

Socioeconomic status and its relationship with breastfeeding in Mexican infants younger than 1 year

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Background

Breast-feeding has beneficial effects in the mother and toddler, the absence of it has been implicated in numerous adverse effects [1]. According to UNICEF if everyone would be nourished nice the first hour of birth by breastfeeding and continued to do so during the first 6 months of life, by the year of two, eight thousand lives would be spared [2]. Breast milk has proven benefits regarding nutrition, gastrointestinal function stimulation growth and development, boosting the immune system by decreasing the incidence of infection and promoting psychological wellness [3].

The macro and micronutrients found in breast milk are primarily proteins as lactoferrin, Immunoglobulin (IgA) and lysozymes that act as antimicrobials and as a barrier in the intestinal mucosa layers [4]. Lipids, free fatty acids and monoglycerides destroy virus, bacteria and protozoa (28), while carbohydrates favor the colonization of Bifidobacteria and Lactobacillus with beneficial effects on multiple metabolic functions [5]. Compared with the use of formula, the morbidity and mortality is less in the patients breastfed in developing countries, hence hospitalization and ambulatory rate is below in the same group [6,7].

The long term benefits of breastfeeding have been well established, and a preventive correlation could be made with the development of obesity. A study made by the Center for Disease Control and Prevention (CDC) found a decreased relative risk of obesity for those breastfed for all least 6-12 months of 0.7:1 compared with those that were not breastfed [8].

We see also less cases of leukemia and lymphoma when the patient received breastmilk, however in terms of neurodevelopment more studies have to be made to state this correlation [9,10]. Another interesting benefit related is the socioeconomic with the known value of the commercial formulas. According to a study made in the USA cost reduction was the result of less hospitalization and consult rate translated to less labor absenteeism for children illness, the total estimated save was calculated in 13 thousand million dollars for 2007 if 90% of the families of the country would breastfed [11].

Even though in Mexico calculated savings by avoiding formula goes around eight hundred to a thousand dollars annually per family (according to the national consumers organization - Profeco), we

currently we see less patients nursing [12]. Early introduction of breastmilk substitutes, such as formula during the first month of life has a relative risk of 1.55, meaning 55% more risk of breastfeeding suspension compared with those that did where not supplemented [13]. Other important point to review is the problems related with breastfeeding that affect directly with its incidence and continuation. Inadequate intake or improper perception of milk production are the most common causes for breastfeeding suspension [14].

Bad technique is the most important cause of early suspension, advice and treatment are necessary to address this issue. Mammary pain and nipple fissures are subsequent changes of the previous point mentioned; therefore technique instruction is imperative by the corresponding health attendee [15].

According to UNICEF patients of 6 months of age and less that reside in developing countries have an estimated prevalence of 38% rate for breastfeeding exclusively.

In USA around 71-72% receives breast milk at some point of their lives, by the age of 6 months the rate decreased from 42% at birth to 13%, and the hispanic community contributed to most of the breastfeeding population [16].

In Canada positive contributing factors related with breastfeeding where maternal education, more age, higher study preparation, high socioeconomic status and living in small towns or communities [17]. Australia however did not find statistical difference regarding the rate of initiation of breastfeeding [18].

The estimated prevalence in Mexico for exclusive breast-feeding during the first 6 months of life in 2006 was reported in 22.3%, decreasing importantly for 2012 to 14.6% [19]. This is under the world recommendations published by the World Health Organization (WHO).

In other countries there has been found a contradictory association between socioeconomic status and duration of breastfeeding. In Mexico the poverty incidence is reported in 46.7%, meaning that if a positive association is found, nursing could have an impact in almost half of the entire population.

Problem

Information has been documented in other countries about how socioeconomic status has a direct impact on the incidence of nursing. There has not been such information reported in Mexico. Do differences in socioeconomic status have variance in the exclusivity and application of nursing in their babies?

Study limitations

This study was limited to the collection of a national health survey and was done in terms of time with relatively recent data (2012). In this study we established association however not causality because of the multiple and known contributing factors related with breastfeeding. The demographic information is from Mexico so most of its impact will be of national use, still it can be used to compare the incidence, demographics and epidemiology with other countries.

Objective

The primarily objective of this study was to compare the duration of breast-feeding in Mexican infants younger than one year with low socioeconomic status versus those with medium and high socioeconomic status. As secondary objectives we described sociodemographic characteristics of the studied sample, among them: sex, age and geographic distribution between subjects.

Methods

The design was a retrospective, cross-sectional study of a 1,962 subjects younger than 1 year, Nested to a Mexican cohort (ENSANUT 2012). Socioeconomic status of the studied sample was previously defined by the Statistics and Demographics National Institute (INEGI). Exclusive breastfeeding was not defined in this study; we only analyzed the incidence of breastfeeding and its socio-demographic relation. And we could not know how many patients continued breastfeeding after the application of the survey.

The study period was from may 2011 through may 2012, the data was obtained at the public national health institute through the national health and nutrition survey 2012 (ENSANUT 2012) applied in 1719 houses (total of 55,008 homes surveyed). For the sample calculation we used this formula for hypothesis corroboration between two different proportions among two study groups:

$$n = \frac{(Z\alpha + Z\beta)^2(P_1Q_1 + P_2Q_2)}{(P_1 - P_2)^2}$$

The level of significance (α) was of 95% for two tails, $Z\beta = 1.90$, $Z\alpha = 1.96$ with a potency of B 90% for both. Previous reported frequency was taken into account from previous publications, being 37.1% and 49.1% for P1 and P2 respectively. The needed sample size was 436 subjects.

The real sample where Mexican subject less than 1 year of age, excluding those with more than 1 year and those with incomplete information in the survey. Sample size was 1,965 subjects, we eliminated 3 subjects that had incomplete forms filled in the survey accounting for a final survey sample size of 1,962.

We decided to make a second analysis which only included those who had already suspended breastfeeding. From the total of 1,962 subjects 12 were eliminated, the remaining 1,850 at some point received breast milk. Of those 1,247 were eliminated because

they continued nursing. Final subjects that at some point received breastfeeding and suspended it afterwards were 603.

Statistical analysis

For the abnormal distribution curve found in the studied samples we used U Mann-Withney- Wilcoxon test. Contingency tables of 2x2 were used to compare both groups and calculate odds Ratio (OR). The dependent variable measured was breast feeding duration in terms of completed months and days. To unify units every value was converted to month and fractions of months as a quantitative continue variable.

Another dependent variable assessed was breastfeeding initiation, meaning if the subject received breastfeeding at certain point before the age of one year. It is a binary value (yes or no), qualitative nominal variable. The independent variable studied was socioeconomic status, which divided the subjects in two groups: low versus medium-high socioeconomic status, a qualitative ordinal variable.

Results

The number of subjects was 783 (39.9%), 691 (35.2%) and 488 (24.9%) for low, medium and high socioeconomic status respectively. The group of interest for the research team was the low socioeconomic status group, being the first group assigned with 783 subjects (39.9%) versus the medium-high socioeconomic group (60.1%). Studied sample had a similar distribution of male (49.7%) and female (50.3%) ratio which was respected in the three groups. Mean age distribution of the surveyed patients was 6.5 + 3.5 months.

Urban living setting was the most commonly found in the total subjects representing 62.5% against the rural area with a proportion of 37.5%. Geographically speaking, most of the sample was concentrated in the south area (38.4%), more than half of the low socioeconomic status subjects reside in this area (53.4%) (See Table 1).

Socio-demographic data	Low (n=1179)	Medium-High (n=783)	Total (n=1992)
Women	381 (48.7)	605 (48.7)	986
Age in Months, Mean± SD	6.4±3.5	6.7±3.4	6.5±3.5
Urban area	334	892	1226
South area	418	335	753
Central area	231	470	701
North area	115	326	441
Metropolitan area	19	48	67

Table 1: Socio-Demographic Characteristics of the studied sample

Breast feeding duration is more common during the first months. Before the first month of life both groups have the highest duration frequency (See Table 2).

Breast feeding duration	Low	Medium-High	Total
0 moths	150 (31.1)	333 (38.9)	483
1 month	74 (32.7)	152 (67.3)	226
2 months	74 (40.9)	107 (59.1)	181
3 months	62 (33.9)	121 (66.1)	183
4 months	63 (42.3)	86 (57.7)	149

5 months	59 (36.6)	102 (63.4)	161
6 months	54 (49.1)	56 (50.9)	110
7 months	45 (48.9)	47 (46.1)	92
8 months	55 (53.9)	47 (46.1)	102
9 months	56 (52.8)	50 (47.2)	106
10 months	49 (60.5)	32 (39.5)	81
11 months	42 (47.7)	46 (52.3)	88
Total	783 (39.9)	1179 (60.1)	1962 (100)

Table 2: Frequency of breast feeding duration.

For the breastfeeding duration, the Shapiro-Wilk test ($p < 0.05$) showed that the histogram frequencies of the sample doesn't have a normal distribution in any of the studied groups. For the low socioeconomic status it has an asymmetry of -0.31 (TE 0.87) and Curtois of -1.21 (TE 0.18). For the medium-high group there is an asymmetry of 0.814 (TE 0.07) and Curtois of -0.43 (TE 0.14). Both groups have a strongly negative Z value between -3.1 and -6.9 giving the graph a plane form as shown in Figure 1 and 2.

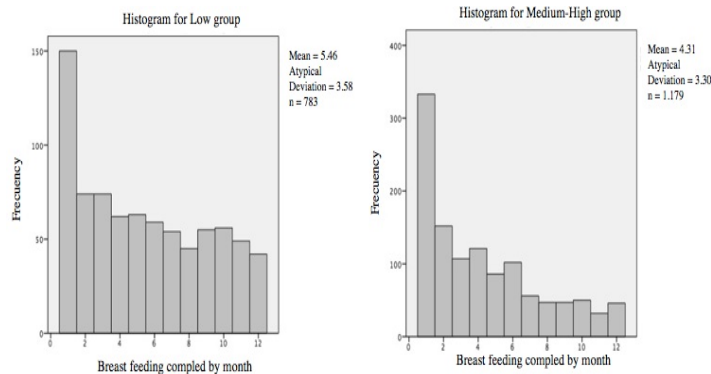


Figure 1&2: Distribution graph in completed breast feeding months for low and medium-high socioeconomic status.

For the age variables, the Shapiro-Wilk test ($p < 0.05$) showed that the histogram frequencies of the sample doesn't have a normal distribution in any of the studied groups. For the low socioeconomic status it has an asymmetry of -0.30 (TE 0.87) and Curtois of -1.21 (TE 0.17). For the medium-high group there is an asymmetry of 0.096 (TE 0.071) and Curtois of -1.24 (TE 0.14). Both groups have a strongly negative Z value between -6.9 and -8.7 giving the graph an plane form as shown in Figure 3 and 4.

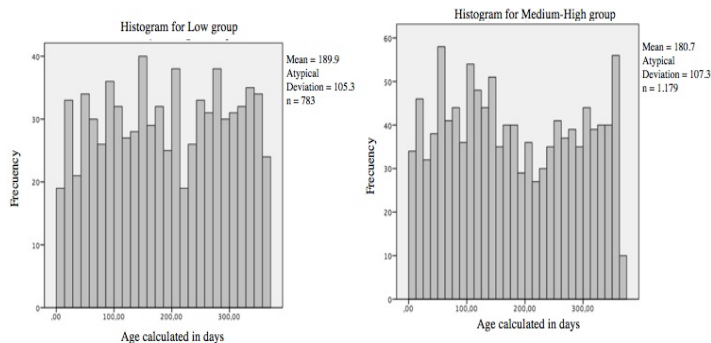


Figure 3& 4: Distribution graph in days for low and medium-high socioeconomic status

We found that 5.7% of the subjects never started breastfeeding; the proportion of these is double in the medium-high socioeconomic

status.

	Total	Low	Medium-High
Yes	112	35 (31.3)	77 (68.7)
No	1850	748 (40.4)	1102 (59.6)

Table 3: Distribution for Non-breast feeding group.

The causes for not starting breastfeeding that were observed in most part (88-92%) where without any medical indication. Poor milk production (patient perception), bad technique and maternal illness accounted for most of the causes combined representing 72.4% of the cases. Every one of them is easily corrected with assessment and evaluation.

Reason	Frequency
“Low milk production”	34 (30.4%)
Poor technique	26 (23.2%)
Mother illness	21 (18.8%)
Mother taking medication	7 (6.3%)
Social (foster care)	6 (5.4%)
Prematurity	6 (5.4%)
“Did not liked it”	4 (3.6%)
Breat anatomic anomalies	4 (3.6%)
Busy mother schedule	3 (2.7%)
cleft/palate	3 (2.7%)
“its inconvenient”	1(0.9%)
Mother goes back to school or work	1 (0.9%)

Table 4: Reasons for not starting breast feeding.

For the total of 1,850 subjects that received breastfeeding around 67.4% continued nursing at the time of the survey (1,247) and 32.6% had already suspended it (603).

For all the subjects receiving breastfeeding we found an average of 4.3 months with and ED of + 3.4 months. For those who suspended breast milk the average was 3.3 months with an EF of of + 2.8 months.

In (Figure 5) we represent a graph of boxes and ranks, median and quartiles. Low socioeconomic status has a higher median compared with the medium high group, we can observe wide distribution between both groups.

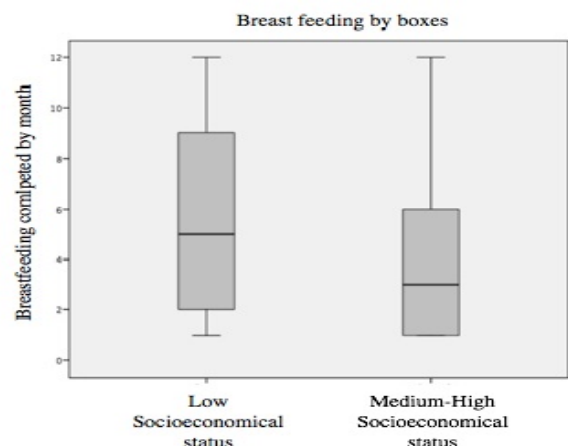


Figure 5: Boxes for breast feeding duration.

The analysis that included the whole subjects (n=1,962) found that abandonment of breastfeeding is higher during the first months. Around 28% of the medium-high group suspended nursing before the first month of life, while in the low group, the abandonment rate was 19%.

We see an interesting phenomena, because after the sixth month, the quantity of subjects suspending breast feeding is higher in the low socioeconomic group.

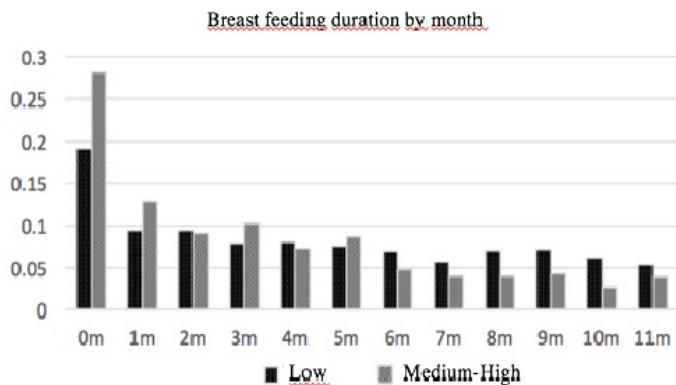


Figure 6: Graph bar comparing the proportion and duration of breast feeding.

The accumulated proportion of subjects continuing breastfeeding is compared between the two groups in the next graph. We can see important difference between groups in the first month of life, being higher in the low socioeconomic subjects. The biggest discrepancy is noted in the sixth month with a porcentual difference of 14 points (38.4% vs 23.5%) $p < 0.001$.

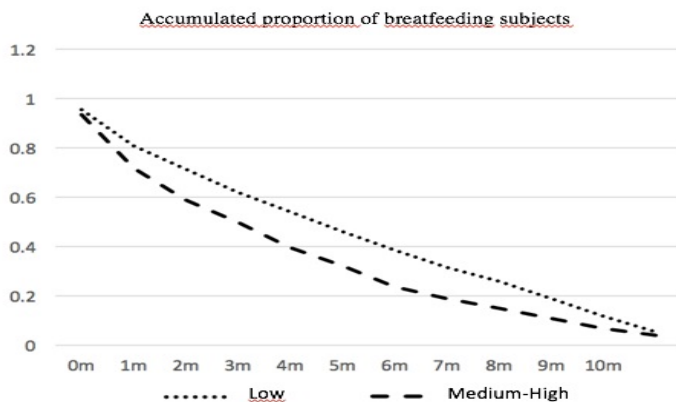


Figure 7: Line graph comparing accumulated breastfeeding.

The mean breastfeeding duration was 5.4 months (± 3.5 months) in the low socioeconomic status, versus 4.3 months (± 3.3 months) in the medium to high socioeconomic status. The level of significance was found to have $p < 0.001$.

Socio Economical status	Mean	Median	standar deviation
Low	5.46	5.00	3.584
Medium-High	4.31	3.00	3.301
Total	4.77	4.00	3.462

Table 5: Breast feeding duration.

Secondary analysis showed similar results. Higher abandonment

rate was seen before the first month of life, around 40% of the total subjects. There is another increment seen around the fifth month of life.

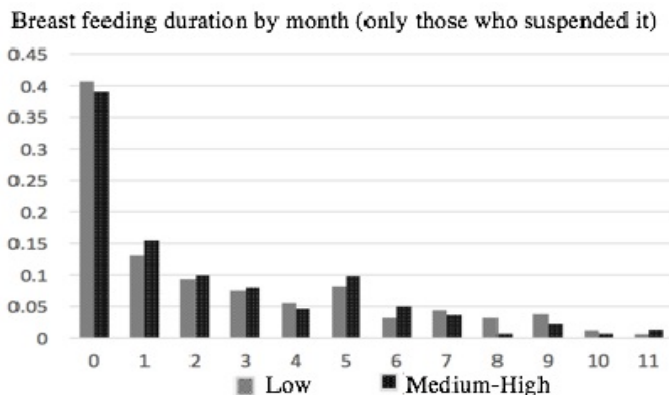


Figure 8: Graph bar comparing the proportion and duration of breast feeding of those who already suspender breast feeding.

We compare the proportion of subjects that had already suspended breast feeding (n = 603). Both groups follow similar tendencies ($p = 0.869$), between six and eight months of life the difference is at its highest with a 5%, in the other months is below 2%.

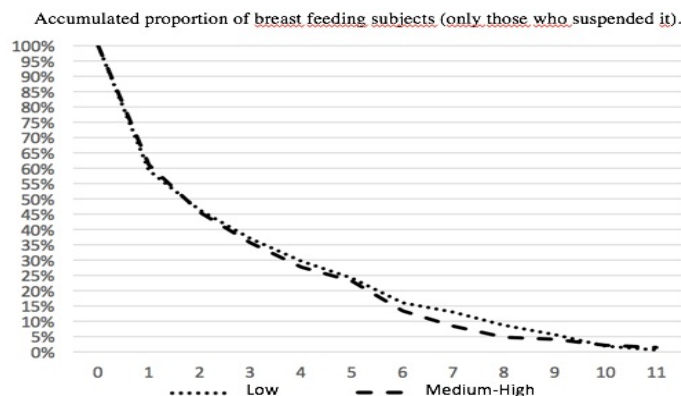


Figure 9: Line graph comparing accumulated breastfeeding (those that suspended it).

Low socioeconomic group has a mean of 3.4 months, while in the medium-high group a mean of 3.3 months.

Socio Economical status	Mean	Median
Low	3.42	2.90
Medium-High	3.27	2.69

Table 6: Duration of breast feeding in subjects that already suspended it.

Another studied variable we analyzed was the quantity of subjects that received breastfeeding at some point during the first year of life. The odds ratio to continue breastfeeding in the low socio economical group was 1.49 ($p = 0.055$) with a confidence interval of 0.991 to 2.25, meaning it was not of statistical value, hence no difference at starting breastfeeding.

	Low	Medium-High	Total
Received breast feeding	748 (40.4)	1102 (59.6)	1850
Never received breast feeding	35 (31.3)	77 (68.7)	112
Toatl	783 (39.9)	1179 (60.1)	1962

Table 7: Group that received breast feeding.

Discussion

The three more common causes for not initiating breastfeeding where poor milk production (patient perception), bad technique and maternal illness accounted for most of the causes combined representing 72.4% of the cases, suspension cause where not studied. The biggest suspension rate was seen during the first month independently of the socioeconomic Status; however, suspension was bigger for those of low socioeconomic status (19%) compared the medium-high socioeconomic status (28%).

There is an interesting phenomena observed in the trend of suspension of breastfeeding. Before the 6th month, the higher abandonment group is the medium-high socioeconomic status, afterwards, between 6 months and 1 year of age the low socioeconomic group has a higher suspension rate per month. In future studies it would be interesting to see if ablation is related with this event.

Mean breastfeeding duration was 5.4 months (± 3.5 months) in the low socioeconomic status versus 4.3 months (± 3.3 months) in the medium to high socioeconomic status ($p < 0.001$). This findings are opposed to what other studies have published (17, 18 y 20). There is no difference between groups that already suspended breast feeding, meaning that the behavior related to nursing is the same in both groups: low and medium-high socioeconomic status ($p = 0.869$).

According to our study low socioeconomic status has an advantage and increased probability of 2.4 times ($OR = 2.41$) for continuing nursing over those belonging to a medium-high socioeconomic group ($p < 0.0001$). This is the first study of its kind published in Mexico; the subjects represented the whole country population, with nationwide value. The proposed objectives for this study where met and the results could have a public health impact.

We could show association; however this does not meet causality, still knowing the risk population makes it possible to assess and evaluate strategies for intervention. This can be material for future studies and investigating the cause of suspension after 6 months of age can be evaluated as well. Emphasis must be made in the benefits of breast feeding, and interventions focused on its practice for reinforcement must be made, specially in the first month of life where both groups as we saw in our study had the greater suspension rate.

Conclusion

There is a statistically significant difference ($p < 0.0001$) in breastfeeding duration among Mexican infants younger than one year with low socioeconomic status, versus those with medium to high socioeconomic status. Mean breastfeeding duration was 5.4 months (± 3.5 months) in the low socioeconomic status versus 4.3 months (± 3.3 months) in the medium to high socioeconomic status.

References

1. Dewey KG, Heinig M, Nommsen-Rivers LA (1995) Differences in morbidity between breast-fed and formula-fed infants. *The Journal of Pediatrics* 126: 696-702.
2. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, et

- al. (2013) Maternal and child undernutrition and overweight in low-income and middle-income countries. *The Lancet* 382: 427-451.
3. Claud EC (2001) Hypothesis: inappropriate colonization of the premature intestine can cause neonatal necrotizing enterocolitis. *The FASEB Journal* 15: 1398-1403.
4. Hamosh M (2001) Bioactive Factors in Human Milk. *Pediatric Clinics of North America* 48: 69-86.
5. O'Hara A M, Shanahan F (2006) the gut flora as a forgotten organ. *EMBO reports*, 7: 688-693.
6. Sankar MJ, Sinha B, Chowdhury R, Bhandari N, Taneja S, et al. (2015) Optimal breastfeeding practices and infant and child mortality: a systematic review and meta-analysis. *Acta Paediatrica Acta Paediatr* 104: 3-13.
7. Oddy WH (2003) Breast feeding and respiratory morbidity in infancy: a birth cohort study. *Archives of Disease in Childhood* 88: 224-228.
8. Grummer-Strawn LM, Mei Z (2004) Does Breastfeeding Protect Against Pediatric Overweight? Analysis of Longitudinal Data from the Centers for Disease Control and Prevention Pediatric Nutrition Surveillance System. *Pediatrics* 113: e81-e86.
9. Amitay EL, Keinan-Boker L (2015) Breastfeeding and Childhood Leukemia Incidence. *JAMA Pediatrics JAMA Pediatr* 169: e151025.
10. Mortensen EL (2002) the Association between Duration of Breastfeeding and Adult Intelligence. *Jama* 287: 2365-2371.
11. Bartick M, Reinhold A (2010) the Burden of Suboptimal Breastfeeding in the United States: A Pediatric Cost Analysis. *Pediatrics* 125.
12. Profeco. Formulas para lactantes http://www.profeco.gob.mx/revista/pdf/est_05/formula_lactan_mayo05.pdf
13. Li R, Darling N (2004) Breastfeeding Rates in the United States by Characteristics of the Child, Mother, or Family: The 2002 National Immunization Survey. *Pediatrics* 115: e31-e37.
14. Niño R, Silva G (2012) Factores asociados a la lactancia materna exclusiva. *Rev Chil Pediatr* 83: 161-169.
15. Singh GK, Kogan MD, Dee DL (2007) Nativity/Immigrant Status, Race/Ethnicity, and Socioeconomic Determinants of Breastfeeding Initiation and Duration in the United States. *Pediatrics* 119: S38-S46.
16. Clark LL, Beal VA (1982) Prevalence and duration of breastfeeding in Manitoba. *Can Med Assoc J* 126: 1173-1175.
17. Donath S, Amir L (2000) Rates of breastfeeding in Australia by State and socio-economic status: Evidence from the 1995 National Health Survey. *Journal of Paediatrics and Child Health* 36: 164-168.
18. Dewey KG, Heinig M, Nommsen-Rivers LA (1995) Differences in morbidity between breast-fed and formula-fed infants. *The Journal of Pediatrics* 126: 696-702.
19. Heck KE, Braveman P, Cubbin C (2006) Socioeconomic Status and Breastfeeding Initiation among California Mothers. *Public Health Reports* 121: 51-59.

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