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Breastfeeding and Maternal Employment: Results from Three National Nutritional Surveys in Mexico

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Abstract To evaluate the association between maternal employment and breastfeeding (both duration and status) in Mexican mothers using data from three National Health and Nutrition Surveys conducted in 1999, 2006 and 2012. We analyzed data from the 1999 National Nutrition Survey, the 2006 National Nutrition and Health Survey, and the 2012 National Nutrition and Health Survey (NNS-1999, NHNS-2006 and NHNS-2012) on 5,385 mothers aged 12–49 years, with infants under 1 year. Multivariate logistic regression models were used to analyze the association between breastfeeding and maternal employment adjusted for maternal and infant's socio-demographic covariates. Maternal formal employment was negatively associated with breastfeeding in Mexican mothers with infants under 1 year. Formally employed mothers were 20 % less likely to breastfeed compared to non-formally employed mothers and 27 % less likely to breastfeed compared to unemployed mothers. Difference in median duration of breastfeeding between formally employed and unemployed mothers was 5.7 months for NNS-1999, 4.7 months for NNHS-2006 and 6.7 months for NNHS-2012 respectively ($p < 0.05$). In NHNS-2006 and NHNS-2012, health care access was associated with longer breastfeeding duration. Maternal employment has been negatively associated with breastfeeding in Mexican mothers of <1 year infants at least for the last 15 years. For Mexicans involved in policy design, implementation or modification, these data might offer robust evidence on this negative association, and can be used confidently as basis for conceiving a more just legislation for working lactating women.

Keywords Breastfeeding · Survey · Maternal employment · Mexico

Abbreviations

ME	Maternal employment
MDB	Median duration of breastfeeding

Introduction

Scientific evidence has shown that breastfeeding has many advantages for infants and mothers [1, 2]. Exclusive and adequate duration of breastfeeding in early life protects children from infectious diseases, such as gastrointestinal infections [3], which contribute to infant morbidity and mortality in countries like Mexico [2]. In the long term, breastfeeding promotes healthy growth and development, and has a modest protective effect on obesity during childhood and adolescence [4]. For the mother, breastfeeding facilitates recovery of pre-pregnancy weight, which is of public health relevance due to the increase in prevalence of overweight and obesity among Mexican women [2, 5, 6]. Breastfeeding has also been shown to reduce the risk of breast cancer and chronic diseases [7–9]. For this reason, The World Health Organization (WHO)

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recommends that infants be exclusively breastfed and receive no other food or liquids besides breast milk until 6 months of age, when they should continue receiving breastmilk up to 2 years of age or beyond–should mother and child so desire- along with appropriate complementary foods [10].

Although the benefits of breastfeeding are well known, many mothers stop breastfeeding before their children reach 6 months, for medical, psychological, social, economic, or cultural reasons [11–13]. Psychological complications with excess weight during lactation have been documented, including embarrassment while nursing in public or with mechanical problems related to large breasts and nipples. The latter might create latching problems, which have been associated with reduced initiation and duration of breastfeeding [14]. Other reasons expressed by mothers for not breastfeeding include complications such as sore and cracked nipples, perception of not having enough breastmilk to feed their child, emotional stress, and pressure from close relative to introduce other liquids, formula and solid foods [15]. These cultural and social barriers for breastfeeding are generally worsened by a lack of counseling and support from health care providers and hospital practices [15–17].

Another factor associated with breastfeeding is women's participation in the labor force. During the last 40 years, the labor force has increased in Mexico by more than 50 % [18]. The proportion of economically active women during the 1970s was 17.6 %, this proportion increased to 31.5 and 43.5 %, in the 1990 and 2012, respectively [19]. Women who return to work frequently find it difficult to breastfeed due to unsupportive work environments [20]. To continue breastfeeding after going back to work, a mother must either be physically near her infant or be able to pump and store her breastmilk at work [20]. Women report key barriers during working hours as lack of privacy, insufficient time to express milk, working full time (>35 h/week), and inflexible work schedules [21–24].

Breastfeeding duration in Mexico has not increased measurably in 30 years, as different surveys have reported, the median duration of breastfeeding changed from 8.7 months in 1976 to 10.4 months in 2012 [25–29]. Also, Mexico has the lowest prevalence of exclusive breastfeeding (14.4 %) compared to other Latin American countries such as Chile (43.5 %), Brazil (38.6 %), Colombia (46.8 %), and Guatemala (46.6 %) [30]. The increase in exclusive breastfeeding observed in countries like Brazil (2–38.6 % from 1986 to 2006) may be attributed to implementation of strong breastfeeding mass media campaign and health support programs such as the International Code of Marketing of Breast-milk Substitutes along with policies supporting breastfeeding [31].

In Mexico breastfeeding policies are known but not enforced. There is lack of support for legislation related to maternity leave and accommodations for breastfeeding in the workplace, and therefore lacks facilities to support breastfeeding mothers [29, 30]. Although there are local studies, no national data in Mexico is available, documenting the association between maternal employment and decreased breastfeeding duration.

Breastfeeding should be viewed as a legal right to the mother and the child because of the enormous benefits this practice brings to them [1, 2] both in terms of health as well as in its massive economic significance for families and health systems [32]. Congruent with mission oriented research philosophy [33], the first task to construct public policy to improve population's' health, is to document the distribution of its problems and documentation of its determinants. Thus, documenting the potential negative effect of maternal employment on breastfeeding practices is the necessary first step in the construction of an evidence-based public policy that supports and promotes adequate breastfeeding practices for all.

The aim of this study was to evaluate the association between maternal employment (ME) and breastfeeding (both duration and status) in Mexican mothers using data from three National Health and Nutrition Surveys conducted in 1999, 2006 and 2012.

Materials and Methods

Study Design

This is a non-experimental cross-sectional study. We present cross-sectional data from the last three National Health and Nutrition surveys conducted in Mexico (NNS-1999, NHNS-2006, and NHNS-2012). The surveys gathered information from 17,944 households in 1999, 48,600 in 2006, and 50,528 in 2012 using a probabilistic, multistage, stratified random sample which provided representative data of urban and rural areas at a national level, and of four regions of Mexico (North, Center, South and Mexico City). The NHNS-2006 and 2012 were also representative at the state level. The sampling framework and methodology used for the three surveys were very similar, organized by the same research team, and have been described in detail elsewhere [34–36].

Study Subjects

For this analysis, we studied women with infants under 1 year of age from the three National Health and Nutrition Surveys (n = 5,504). Pregnant women (n = 36) and women missing information on ME were excluded

(n = 83) for a final analytic sample of 5,385. The women excluded from the analysis (2 % of eligible women) did not significantly differ from variables of interest. The final sample included urban and rural households from the four regions representing 3,937,301 Mexican women with breastfeeding and ME information from the three National Health and Nutrition surveys.

Data Collection

Similar data collection methods were used in the three surveys. Breastfeeding practices information was collected by personal interviews of mothers in their homes. This study included both breastfeeding and socio-demographic variables as described below. Prior to the surveys, interviewers were trained for 6 weeks in all areas of data collection by trained and standardized supervisors. Written informed consent from the informants was obtained for all three national surveys, after explaining the general survey objectives and methods and obtaining written informed consent. Incentives for participating in the survey were not given. Ethical approval was obtained from the Ethics Committee of the National Institute of Public Health. The Ethical Approval numbers for the NNS-1999, NHNS-2006 and NHNS-2012 were CI-66, CI-486 and CI-1,033, respectively.

Breastfeeding

A mother was classified as breastfeeding if she fed her child milk from her breast the day or night prior to the interview, regardless of whether or not she fed her child any other beverage or solid or semisolid food. Based on the status quo method as recommended by the WHO [37] information on breastfeeding was assessed using the following questions: Do you still breastfeed (the target child)? (NNS-1999 and NHNS-2006), and: Did you breastfeed (the target child) yesterday during the day or at night? (NHNS-2012). If the answer was positive to both questions, the child was considered to be breastfed.

Mean Duration of Breastfeeding (MDB)

The MDB was defined as the age in months when 50 % of infants 0–11 months received breast milk during the previous day or night, regardless of the consumption of any other beverage, solid or semi-solid food [38].

Maternal Employment (ME)

We defined ME similarly in the three surveys. A mother was considered to be employed if she reported holding a paid job or participating an economic activity for which she received monetary compensation during the week prior to the interview. The categories of ME were: (a) *formally employed*, if the mother received a fixed salary, (b) *non-formally employed*, if she participated in an economic activity without a fixed salary, and (c) *unemployed*, if the mothers reported not holding a paid job.

Other socio-demographic variables included in this study were: womeńs age (years) childs age (months), gender, indigenous household (at least one woman in the household reported speaking a native language), marital status (living or not with a partner), educational attainment, parity (number of live children), area (urban for localities >2,500 inhabitants and rural otherwise), geographic region (North, Center, South, and Mexico City), being a beneficiary of any kind of federal food aid (Program *Oportunidades*, LICONSA, *Programa Apoyo Alimentario, Desarrollo Integral de la Familia*, or any non-governmental organizations that distribute foods) and having access to health services (insured or not) [39]. A socioeconomic status (SES) index was constructed though principal component analysis using household conditions (floor, roof and wall material), number of people living in the household, basic household infrastructure (e.g., sources and disposal of water) and number of domestic appliances (e.g., radio, television, and refrigerator) validated in the three surveys. Index was selected as the first component accumulates 40.5 % of the total variability [34–36].

Statistical Analysis

Descriptive information is presented as means ± standard errors for continuous variables and proportions for categorical variables. Chi square test for proportions and Student's t test for means were used to test for differences between proportions and means among ME status and survey years. Throughout the study, statistical significance was defined as $p < 0.05$.

Association Between Breastfeeding and Maternal Employment Status

We evaluated the association between breastfeeding (yes/no) as the outcome and ME as exposure, using multivariate logistic regression model [40] using data of all three surveys. The model adjusted for covariates that may confound this association: childs age, SES index, area of residency, ethnicity, partner and access to health services. In addition, we included a dummy variable to indicate survey year to account for differences over time. We used a pooled cross-sectional technique to evaluate the association between breastfeeding and ME status [41] with data from all three surveys. With this technique we obtained a larger sample size, especially important for the group of infants whose mothers had a non-formal employment.

Table 1 Description of Maternal and Infanťs Characteristics by Maternal Employment[a] Status (Mexican Health and Nutritional Surveys: NNS-1999, NHNS-2006 and NHNS-2012)

	NNS-1999					NHNS-2006					NHNS-2012				
	n	ALL %	Formally employed %[b]	Non-formally employed %[c]	Un-employed %[d]	n	ALL %	Formally employed %[b]	Non-formally employed %[c]	Un-employed %[d]	n	ALL %	Formally employed %[b]	Non-formally employed %[c]	Un-employed %[d]
n	1,619	1,619	234	167	1,218	1,846	1,846	349	75	1,422	1,920	1,920	250	127	1,543
Maternal characteristics															
Employment %	1,619		16.48	4.71*	76.68*	1,846		18.61	4.53*	78.97*	1,920		15.60	7.81*	76.59*
Age[€] (year)	1,618	26.07 (0.18)	27.67 (0.56)	27.50 (0.88)	25.84 (0.25)	1,846	26.09 (0.22)	26.80 (0.44)	28.28 (0.88)	26.41 (0.28)	1,920	26.81 (0.19)[¥#]	27.99 (0.42)	29.06 (0.86)	26.34 (0.23)*
Educational attainment[€] (year)	1,611	7.58 (0.17)	9.76 (0.43)	9.51 (0.67)	8.05* (0.13)	1,838	8.60 (0.12)	10.59 (0.25)	9.09 (0.56)	7.74* (0.14)	1,920	9.55[¥#] (0.13)	11.81 (0.42)	9.57 (0.62)	9.09* (0.13)
Parity[€]	1,578	2.61 (0.06)	2.27 (0.11)	2.44* (0.29)	2.21* (0.06)	962	2.15 (0.06)	1.83 (0.11)	2.68 (0.32)	2.70* (0.08)	940	2.21[¥] (0.06)	1.92 (0.13)	2.40 (0.19)	2.24* (0.07)
Urban area[e] %	1,619	69.83	20.26	8.30*	71.43*	1,846	78.07	20.90	5.33*	73.77*	1,920	71.32	18.18	9.58*	72.24*
Spouse (yes, %)	1,572	89.29	13.77	9.83*	76.40*	1,845	82.95	14.10	4.78*	81.12*	1,920	84.47[¥]	13.17	7.81*	79.02*
Ethnicity[f] (yes, %)	1,591	8.99	4.96	22.77*	72.27*	1,846	5.81	6.24	3.36	90.40*	1,920	8.71[¥]	3.65	3.08	93.28*
Health services[g] (yes, %)	1,618	49.18	24.94	7.16*	67.90*	1,803	34.47	29.07	4.26*	66.67*	1,916	65.83[¥]	18.36	7.04*	74.59*
Food aid[h] (receiving, %)	1,619	25.49	11.93	13.59	74.48*	1,846	5.90	24.16	0.94*	74.90*	1,919	28.67[¥]	7.47	5.83	86.70*
SES[i] (score)															
Low tertile %	1,592	32.43	7.48	12.74*	79.78*	1,838	38.29	12.14	3.48*	84.37*	1,920	35.29	7.49	7.14	85.37*
Medium tertile %	27.98	16.09	8.64*	75.26*	34.11	18.36	5.02*	76.62*	35.35[¥]	6.10*	79.02*				
Upper tertile %		39.59	23.80	7.92*	68.28*		27.60	27.11	6.12*		66.77*	29.36[¥]	26.20	10.68*	63.12*
Infant's characteristics															
Age[€] (mo)	1,619	5.91 (0.10)	6.29 (0.25)	5.83 (0.33)	5.84 (0.12)	1,846	6.24 (0.10)	6.72 (0.26)	7.16 (0.51)	6.06 (0.11)*	1,920	5.98 (0.11)	6.35 (0.29)	6.72 (0.37)	5.82 (0.12)
Gender															
Girl %	1,619	49.70	15.87	8.51*	75.61*	1,846	47.80	17.75	4.11*	78.14*	1,920	50.81	12.78	7.76*	79.46*
Breastfeeding information															
Breastfeeding %	1,619	62.48	12.38	10.66	76.96*	1,846	64.70	15.11	3.92*	80.97*	1,920	61.23[¥]	11.62	7.13*	81.25*
Exclusive breastfeeding %	727	19.95	4.31	10.49*	85.20*	917	18.79	8.55	3.76	87.69*	994	14.46[¥]	9.36	3.52	87.12*

Table 1 continued

	NNS-1999					NHNS-2006					NHNS-2012				
	n	ALL %	Formally employed %[b]	Non-formally employed %[c]	Un-employed %[d]	n	ALL %	Formally employed %[b]	Non-formally employed %[c]	Un-employed %[d]	n	ALL %	Formally employed %[b]	Non-formally employed %[c]	Un-employed %[d]
n	1,619	1,619	234	167	1,218	1,846	1,846	349	75	1,422	1,920	1,920	250	127	1,543
Median duration of breastfeeding[α]	1,619	10.1 [6.9, >11]	4.4 [2.2, 6.4]	–	10.1 [7.1, >11]	1,846	9.9 [7.4, >11]	6.2 [2.8, 7.8]	–	10.9 [8.3, >11]	1,920	10.4 [7.1, > 11]	4.3 [2.8, 5.9]	–	11.0 [7.3, >11]

Values are means and proportions by employment status and surveys

n sample size

[a] Employment: Reports holding a job or having some economic activity from which she perceived money in exchange the week prior to the interview

[b] Formally employed: mothers reported receiving a fixed salary the week prior to the interview

[c] Non-formally employed: mothers reported not receiving a fixed salary but held an economic activity the week prior to the interview

[d] Unemployed: mothers reported not holding a paid job the week prior to the interview

[e] Urban area (pop > 2,500); Rural area (pop ≤ 2,500)

[f] Indigenous household: At least one woman 12–49 year speaks an indigenous language in the household

[g] Health services: Access to a partial or complete health insurance provided either by the government or by other services. Health access may include any of the following: IMSS; ISSSTE; PEMEX; SSA/Oportunidades, Army or Navy, or by a private insurance

[h] Food Aid: Any household individual receiving one or more of the following federal food aid programs: LICONSA, DIF, PAL or from any NGO

[i] Calculated through principal component analysis

[€] Mean (Standard Error)

[α] Median [95 % Confidence Interval]

* Statistically significant difference from formally employed mothers, $p < 0.05$

[¥] Statistically significant difference between 1999 versus 2012 surveys, $p < 0.05$

[#] Statistically significant difference between 2006 versus 2012 surveys, $p < 0.05$

We assessed the covariates' (schooling, maternal age, food aid, SES and access to health services) potential effect modification by including their cross products with ME, and used the likelihood ratio test to determine their statistical significance ($p < 0.01$). Model goodness-of-fit was evaluated by the Hosmer–Lemeshow test; model ($p > 0.26$) [40]. Finally, data were grouped into complete month intervals.

Median Breastfeeding Duration

MDB was defined as the age in months at which 50 % of children <1 year received breast milk during the previous day or night, regardless of the consumption of any other beverage, solid or semi-solid food [38]. To estimate MDB by ME status, we used a two-step process. First, we smoothed means of breastfeeding by month with moving averages of 3 adjoining months and the estimated means of breastfeeding by month with the logistic model described above. Second, we using linear interpolation to identify the age at which 50 % of children 0–11 months received breastfeeding, as suggested by WHO [42]. Finally, statistical differences between medians were calculated with nonparametric bootstrap percentile (95 % CI) [43]. All analyses were adjusted for the sampling design of the survey, using STATA SE v13 SVY module for complex samples (College Station, USA) [44].

Results

Socio-demographic Differences Across Surveys

In all three surveys, close to 16 % of the mothers reported formal employment the week prior to the interview and almost 8 out of 10 mothers were unemployed (Table 1). The lowest percent of non-formally employed mothers and the highest percent of unemployed mothers were reported in the NHNS-2006. The average educational attainment of the mothers increased across surveys, with higher educational attainment (above elementary school) in the most recent survey (NHNS-2012), compared to the NNS-1999 and NHNS-2006 ($p < 0.05$). In the first survey, half of the households were affiliated with any health service; this proportion decreased to one-third in the NHNS-2006 and increased in the last survey to more than half $p < 0.05$.

Socio-demographic Differences Across Employment Status Within Each Survey

Educational attainment was higher among formally employed compared to non-formally employed and unemployed mothers ($p < 0.05$). Almost 2 out of every 10 mothers of infants under 1 year living in urban areas were formally employed, and 7 out of 10 were unemployed with differences within employment status in each of the surveys $p < 0.05$.

The prevalence of exclusive breastfeeding in <6 m in the NNS-1999 was 19.95 %. Of these exclusively breastfeeding women, 4.31 corresponds to formal employed mothers, 10.49 % to non-formally employed and 85.20 % to unemployed mothers. The prevalence of exclusive breastfeeding in the NHNS-2006 doubled among the formally employed mothers (8.55 %) compared to the NNS-1999. The prevalence of exclusive breastfeeding in the NNHS-2012 declined to 14.46 % compared to NNS-1999 and to NHNS-2006.

Breastfeeding and Employment Status

In all surveys, mothers regardless of employment status, has a similar estimated proportion (≥75 %) of breastfeeding before 1 month of age (Fig. 1). Infants under 1 year of age of formally employed mothers, in all surveys, were less likely to be breastfed in each month compared to unemployed mothers. For example, formally employed mothers were less likely to breastfeed compared to unemployed mothers, and the difference was statistically significant at 3 months (63 vs. 70 %, NNS-1999; 72 vs. 78 %, NHNS 2006; 63 vs. 70 %, NHNS 2012) and 6 months (55 vs. 61 %, NNS-1999; 63 vs. 70 %, NHNS 2006; 55 vs. 61 %, NHNS 2012 (Fig. 1). This difference at 6 and 7 months (6 months in Fig. 1) was close to 6 % points in all surveys, with formally employed mothers always having lower proportion of breastfeeding.

Proportion of Breastfeeding with Logistic Regression Model

Multivariate results controlling for child́s age, SES index, area of residency, ethnicity, partner and access to health services confirmed that formal employment was negatively associated with breastfeeding (Table 2). Formally employed mothers had 20 % lower likelihood (OR 1.25) of breastfeeding compared to non-formally employed mothers; and 27 % lower likelihood of breastfeeding compared to unemployed mothers (OR 1.37). As the age of the children increased, the likelihood of being breastfed decreased (OR 0.83, $p < 0.001$). As SES increased, the odds of breastfeeding decreased.

The association between access to healthcare services and breastfeeding significantly differed according to survey year ($p < 0.05$). In the NNS-1999 the probability that a mother breastfed for longer periods was higher among those not having access to health services than among those who had access to health services. In contrast, having

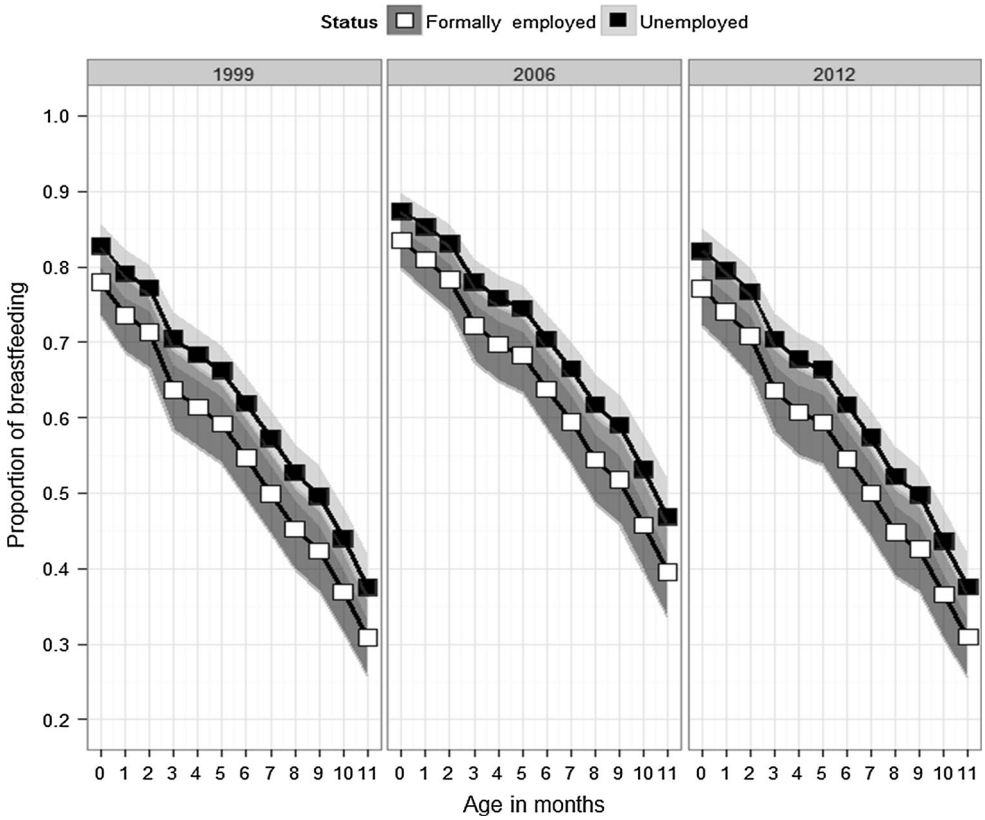

Fig. 1 Breastfeeding duration by month of age by employment status (Mexican Nutritional surveys: NNS-1999, NHNS-2006 and NHNS-2012). Proportion (*open square*, *filled square*) and 95 % CI are presented. Proportion adjusted by covariates [infanťs age (mo), ethnicity, SES (index), food aid, stratum and interaction between health services and survey]

access to health services was positively associated with breastfeeding in NHNS-2006 and NHNS-2012 (Fig. 2).

Discussion

We document a strong and negative association between maternal formal employment and median breastfeeding duration in Mexican women, using data from three nationally representative surveys (1999, 2006 and 2012). Mothers without a paid-job (stay-home mothers) and those non-formally employed (such as food vendors, house cleaning, retail sales or the like) breastfed their infants for similar durations. It was the formal employment, which generally occurs in offices with defined office hours, which had a clear strong negative association to breastfeeding duration. Median breastfeeding duration was consistently lower in formally employed mothers as compared to unemployed mothers or to those holding non-formal jobs, by 5.7 months in 1999, 4.7 months in 2006, and 6.7 months in 2012.

This negative association is consistent with previous findings in both Mexico and Latin America relative to breastfeeding practices and employment [23, 45, 46]. Prior studies in Mexico have documented that employment was negatively associated to breastfeeding. In 2003, Navarro and colleagues reported that 42.3 % of working mothers abandoned breastfeeding before their infants were 3 months [23]. In this study of 265 mothers, working long hours and lacking facilities for expressing and storing breast milk at work explained early cessation of breastfeeding [23]. Similarly, in a study of exclusive breastfeeding and employment in Central Mexico, ME outside the home (not classified as formal or informal) was negatively associated with breastfeeding durations [45]. Perez-Escamilla and colleagues studying the determinants of exclusive breastfeeding in a cohort of urban Latin American mothers (Mexico, Brazil and Honduras) documented that employment was negatively associated with exclusivity for 4–6 months [46].

Formally employed women face challenges combining both employment and breastfeeding. Mexican Federal Law Employment [47] states that lactating women have the right to take two 30-min periods off their employment responsibilities to breastfeed during working hours. This time is insufficient to return home to feed the baby, and the alternative is that mothers extract their breast milk at the working site. This means that women need lactation facilities at work, which in Mexico are almost universally absent. Thus, many women decide to collapse the two 30 min periods shortening their working shift by 1 h. However, if mothers do not express and collect their milk while away from their babies during this 7 h or more periods, her infant is fed formula which diminishes breast milk demand, further decreasing its production, strengthening the negative cycle of insufficient milk syndrome.

Table 2 Relationship between breastfeeding and maternal employment status (Mexican Nutritional Surveys*: NNS-1999, NHNS-2006 and NHNS-2012)

Variable	Odds ratio	*p* value	(95 % CI)
Status of employment[a]			
Formal employment[b]	1		
Non-formal employment[c]	1.25	0.214	(0.88, 1.79)
Unemployed[d]	1.37	0.007	(1.09, 1.72)
Infant age, month	0.83	0.000	(0.81, 0.85)
Socio economic level[e] (score)	0.78	0.000	(0.73, 0.85)
Stratum[f]			
Urban	1		
Rural	0.70	0.000	(0.57, 0.85)
Ethnicity[g]			
No	1		
Yes	2.62	0.000	(1.79, 3.83)
Partner			
No	1		
Yes	1.66	0.000	(1.32, 2.09)
Survey			
NNS-1999	1		
NNHS-2006	1.22	0.176	(0.91, 1.63)
NNHS-2012	0.79	0.150	(0.58, 1.09)
Health services[h]			
No	1		
Yes	0.78	0.079	(0.59, 1.03)
Interaction Survey and health services			
1999 with health services	1		
2006 with health services	1.47	0.069	(0.97, 2.23)
2012 with health services	1.51	0.051	(1.00, 2.28)

* Multiple Logistic Regression: Odds ratio, 95 % CI and *p* values are presented. n = 5,224 Mexican women they represent to 3,788,084

[a] Employment: Reports holding a job or having some economic activity from which she perceived money in exchange, the week prior to the interview

[b] Formally employed: mothers were receiving a fixed salary the week prior to the interview

[c] Non-formally employed: mothers who reported not having a fixed salary prior to the interview

[d] Unemployed: mothers who reported not holding a paid job the week prior to the interview

[e] Calculated through principal component analysis

[f] Stratum: Urban (pop > de 2,500); Rural (pop < de 2,500)

[f] Indigenous household: At least one woman 12–49 year speaks an indigenous language in the household

[h] Health services: Access to a partial or complete health insurance provided either by the government (IMSS; SSA; ISSSTE; PEMEX; Army or Navy), or by a private insurance

This negative cycle leads to breastfeeding abandonment [15] and explains shorter durations of both, exclusive or any type breastfeeding [48, 49].

We also documented in this study that being of indigenous background, living in rural areas, and low SES were associated with a longer durations of breastfeeding. Similar results have been found in local studies in Mexico [45]. Nevertheless, the opposite is emerging in other Latin American countries, where changes although small, in breastfeeding practices have been in observed in mothers living in urban areas and in mothers with higher socioeconomic status [50]. As the authors discuss, changes were related to breastfeeding behaviors within certain subgroups, and not to changing population's characteristics; perhaps related to more access to relevant information, or to programs protecting breastfeeding (such as in Brazil) not currently occurring in Mexico.

Another factor found in our study was that access to any kind of health services was negatively associated to breastfeeding duration in 1999, but in 2006 and 2012,

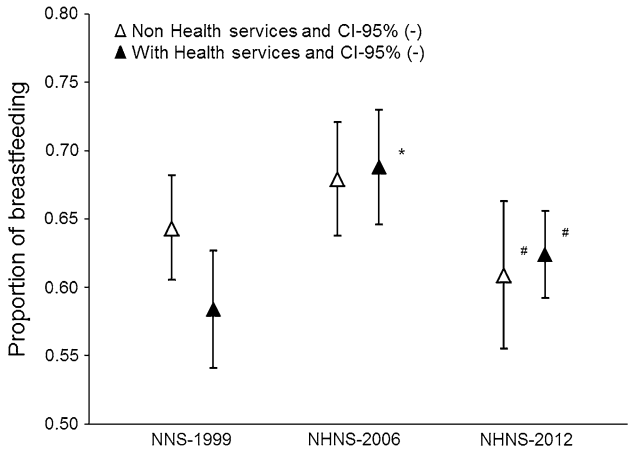

Fig. 2 Breastfeeding modified by access to health services. (Mexican Nutritional surveys: NNS-1999, NHNS-2006 and NHNS-2012). Proportion (*filled triangle*, *open triangle*) and 95 % CI are presented. Proportion adjusted by covariates: infanťs age (mo), ethnicity, SES (index) and stratum. *Statistically differences between 1999 and 2006, #statistically differences between 2006 and 2012, ¥$p < 0.05$

mothers with health care access reported longer breastfeeding duration. This coincides with the national scaling-up of the *Oportunidades* Program, a conditional cash transfer program also providing health care targeting 6 million families in poverty [51], as well as the implementation of *Seguro Popular*, a universal free health coverage system for the uninsured. *Oportunidades* Program has an important breastfeeding promotion component and reports have documented that those who receive *Oportunidades* have better lactation practices compared to those who do not receive them [29]. No formal data have been published related to the effect of *Seguro Popular* on breastfeeding, although it's strong emphasis on this practice has an important potential to improve infant and young child feeding practices.

Our study has several limitations that must be considered when interpreting the findings. First the data are cross-sectional precluding any inference about a causal association between ME and breastfeeding duration. Thus our study cannot unambiguously distinguish between whether formal employment negatively impacts breastfeeding duration or if a desire to breastfeed for longer negatively impacts maternal participation in the formal labor market. Nevertheless, the association provides a signal to policy makers that combining breastfeeding and formal labor market participation for mothers is difficult. Second, all three surveys lack relevant information on employment fine details including whether mothers enjoyed their maternity leave, her number of working hours, her position as head of the household, work-home commuting distance and time [20–23] or milk extraction facilities at her workplace [20–23]. These factors are important for better understanding labor conditions in which formally employed mother's breastfeed in Mexico. Third we were not able to analyze median duration of *exclusive* breastfeeding by employment status, because of the small prevalence of exclusive breastfeeding across surveys and by employment status. Fourth, figures for the three national surveys do not form a longitudinal panel of observations, but three independent nationally representative samples; in this sense, we cannot state that there are changes in the population but we can say that the relationships between breastfeeding and employment status have changed over time from 1999 to 2012.

In spite of these limitations, our study has several strengths. This is the first study in Mexico that documents breastfeeding and ME using nationally representative nutrition and health surveys. We were able to take advantage of similar information on breastfeeding across the three waves of data collection. Thus, our data have internal and external validity, and results are robust enough to be considered in the breastfeeding policy design, currently under consideration in Mexico. In particular, the General Health Law is now under scrutiny relative to articles and sections linked to maternal legal rights during pregnancy and lactation.

Conclusion

Our results indicate that ME has a strong negative association with breastfeeding among Mexican mothers with infants <1 year of age. Breastfeeding is one of the most cost-effective strategies to support infant health and survival; for it to take place, women need support from their family, community, health services, and work place. The negative impact of employment on breastfeeding calls for targeted and timely interventions to protect lactation among working women in Mexico. For Mexicans involved in policy design, implementation or modification, these data might offer robust evidence on this negative association, and van be used confidently as basis for conceiving a more just legislation for working lactating women.

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