Do state-level breastfeeding policies promote breastfeeding?

Introduction

While the benefits of breastfeeding are well-known[1] and there have been increases in breastfeeding over the past few decades,[2] currently white and Hispanic mothers have higher levels than black mothers and mothers from more disadvantaged circumstances are less likely to start and continue breastfeeding.[3] Among the known barriers to breastfeeding, returning to work and embarrassment about breastfeeding, particularly in public, remain challenges for many women.[1]

Despite the recent passage of the Patient Protection and Affordable Care Act,[4] the first federal legislation to support breastfeeding, and an increase in state-level breastfeeding policies,[5] there is little known about whether and/or what type of policies increase breastfeeding and a formal evaluation has not been conducted.[5-7] Our aim was to examine the impact of state-level breastfeeding policies on breastfeeding initiation and duration as well as disparities in these infant feeding practices.

Methods

The Pregnancy Risk Assessment Monitoring System (PRAMS) is a state-level surveillance system designed to monitor maternal health behaviors and outcomes. Mothers are selected randomly, approximately 4 months postpartum. States receive questionnaires from 1,300-3,400 mothers per year, which are linked with an infants' birth certificate. In the analyses we included 326,263 mothers from 31 states (including NYC) that participated in PRAMS from 2000-2008 with 2 or more years of data.

Breastfeeding initiation and duration

Mothers reported whether they ever breastfed or pumped breast milk and fed it to their baby after delivery (breastfeeding initiation). Mothers were then asked the number of weeks or months they did so. We defined breastfeeding duration as continuing for at least 4 weeks.

Breastfeeding laws

In previous work, we coded the following laws for each state (yes/no): 1) employers are encouraged or required to provide break time and private space for breastfeeding employees, 2) breastfeeding is permitted in any public or private location.[5] Women's breastfeeding intention during pregnancy is strongly associated with infant feeding practices.[8] For each mother we coded whether there was a law in that state six months prior to birth.

Socio-demographic characteristics

On the birth certificate each mother reported her race/ethnicity, years of education, age, marital status, number of previous live births, WIC status during pregnancy, and number of babies born.

Statistical analyses

We estimated differences-in-differences models, a quasi-experimental causal inference technique, to examine the impact of changes in breastfeeding laws on changes in breastfeeding initiation and, separately, breastfeeding for at least 4 weeks. This type of model compares breastfeeding within a state before and after a policy change as well as across states during the same time period. The ordinary least squares regression models included the analysis weights and year and state-level fixed effect. The cluster option was used to obtain robust standard errors. Models were adjusted for all socio-demographic characteristics listed. In addition to examining the overall effect of each policy on all mothers, we estimated interactions between each policy and maternal race/ethnicity, education, and age.

Results

Between 2000 and 2008 breastfeeding increased; 69% of mothers reported giving their infant any breast milk in 2000 compared to 78% in 2008. Similarly, breastfeeding for at least 4 weeks increased from 56% to 65%. Between 2000 and 2008, 7 of the 32 states in the PRAMS data had laws come into effect which encouraged or required employers to provide break time and private space for breastfeeding employees and 11 states had laws come into effect that permitted breastfeeding in any public or private location.

We found that breastfeeding initiation was 1.7 percentage points higher in states with laws for workplace provisions after such laws were in place ($p=0.01$) (Model 1, Table 1). There was a significant interaction between laws for workplace provisions and maternal race/ethnicity (Model 2). The estimated interaction term indicates that the increase in breastfeeding initiation associated with these laws was driven by an increase in breastfeeding among Hispanic mothers. Hispanic mothers had a 5.8 percentage point increase in breastfeeding initiation in states with new laws for workplace provisions. There were no significant interactions between the policy and maternal education or age.

While on average there was no overall association of laws for breastfeeding in any location with breastfeeding initiation (Model 1, Table 2), we observed interactions with maternal race/ethnicity (Model 2) and, separately, education (Model 3). States with new laws permitting breastfeeding in any location saw an increase in breastfeeding initiation by 5.6 percentage points for Black mothers. There was also evidence for an interaction effect between laws for breastfeeding in any location with maternal education (Model 3). While breastfeeding initiation increased on average after the implementation of policies for

mothers with 0-11 years of education, the effect of the policy diminished for mothers in the two highest educational groups. For mothers with 13-15 years or 16+ years of education, rates of breastfeeding initiation decreased slightly relative to other groups and underlying trends in breastfeeding rates for these women. There was no significant interaction between the policy and maternal age.

All models were repeated to examine the impact of state-level policy changes on breastfeeding for at least 4 weeks. The patterns of the results were similar for both policies examined; however, the strength of the associations was attenuated slightly (data not shown).

Discussion

We found that state-level laws appear to increase breastfeeding and may help reduce disparities. State-level laws for workplace provisions increased breastfeeding overall and location-based policies increased breastfeeding initiation and duration among Black mothers. To our knowledge, this evaluation provides the first longitudinal evidence that state-level laws may promote breastfeeding.

While the PRAMS dataset does not include all states, it provides detailed information on infant feeding practices among a representative sample of mothers during a time of active policy change. The differences-in-differences approach we undertook allowed us to test laws through a natural experiment when randomized controlled trials are difficult to conduct. There are few population-level interventions to increase breastfeeding.[1] Our results suggest that enacting state-level laws should be considered as a strategy to help promote breastfeeding, reduce disparities, and achieve public health goals.

References

1) USDHHS. *The Surgeon General's Call to Action to Support Breastfeeding.* Washington, DC: USDHHS, 2011. 2) Grummer-Strawn LM, Shealy KR. Progress in protecting, promoting, and supporting breastfeeding: 1984-2009. *Breastfeed Med* 2009;4 Suppl 1:S31-9. 3) Racial and ethnic differences in breastfeeding initiation and duration, by state-National Immunization Survey, United States, 2004-2008. MMWR;59(11):327-34. 4) Protection and Affordable Care Act, 2010. Public Law No. 111-148, Section 4207. 5) Nguyen TT, Hawkins SS. Current state of US breastfeeding policies *Maternal and Child Nutrition* 2012 epub. 6) Kogan MD *et al*. Multivariate analysis of state variation in breastfeeding rates in the United States. *Am J Pub Health* 2008;98(10): 1872-80. 7) Murtagh L, Moulton AD. Working mothers, breastfeeding, and the law. *Am J Pub Health*; 101(2):217-23. 8) Donath SM, Amir LH. Relationship between prenatal infant feeding intention and initiation and duration of breastfeeding: a cohort study. *Acta Paediatr* 2003;92(3):352-6.

Table 1. Differences-in-differences models of state-level breastfeeding laws for workplace provisions[a] on breastfeeding initiation

	Model 1[b]	Model 2[b]	Model 3[b]	Model 4[b]
	Coefficient (95% CI)	**Coefficient (95% CI)**	**Coefficient (95% CI)**	**Coefficient (95% CI)**
Employment policy	0.017 (0.00, 0.03)**	0.010 (-0.01, 0.03)	0.020 (-0.00, 0.04)	-0.002 (-0.03, 0.03)
Race/ethnicity				
White	baseline	baseline	baseline	baseline
Hispanic	0.188 (0.15, 0.23)**	0.179 (0.13, 0.22)**	0.188 (0.15, 0.23)**	0.188 (0.15, 0.23)**
Black	-0.049 (-0.08, -0.01)**	-0.045 (-0.09, -0.00)*	-0.049 (-0.08, -0.01)**	-0.049 (-0.08, -0.01)**
Other	0.049 (0.01, 0.09)**	0.049 (0.01, 0.09)*	0.049 (0.01, 0.09)**	0.049 (0.01, 0.09)**
Education				
0-11 years	baseline	baseline	baseline	baseline
12 years	0.041 (0.03, 0.05)**	0.041 (0.03, 0.05)**	0.041 (0.03, 0.05)**	0.041 (0.03, 0.05)**
13-15 years	0.135 (0.11, 0.16)**	0.135 (0.12, 0.16)**	0.135 (0.11, 0.16)**	0.135 (0.11, 0.16)**
16+ years	0.203 (0.18, 0.23)**	0.204 (0.18, 0.23)**	0.204 (0.17, 0.24)**	0.203 (0.18, 0.23)**
Age				
<17-19 years	baseline	baseline	baseline	baseline
20-24 years	0.029 (0.02, 0.04)**	0.029 (0.02, 0.04)**	0.029 (0.02, 0.04)**	0.027 (0.01, 0.04)**
25-29 years	0.033 (0.02, 0.05)**	0.032 (0.02, 0.05)**	0.033 (0.02, 0.05)**	0.030 (0.01, 0.05)**
30-34 years	0.033 (0.02, 0.05)**	0.032 (0.02, 0.05)**	0.033 (0.02, 0.05)**	0.029 (0.01, 0.04)**
35+ years	0.034 (0.01, 0.05)**	0.033 (0.01, 0.05)**	0.034 (0.01, 0.05)**	0.029 (0.01, 0.05)**
Policy*Race/ethnicity				
White		baseline		
Hispanic		0.048 (0.01, 0.09)**		
Black		-0.019 (-0.07, 0.03)		
Other		0.001 (-0.06, 0.06)		
Policy*Education				
0-11 years			baseline	
12 years			-0.002 (-0.03, 0.02)	
13-15 years			-0.004 (-0.04, 0.03)	
16+ years			-0.003 (-0.04, 0.03)	
Policy*Age				
<17-19 years				baseline
20-24 years				0.017 (-0.00, 0.04)
25-29 years				0.018 (-0.01, 0.05)
30-34 years				0.023 (-0.01, 0.06)
35+ years				0.030 (-0.00, 0.06)
Year fixed effect	Yes	Yes	Yes	Yes
State fixed effect	Yes	Yes	Yes	Yes

* $p \leq 0.05$, ** $p \leq 0.01$

[a] 7/32 states had new laws for workplace provisions: CO, IL, NY, NYC, OK, OR, RI

[b] Models also adjusted for: marital status, previous births, WIC status, multiple births

Table 2. Differences-in-differences models of state-level breastfeeding laws for location policies[a] on breastfeeding initiation

	Model 1[b]	Model 2[b]	Model 3[b]	Model 4[b]
	Coefficient (95% CI)	**Coefficient (95% CI)**	**Coefficient (95% CI)**	**Coefficient (95% CI)**
Location policy	0.008 (-0.00, 0.02)	-0.004 (-0.02, 0.01)	0.038 (0.01, 0.06)**	0.019 (-0.01, 0.05)
Race/ethnicity				
White	baseline	baseline	baseline	baseline
Hispanic	0.188 (0.15, 0.23)**	0.182 (0.13, 0.23)**	0.188 (0.15, 0.23)**	0.188 (0.15, 0.23)**
Black	-0.049 (-0.08, -0.01)**	-0.084 (-0.13, -0.04)**	-0.049 (-0.08, -0.01)**	-0.049 (-0.08, -0.01)**
Other	0.049 (0.01, 0.09)**	0.053 (0.01, 0.10)*	0.049 (0.01, 0.09)**	0.049 (0.01, 0.09)**
Education				
0-11 years	baseline	baseline	baseline	baseline
12 years	0.041 (0.03, 0.05)**	0.041 (0.03, 0.05)**	0.049 (0.03, 0.06)**	0.041 (0.03, 0.05)**
13-15 years	0.134 (0.11, 0.16)**	0.134 (0.11, 0.16)**	0.157 (0.13, 0.19)**	0.134 (0.11, 0.16)**
16+ years	0.203 (0.18, 0.23)**	0.204 (0.18, 0.23)**	0.239 (0.20, 0.28)**	0.203 (0.18, 0.23)**
Age				
<17-19 years	baseline	baseline	baseline	baseline
20-24 years	0.030 (0.08, 0.04)**	0.029 (0.02, 0.04)**	0.029 (0.02, 0.04)**	0.027 (0.00, 0.05)*
25-29 years	0.033 (0.02, 0.05)**	0.033 (0.02, 0.05)**	0.032 (0.01, 0.05)**	0.042 (0.01, 0.07)**
30-34 years	0.033 (0.02, 0.05)**	0.032 (0.02, 0.05)**	0.032 (0.01, 0.05)**	0.046 (0.01, 0.08)**
35+ years	0.034 (0.01, 0.05)**	0.034 (0.01, 0.05)**	0.033 (0.01, 0.05)**	0.046 (0.01, 0.08)*
Policy*Race/ethnicity				
White		baseline		
Hispanic		0.012 (-0.04, 0.06)		
Black		0.060 (0.01, 0.11)*		
Other		-0.003 (-0.06, 0.05)		
Policy*Education				
0-11 years			baseline	
12 years			-0.014 (-0.03, 0.01)	
13-15 years			-0.039 (-0.07, -0.01)**	
16+ years			-0.060 (-0.11, -0.01)**	
Policy*Age				
<17-19 years				baseline
20-24 years				0.005 (-0.03, 0.04)
25-29 years				-0.015 (-0.06, 0.02)
30-34 years				-0.023 (-0.07, 0.02)
35+ years				-0.021 (-0.06, 0.02)
Year fixed effect	Yes	Yes	Yes	Yes
State fixed effect	Yes	Yes	Yes	Yes

* p≤0.05, ** p≤0.01

[a] 11/32 states had new laws for breastfeeding in any location: AR, CO, HI, IL, LA, MD, ME, MS, OH, OK, WY

[b] Models also adjusted for: marital status, previous births, WIC status, multiple births