Washington, DC: U.S. Department of Health and Human Services, Office of Women's Health; 2000.
- [19] Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, Trikalinos T, Lau J. Breastfeeding and Maternal and Infant Health Outcomes in Developed Countries. Evidence Report/Technology Assessment No. 153. AHRQ Publication No. 07-E007. Rockville, MD: Agency for Healthcare Research and Quality. April, 2007.
- [20] Centers for Disease Control and Prevention. National Immunization Survey, Breastfeeding among U.S. children born between 1999 and 2006. [http://www.cdc.gov/breastfeeding/data/NIS\\_data/index.htm](http://www.cdc.gov/breastfeeding/data/NIS_data/index.htm).

- [21] Ross Products Division. Updated breast-feeding trend: 1987–1995. Available from: Ross Laboratories, 625 Cleveland Avenue, Columbus, OH 43215.
- [22] Littman H, Medendorp SV, Goldfarb J. The decision to breastfeed: the importance of fathers' approval. *Clinical Pediatrics* 1994;33:214–9.
- [23] Hawthorne K. Intention and reality in infant feeding. *Modern Midwife* 1994;4:25–8.
- [24] Lindberg LD. Trends in the relationship between breastfeeding and postpartum employment in the United States. *Social Biology* 1996;43:191–202.
- [25] Fein SB, Labiner-Wolfe J, Shealy KR, et al. Infant Feeding Practices Study II: study methods. *Pediatrics* 2008;122(S2):S28–35.
- [26] Ross Products Division. Breastfeeding trends—2003. Available from: Ross Laboratories, 625 Cleveland Avenue, Columbus, OH 43215.
- [27] Bridges CB, Frank DI, Curtin J. Employer attitudes toward breastfeeding in the workplace. *Journal of Human Lactation* 1997;13(3):215–9.
- [28] Brown CA, Poag S, Kasprzycki C. Exploring large employers' and small employers' knowledge, attitudes, and practices on breastfeeding support in the workplace. *Journal of Human Lactation* 2001;17(1):39–46.
- [29] Dunn BF, Zavala KJ, Cline AD, Cost PA. Breastfeeding practices in Colorado businesses. *Journal of Human Lactation* 2004;20(2):170–7.
- [30] Whaley SE, Meehan K, Lange L, Slusser W, Jenks E. Predictors of breastfeeding duration for employees of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). *Journal of American Dietetic Association* 2002;102(9):1290–3.
- [31] Cohen R, Mrtek MB. The impact of two corporate lactation programs on the incidence and duration of breastfeeding by employed mothers. *American Journal of Health Promotion* 1994;8(6):436–41.
- [32] Ortiz J, McGilligan K, Kelly P. Duration of breast milk expression among working mothers enrolled in an employer-sponsored lactation program. *Pediatric Nursing* 2004;30(2):111–9.
- [33] Fein SB, Mandal B, Roe BE. Success of strategies for combining employment and breastfeeding. *Pediatrics* 2008;122(S2):S56–62.
- [34] Guendelman S, Kosa JL, Pearl M, Graham S, Goodman J, Kharrazi M. Juggling work and breastfeeding: effects of maternity leave and occupational characteristics. *Pediatrics* 2009;123:e38–46.
- [35] Roe BE, Whittington LA, Fein SB, Teisl MF. Is there competition between breastfeeding and maternal employment? *Demography* 1999;36:157–71.
- [36] Waldfogel J. Family and medical leave: evidence from the 2000 surveys. *Monthly Labor Review* 2001;124(9):17–23.
- [37] Wright AL, Bauer M, Naylor A, Sutcliffe E, Clark L. Increasing breastfeeding rates to reduce illness at the community level. *Pediatrics* 1998;101:837–44.
- [38] Centers for Disease Control and Prevention, Department of Health and Human Services, Breastfeeding report card—United States, 2008. <http://www.cdc.gov/breastfeeding/pdf/2008%20Breastfeeding%20Report%20Card.pdf>.
- [39] International Labor Organization. R191 maternity protection recommendation, 2000. Available at [www.ilo.org/ilolex/cgi-lex/convde.pl?R191](http://www.ilo.org/ilolex/cgi-lex/convde.pl?R191). Accessed on 9/28/09.