Breastfeeding Persistence at 6 Months: Trends and Disparities from 2008 to 2015

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Objective To assess trends and disparities in breastfeeding by maternal characteristics (race and ethnicity, age at delivery, obesity, parity, and level of education) and the relative importance among these for breastfeeding at 6 months.

Study design This retrospective birth cohort study included 195 861 live singleton children born at 32-42 weeks of gestation from 2008 to 2015 within a single integrated healthcare system. All children had healthcare coverage during the first year of life. Maternal characteristics and breastfeeding status at 6 months of age were extracted from electronic medical records. Trends over time of any breastfeeding ≥6 months were evaluated for the 5 maternal characteristics. Robust Poisson regression models were used to estimate breastfeeding rate differences associated with each of the 5 characteristics. The relative importance among them associated with breastfeeding ≥6 months was assessed by comparing model quasi-likelihood information criteria.

Results Rates of breastfeeding ≥6 months significantly increased overall and among groups defined by the maternal characteristics. However, there was little improvement over time in closing disparities associated with maternal race and ethnicity, age at delivery, prepregnancy obesity status, and level of education. Education level contributed to the greatest disparity in breastfeeding ≥6 months. Maternal age was the second factor, followed by prepregnancy obesity and maternal race and ethnicity.

Conclusions Breastfeeding outreach programs focusing on women with less than a college education, women <25 years old, and women from non-Hispanic black or Hispanic race and ethnicity may help to reduce disparities and improve breastfeeding persistence rates within integrated healthcare systems. *(J Pediatr 2019;208:169-75)*.

The benefits of breastfeeding to mothers and their offspring are well known,[1-3] with increasing evidence that longer duration of breastfeeding has multiple health and economic benefits.[4-6] Consequently, efforts have increased nationwide to promote breastfeeding persistence past initiation.[1] Healthy People 2020 set an objective to increase the proportion of infants breastfed at 6 months to 60.6%.[7,8] The midcourse review of Healthy People 2020 found that among children born in 2011, the proportion of infants' breastfed at 6 months increased to 49.4%. More recently, 2014 birth data from the Center for Disease Control's National Immunization Survey showed that the rate of breastfeeding at 6 months was 55% in the US and the rate for California was 64%.[9,10]

Although the overall objective to increase the proportion of infants breastfed at 6 months is nearly met, there are persistent disparities.[10] Several studies have examined breastfeeding disparities by maternal race and ethnicity[11-16] and obesity,[13,17-26] maternal age at delivery,[27,28] parity,[27] and level of education.[21,29] Breastfeeding behavior can also be affected by societal images, work related barriers, paternal support, issues with lactation and latching, maternal perception of infant satiety and nutrition,[30,31] maternal smoking, mode of delivery, and breastfeeding education.[32] To our knowledge, no recent study with a large population has assessed disparities in trends over time among these characteristics and the relative importance among them associated with breastfeeding persistence.

The purpose of this study was to examine breastfeeding trends from 2008 to 2015 by maternal race and ethnicity, age at delivery, prepregnancy obesity, parity, and level of education using data from an integrated health system and to evaluate the relative importance among these 5 characteristics in their relationship to breastfeeding persistence at 6 months. The information obtained about breastfeeding disparities may be used to develop targeted programs to increase breastfeeding persistence.

BMI	Body mass index
EMR	Electronic medical record system
KPSC	Kaiser Permanente Southern California
QIC	Quasi-likelihood information criteria
QICu	Quasi-likelihood information criteria for correlated data

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Methods

This retrospective cohort study included singleton children who were born at 32-42 weeks of gestation at Kaiser Permanente Southern California (KPSC) hospitals between January 1, 2008 and December 31, 2015. KPSC is a large healthcare organization that provides comprehensive care and uses an electronic medical record system (EMR). The membership includes commercial, Medicare, Medi-Cal, Children's Health Insurance Program, and charitable coverage insurance. Demographic distribution of KPSC membership broadly represents Southern California residents and KPSC covers approximately 16.0% of the population in the coverage area.[33] KPSC follows the American Academy of Pediatrics guideline for breastfeeding. From 2008 to part of 2010, breastfeeding information was primarily recorded in nursing notes for each child at every visit (including immunization visits), as part of well-baby care. Starting in 2010, inquiries about breastfeeding (ie, "Do you feed your baby breast milk?") were added to Well Check Health Questionnaires that were administered to parents and entered into EMR by clinical staff at each standard well-baby healthcare visit (from birth to 4 weeks, then 2, 4, 6, 9, and 12 months). Information about breastfeeding during the first year of life was extracted from these questionnaires, as well as from the nursing notes and other documents such as discharge summaries and progress notes. For the latter, text searching and natural language processing techniques were applied. A random sample of notes from 500 children was selected and a detailed manual review was conducted to validate the results. The manual review was used as the gold standard. Sensitivity, specificity, positive, and negative predictive values for breastfeeding ≥6 months were 89%, 89%, 83%, and 93%, respectively. Breastfeeding data was limited to the first year after birth.

A total of 260 523 children met the inclusion criteria. Among them, 54 440 children did not enroll as KPSC health plan members by age 1 year and were excluded to minimize ascertainment bias in the identification of breastfeeding. We further excluded 10 224 children because of maternal age not within the 15- to 55-year-old range (n = 98), missing data for maternal race and ethnicity (n = 65), prepregnancy body mass index (BMI) (n = 2717), level of education completed (n = 1680), or breastfeeding outcome (n = 5663). The final data analysis included a total of 195 861 children born to 159 333 women.

Maternal age at delivery, race and ethnicity (self-reported), education, parity, and prepregnancy BMI were extracted from the EMR or birth certificate records and linked by a unique membership identifier used for patient care. Maternal prepregnancy BMI was calculated using maternal height and weight from the EMR on the date closest to the last menstrual period from a window of 6 months before until 3 months after the last menstrual period. All data were checked for quality through data plots and frequency tables. Potential outliers and data errors were rectified by cross-checking against historical data in the EMR. The validity of data was established in previous publications.[34-36] The KPSC Institutional Review Board approved this study and provided complete waiver of participant consent.

Data Analyses

Maternal breastfeeding status for the index child was classified as breastfeeding ≥6 months or not, regardless of exclusivity, based on the breastfeeding status captured from all visits within the first year of life. Breastfeeding status was classified as ≥6 months if the breastfeeding status was recorded as "yes" at 6 or later months in EMR. Maternal age was classified into the categories 15-19, 20-24, 25-29, 30-34, 35-39, and 40-55 years of age. Maternal race and ethnicity was self-reported and classified into non-Hispanic white, non-Hispanic black, Hispanic, Asian and Pacific Islander, and others. Maternal prepregnancy obesity was classified into underweight (BMI <18.5 kg/m^2), normal (18.5 ≤BMI <25 kg/m^2), overweight (25 ≤BMI <30 kg/m^2), or obese (≥30 kg/m^2). Maternal parity was classified into 0, 1, and >1. Maternal education was classified into high school or less, some college, and college or higher. Cohort characteristics for maternal measures are presented as N (%). Potential cohort selection bias was assessed by comparing the maternal characteristics between the children who were included in this study and the children who were excluded.

Trends of breastfeeding ≥6 months from 2008 to 2015 were assessed by plotting the rates (in percentage) by birth year. Trends were plotted for all children combined and stratified by maternal race and ethnicity, age at delivery, prepregnancy obesity, parity, and level of education. The significance in trends over time was assessed by the Cochran-Armitage trend test.

To assess the disparities of breastfeeding associated with each of the 5 maternal characteristics, robust Poisson regression models were used to estimate the rate difference in breastfeeding associated with each characteristic adjusting for birth year in bivariate analysis, and in multivariate analysis after further adjusting for the other four characteristics. Rate differences were presented instead of ORs because they have direct public health interpretation. The relative importance of each characteristic associated with breastfeeding was assessed by comparing quasi-likelihood information criteria (QIC) and quasi-likelihood information criteria for correlated data (QICu) in the robust Poisson regression where models with the lowest QIC or QICu indicate the strongest association. The order of importance among these characteristics was determined by ranking QIC and QICu by offering these characteristics in a stepwise fashion. Sensitivity analysis was conducted by restricting 1 child per woman where only the first child was included in the data analysis. All analyses were performed using SAS Enterprise Guide 5.1 (SAS Institute, Cary, North Carolina).

Results

The cohort included in this report is comprised of 50% Hispanic, 26% non-Hispanic white, 8% non-Hispanic black, and 14% Asian and Pacific Islanders (Table I). Over 90% of the

children were born to women age 20-39 years; 28% and 26% of the mothers were overweight or obese, respectively, at the onset of pregnancy. About one-third of the children were the first child and one-third were the second child in a family. About 40% of women had college or higher education, and 31% had some college education. The increase in the number of children from 2008 to 2015 reflects the increase of member enrollment at KPSC during these years. Compared with children included (**Table I**), the children excluded were more likely to be born to mothers with Hispanic race and ethnicity, age 15-19 and 20-24 years at delivery, and with high school or less education. Distribution of prepregnancy obesity status and parity were generally comparable between the cohorts included and excluded.

Rates of breastfeeding ≥6 months increased significantly for the years from 2008 to 2015 (45.6%, 47.2%, 52.1%, 57.0%, 59.4%, 69.8%, 70.8%, and 71.9%; $P < .0001$). The rising trends over time were observed for each of the subgroups after stratifying the cohort by the 5 maternal characteristics (**Figure** and **Table II**; **Table II** available at www.jpeds.com). For race and ethnicity (**Figure**, A), the rates were highest in Asian and Pacific Islanders, followed by non-Hispanic white, and lower in Hispanic and non-Hispanic black mothers. Non-Hispanic black mothers had the lowest rates before 2011 and comparable rates to Hispanic mothers after 2011. For maternal age (**Figure**, B), rates of breastfeeding ≥6 months were highest among mothers aged 30-34 years and 35-39 years, followed by mothers aged 40-55 years and 25-29 years. The rates were lower in mothers aged 20-24 years and lowest in mothers aged 15-19 years. For maternal prepregnancy obesity status (**Figure**, C), rates of breastfeeding ≥6 months were highest in mothers with normal weight and lowest for mothers with obesity. As noted in **Figure**, D, only small differences in breastfeeding rates were observed across the parity groups. Lastly, for maternal education (**Figure**, E), mothers with college or higher education had much higher rates of breastfeeding ≥6 months than mothers without this level of education. Mothers with high school or less education had the lowest breastfeeding rates.

Table I. Maternal characteristics between children included and excluded

Characteristics	Included (N = 195 861) N (%)	Excluded (N = 64 664) N (%)
Race/ethnicity		
Non-Hispanic white	50 105 (25.6)	14 997 (23.2)
Non-Hispanic black	14 931 (7.6)	5411 (8.4)
Hispanic	97 558 (49.8)	35 479 (54.9)
Asian and Pacific Islander	28 271 (14.4)	6285 (9.7)
Other	4996 (2.6)	1578 (2.4)
Missing		914 (1.4)
Maternal age at delivery		
15-19 y	6584 (3.4)	5611 (8.7)
20-24 y	25 639 (13.1)	14 352 (22.2)
25-29 y	54 463 (27.8)	17 616 (27.2)
30-34 y	65 172 (33.3)	15 992 (24.7)
35-39 y	35 541 (18.1)	8131 (12.6)
40-55 y	8462 (4.3)	2043 (3.2)
Missing		919 (1.4)
Prepregnancy BMI		
Underweight (BMI <18.5 kg/m^2)	4644 (2.4)	1791 (2.8)
Normal (18.5-24.95 kg/m^2)	86 095 (44)	27 126 (41.9)
Overweight (25-29.95 kg/m^2)	55 242 (28.2)	17 322 (26.8)
Obese (BMI ≥305 kg/m^2)	49 880 (25.5)	15 670 (24.2)
Unknown		2755 (4.3)
Parity		
0	64 951 (33.2)	21 039 (32.5)
1	63 542 (32.4)	18 876 (29.2)
>1	46 410 (23.7)	15 359 (23.8)
Unknown	20 958 (10.7)	9390 (14.5)
Education		
High school or less	57 085 (29.1)	26 962 (41.7)
Some college	60 368 (30.8)	19 406 (30)
College or higher	78 408 (40)	14 480 (22.4)
Unknown		3816 (5.9)
Year of infant birth		
2008	21 698 (11.1)	8737 (13.5)
2009	22 812 (11.6)	6720 (10.4)
2010	23 005 (11.7)	6444 (10)
2011	24 242 (12.4)	7041 (10.9)
2012	25 490 (13)	7726 (11.9)
2013	24 307 (12.4)	9894 (15.3)
2014	26 257 (13.4)	9112 (14.1)
2015	28 050 (14.3)	8990 (13.9)

Table III presents the absolute rate differences in breastfeeding ≥6 months by each of the 5 maternal characteristics without (bivariate model) and with (multivariate model) adjustment for the 4 other maternal characteristics. Adjusting for the 4 other characteristics reduced the rate differences associated with each characteristic. After adjusting for each of the other characteristics, the rates were 7.1% and 4.8% lower in non-Hispanic black and Hispanic mothers than in non-Hispanic white mothers; 11.3% and 5.6% lower in mothers aged 15-19 and 20-24 years than mothers aged 25-29 years; 8.4% and 3.3% lower in mothers with obesity and who were overweight than mothers with normal weight; and 11.2% higher in mothers with college or higher education than mothers with high school or less education. Rates in breastfeeding ≥6 months differed by ~1.0% between first child vs subsequent child.

Table IV presents the changes in QICs in the stepwise analysis after adjusting for birth year. A bigger decrease in QIC means a better model fit for the tested variable. After adjusting for birth year, the variable "education" explained most of the variation in breastfeeding rates. After adjusting for birth year and education, the next important variable was maternal age. The order of importance for the remaining 3 variables was prepregnancy obesity status, followed by race and ethnicity and parity. QICu analysis gave the same conclusions (data not shown). Also presented in **Table IV** are the χ^2 statistics from the full model fitting where all 5 maternal characteristics were included simultaneously. Larger χ^2 statistics after considering degree of freedom means greater importance in modeling the variation in breastfeeding rates. Clearly, the results from the χ^2 statistics in this one model were consistent with the QIC and QICu analyses.

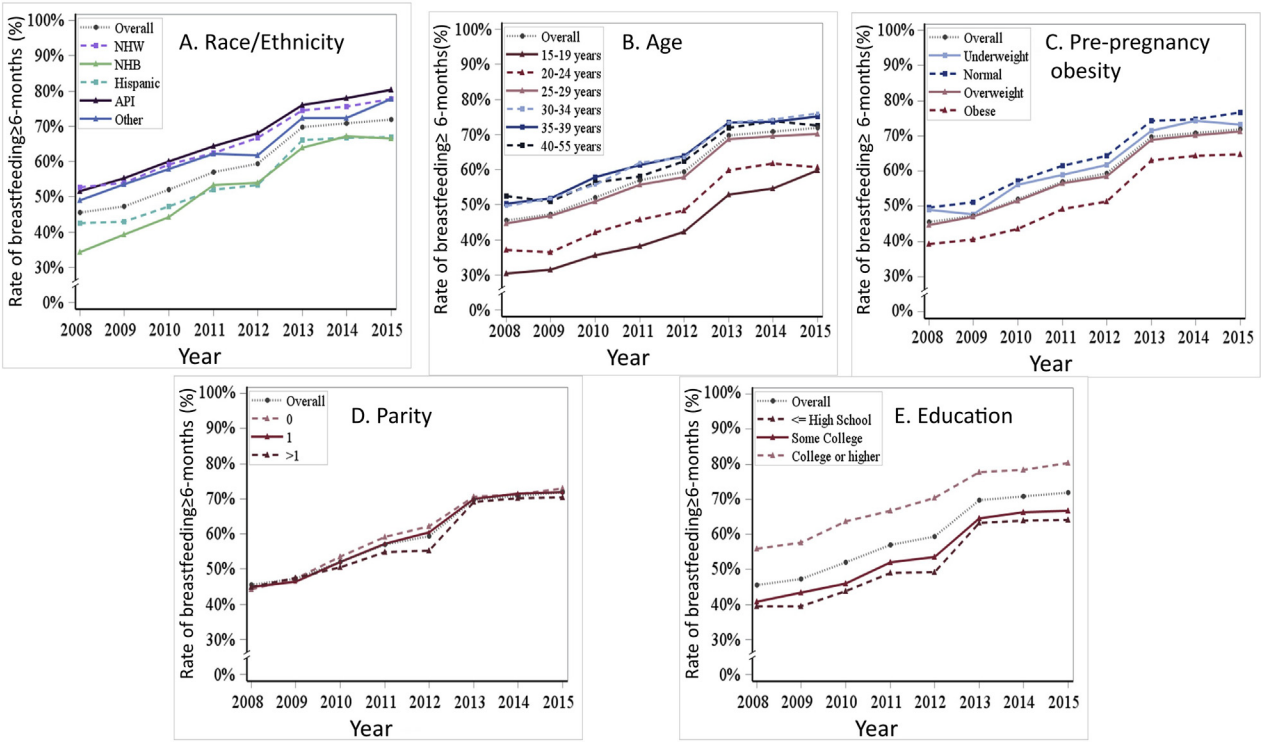

Figure. Rates of breastfeeding ≥6 months by **A,** birth year and maternal race/ethnicity, **B,** age at delivery, **C,** prepregnancy obesity status, **D,** parity, and **E,** maternal level of education. *API*, Asian and Pacific Islander; *NHB*, non-Hispanic black; *NHW*, non-Hispanic white.

Sensitivity analysis including 1 child per woman in the study cohort did not affect our study results (Tables V and VI; available at www.jpeds.com). Maternal education remained as the variable most associated with the variation in breastfeeding rates, followed by maternal age, prepregnancy obesity status, race and ethnicity, and parity.

Discussion

Data from this large and multi-ethnic clinical cohort within an integrated healthcare system demonstrated a significant increase in rates of breastfeeding ≥6 months from 2008 to 2015 overall, and among each group (maternal race and ethnicity, age at delivery, prepregnancy obesity, parity, and level of education). Overall, the rate of breastfeeding ≥6 months increased from 46% in 2008 to 72% in 2015, a ~56% increase over an 8-year period. However, disparities continued to exist over time for race and ethnicity, age at delivery, prepregnancy obesity status, and level of education. Although the trend analysis indicated improvements for all of the variables tested, there was no substantial improvement in closing the gaps in disparities associated with race and ethnicity, age, obesity status, and education. Little disparity was observed for parity. Among the 5 maternal characteristics tested, education contributed to the greatest disparity in breastfeeding persistence. Maternal age was the second factor, followed by prepregnancy obesity. Interestingly, maternal race and ethnicity was ranked as the fourth factor, once maternal education, age at delivery, and prepregnancy obesity were considered. Our results suggest that, within integrated healthcare systems, breastfeeding outreach programs focusing on women with lower education, women less than 25 years old, and women from non-Hispanic black or Hispanic race and ethnicity may help close disparities and improve breastfeeding persistence rates.

In 2011, the US Surgeon General's Call for Action to Support Breastfeeding reported that breastfeeding rates among the US population have increased starting from ~1995 through 2008.[37] However, few studies provide updated trends since 2008. Data from the Centers for Disease Control National Immunization Survey showed rates of breastfeeding at 6 months were 44%, 47%, 48%, 49%, 51%, 52%, and 55%, respectively from 2008 to 2014 (https://www.cdc.gov/breastfeeding/data/nis_data/results.html). The corresponding rates for California were 58%, 61%, 68%, 63%, 66%, 59%, and 64%, respectively. Our rates (46%, 47%, 52%, 57%, 59%, 70%, and 71%, respectively from 2008 to 2014) were between the national and California rates for the years 2008 to 2012, but were higher than the national and California rates in 2013 and 2014. The higher rates in later years may be due to following 2 factors. First, the KPSC regional office initiated a breastfeeding initiative in January 2013 to promote and emphasize breastfeeding persistence, which led to an increase in breastfeeding initiation and continuation

Table III. Rate difference in rates of breastfeeding ≥6 months associated with maternal characteristics for 195 861 children

	Bivariate model*		Multivariate model†	
Variables	**Rate difference (95% CL)**	***P* value**	**Rate difference (95% CL)**	***P* value**
Race/ethnicity				
Non-Hispanic White	Reference		Reference	
Non-Hispanic Black	−13.0% (−13.9%, −12.1%)	<.0001	−7.1% (−8.1%, −6.2%)	<.0001
Hispanic	−10.7% (−11.2%, −10.1%)	<.0001	−4.8% (−5.4%, −4.2%)	<.0001
Asian and Pacific Islander	1.3% (0.6%, 2.0%)	.0002	−2.4% (−3.1%, −1.6%)	<.0001
Other	−2.1% (−3.5%, −0.7%)	.003	−0.3% (−1.7%, 1.1%)	.6
Maternal age at delivery				
25-29 y	Reference		Reference	
15-19 y	−15% (−16.3%, −13.8%)	<.0001	−11.3% (−12.6%, −10%)	<.0001
20-24 y	−9% (−9.7%, −8.3%)	<.0001	−5.6% (−6.4%, −4.9%)	<.0001
30-34 y	5.3% (4.7%, 5.9%)	<.0001	3.3% (2.7%, 3.8%)	<.0001
35-39 y	5.4% (4.8%, 6.1%)	<.0001	3.8% (3.1%, 4.5%)	<.0001
40-55 y	4.3% (3.2%, 5.5%)	<.0001	3.8% (2.6%, 4.9%)	<.0001
Prepregnancy BMI				
Normal	Reference		Reference	
Underweight	−2.1% (−3.6%, −0.7%)	.004	−0.5% (−1.9%, 1.0%)	.5
Overweight	−5.1% (−5.6%, −4.6%)	<.0001	−3.3% (−3.8%, −2.8%)	<.0001
Obese	−11.7% (−12.2%, −11.1%)	<.0001	−8.4% (−8.9%, −7.8%)	<.0001
Parity				
0	Reference		Reference	
1	−0.7% (−1.2%, −0.1%)	.01	−1.1% (−1.7%, −0.6%)	<.0001
>1	−2.1% (−2.7%, −1.5%)	<.0001	−1.0% (−1.6%, −0.4%)	.002
Unknown	−0.2% (−1%, 0.6%)	.6	1.0% (0.2%, 1.8%)	.01
Education				
High school or less	Reference		Reference	
Some college	2.7% (2.1%, 3.2%)	<.0001	1.1% (0.5%, 1.6%)	.0005
College or higher	17.4% (16.8%, 17.9%)	<.0001	11.2% (10.6%, 11.8%)	<.0001
Year of infant birth			4% (3.9%, 4.1%)	<.0001

*Adjusted for year of infant birth.
†Adjusted for year of infant birth and the other 4 maternal characteristics in the model.

starting in 2013. Second, the social/demographic status in this cohort may differ from the samples used in the National Immunization Survey where less than 550 individuals per year were included for the state of California.

Our results on breastfeeding disparities associated with maternal race and ethnicity, age at delivery, obesity, and education level were consistent with results reported previously. Breastfeeding rates were lower in women who were black and Hispanic,[11-16] younger ages,[27,28] obese,[13,17-26] and with less education.[21,29,38] Although parity has been associated with breastfeeding in combination with older maternal age in Japanese women,[27] there was little disparity associated with parity overall in this study. Our study showed that, among these 5 maternal characteristics, level of maternal education contributed to the greatest disparity in breastfeeding persistence at 6 months. Improving breastfeeding requires supports at many levels.[31] Our results help shed light on developing targeted methods to improve breastfeeding persistence rates in large integrated healthcare systems.

Strengths of this study include a large sample size, multiethnic cohort, continuous data over 8 years including all eligible children born from 2008 to 2015, and multiple maternal measures. All data were captured in real time in the EMR, thus, limiting potential recall bias that is associated with information captured retrospectively. Trends by each category of maternal race and ethnicity, age at delivery,

Table IV. Model fitting of maternal characteristics for 195 861 children

Statistics	**Education**	**Age at delivery**	**Prepregnancy BMI**	**Race/ethnicity**	**Parity**
Change in QIC*					
Adjusted for YOB	−5148	−2877	−1906	−2647	−64
Adjusted for YOB, education		−950	−946	−794	−32
Adjusted for YOB, education, age			−1191	−671	−102
Adjusted for YOB, education, age, BMI				−428	−59
Adjusted for YOB, education, age, BMI, race/ethnicity					−46
χ^2 of full model	1591.77	847.61	810.64	374.25	37.13
Degree of freedom	2	5	3	4	3
P value for each	<.0001	<.0001	<.0001	<.0001	<.0001

YOB, year of birth.
*Change in QIC of adjusted model with maternal covariate minus adjusted model without maternal covariate, bigger decrease in QIC means better model fit for the tested variable.

prepregnancy obesity, parity, and education were assessed. The relative importance of these 5 maternal characteristics was jointly assessed to rank the significance of each on breastfeeding disparities.

We acknowledge some important limitations. We could not estimate exclusive breastfeeding because information on the start of formula feeding was not captured. Our analysis did not include information on socioeconomic status, smoking, personal perception of social images, maternal complication other than obesity, delivery mode and infant characteristics, and barriers including work and family related,[30-32] factors that may confound or interact with the variables tested and alter the results. We elected to use breastfeeding ≥6 months as the outcome instead of using duration of breastfeeding, as the exact date of breastfeeding discontinuation was not captured in the EMR. Our sample is from a managed healthcare system, which means everyone had access to healthcare and educational resources that support breastfeeding, thus, our results may not be generalizable to populations without healthcare and educational resources. Lastly, our findings may not be generalizable to other populations that differ from Southern California.

Despite the significant increase in the rates of breastfeeding at 6 months from 2008 to 2015 in an integrated healthcare system, there was little improvement in closing the disparities associated with maternal race and ethnicity, age at delivery, prepregnancy obesity status, and level of education. Breastfeeding outreach programs focusing on women with less than a college education, women younger than 25 years old, and women from non-Hispanic black or Hispanic race and ethnicity may help to reduce the disparities and improve breastfeeding persistence rates within integrated healthcare systems. ■

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50 Years Ago in *The Journal of Pediatrics*

Chronic Polyneuritis of Childhood

Tasker W, Chutorian AM. J Pediatr 1969;74:699-708

Tasker and Chutorian described 17 pediatric patients with suspected chronic inflammatory demyelinating polyradiculoneuropathy (CIDP). Two of these patients were ultimately diagnosed with alternative diagnoses (hereditary neuropathy and metachromatic leukodystrophy). Most of the children in this cohort who received immunomodulatory therapy were treated with corticosteroids, with unclear response, although notably, the mean time between onset of symptoms and initiation of treatment was nearly 2 years.

Pediatric CIDP remains relatively rare overall, but nearly 200 cases have been published since 1980.[1,2] There are now consensus criteria for establishing the diagnosis of pediatric CIDP, which include mandatory clinical, electrodiagnostic, and laboratory criteria. The minimum duration of symptoms for the diagnosis of pediatric CIDP is 4 weeks, in contrast with a >1-year duration of symptoms for the diagnosis of "chronic polyneuritis of childhood" 50 years ago.

There are no randomized controlled trials in pediatric CIDP. However, a review of pediatric case series suggests relatively equal efficacy of intravenous immunoglobulin (IVIG) and corticosteroids when used as initial treatment.[1,2] Combining these case series, 54 of 71 patients (76%) receiving IVIG versus 62 of 76 patients (82%) receiving corticosteroids as initial therapy improved without the need for a second-line therapy.

With earlier recognition of pediatric CIDP, prompt initiation of immunomodulatory therapy may contribute to the improved outcomes noted in more recent case series. The rarity of this disorder limits the ability to study pediatric CIDP in randomized controlled trials, but a trial of single versus multiple doses of IVIG is planned (Clinicaltrials.gov; NCT03684018). Despite having more well-defined diagnostic criteria, similar to the cohort of Tasker and Chutorian, a subset of the patients in these newer case series who initially meet criteria for definite CIDP are later reclassified with genetic or metabolic disorders, highlighting the importance of reevaluating the initial diagnosis of CIDP in the setting of evolving clinical symptoms, particularly in those who do not respond to treatment.

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Table II. Rates of breastfeeding ≥6 months by birth year and maternal characteristics

N (%yes)	2008	2009	2010	2011	2012	2013	2014	2015
Overall	21 698 (45.6%)	22 812 (47.2%)	23 005 (52.1%)	24 242 (57%)	25 490 (59.4%)	24 307 (69.8%)	26 257 (70.8%)	28 050 (71.9%)
Race/ethnicity								
Non-Hispanic white	5181 (52.6%)	5625 (54.0%)	5953 (59.2%)	6395 (62.5%)	6661 (66.7%)	6402 (74.5%)	6779 (75.6%)	7109 (77.7%)
Non-Hispanic black	1810 (34.3%)	1980 (39.3%)	1897 (44.3%)	1925 (53.4%)	1861 (53.9%)	1805 (63.9%)	1818 (67.1%)	1835 (66.4%)
Hispanic	11 332 (42.5%)	11 626 (42.9%)	11 434 (47.2%)	11 854 (52.1%)	12 342 (53.4%)	11 797 (66.1%)	13 029 (66.7%)	14 144 (66.9%)
Other	437 (49.0%)	342 (53.5%)	491 (57.8%)	507 (62.1%)	751 (61.8%)	780 (72.4%)	823 (72.3%)	865 (77.8%)
Asian and Pacific Islander	2938 (51.6%)	3239 (55.2%)	3230 (60.1%)	3561 (64.3%)	3875 (68%)	3523 (76.1%)	3808 (78.0%)	4097 (80.3%)
Age at delivery								
15-19 y	1056 (30.4%)	958 (31.5%)	950 (35.6%)	834 (38.2%)	822 (42.2%)	692 (52.9%)	682 (54.7%)	590 (59.8%)
20-24 y	3240 (37%)	3235 (36.4%)	3031 (42%)	3142 (45.7%)	3280 (48.4%)	3098 (59.9%)	3225 (61.8%)	3388 (60.7%)
25-29 y	6347 (44.7%)	6725 (46.8%)	6626 (50.9%)	6904 (55.7%)	6939 (57.9%)	6513 (68.6%)	6995 (69.5%)	7414 (70.1%)
30-34 y	6549 (49.6%)	7103 (51.8%)	7353 (55.7%)	8082 (61.9%)	8603 (63.5%)	8399 (73.5%)	9243 (74.3%)	9840 (75.9%)
35-39 y	3654 (50.3%)	3861 (51.7%)	4027 (57.8%)	4231 (61.4%)	4730 (63.8%)	4537 (73.4%)	4955 (73.6%)	5546 (75.2%)
40-55 y	852 (52.5%)	930 (50.9%)	1018 (56.3%)	1049 (58.1%)	1116 (62.4%)	1068 (71.9%)	1157 (73.9%)	1272 (72.6%)
Prepregnancy obesity								
Under	499 (49.1%)	600 (47.7%)	554 (56.1%)	541 (59.0%)	613 (61.7%)	598 (71.4%)	634 (74.3%)	605 (73.2%)
Normal	9577 (49.6%)	9911 (51.2%)	10 154 (57.1%)	10 692 (61.5%)	11 452 (64.4%)	10 693 (74.2%)	11 539 (74.8%)	12 077 (76.7%)
Over	6184 (44.7%)	6424 (47.1%)	6510 (51.6%)	6887 (56.6%)	6979 (58.4%)	6876 (68.8%)	7398 (70.1%)	7984 (71.2%)
Obese	5438 (39.3%)	5877 (40.5%)	5787 (43.5%)	6122 (49.2%)	6446 (51.3%)	6140 (63.0%)	6686 (64.4%)	7384 (64.7%)
Parity								
0	8470 (44.3%)	9454 (47.2%)	7245 (53.5%)	7930 (59.2%)	8290 (62.1%)	7353 (70.7%)	7930 (71.2%)	8279 (72.9%)
1	6007 (44.8%)	6372 (46.4%)	7740 (52.1%)	8145 (57.3%)	8597 (60.4%)	8157 (69.9%)	8905 (71.4%)	9619 (72.0%)
>1	5546 (44.8%)	5637 (47.5%)	5761 (50.6%)	5952 (54.8%)	5949 (55.3%)	5335 (69.1%)	5761 (70.2%)	6469 (70.4%)
Unknown	1675 (57.5%)	1349 (50.0%)	2259 (51.2%)	2215 (53.6%)	2654 (56.7%)	3462 (68.8%)	3661 (69.5%)	3683 (71.9%)
Education								
≤High school	7736 (39.5%)	7770 (39.4%)	7206 (43.8%)	7159 (48.9%)	7006 (49.3%)	6404 (63.3%)	6763 (64.0%)	7041 (64.2%)
Some college	6460 (40.8%)	6834 (43.4%)	6962 (45.9%)	7396 (52.0%)	7921 (53.6%)	7572 (64.6%)	8262 (66.3%)	8961 (66.7%)
College or higher	7502 (55.9%)	8208 (57.7%)	8837 (63.7%)	9687 (66.8%)	10 563 (70.4%)	10 331 (77.7%)	11 232 (78.3%)	12 048 (80.3%)

Table V. Rate difference in rates of breastfeeding >= 6 months associated with maternal characteristics for 159 333 children (1 child per woman)

	Bivariate model*		Multivariate model†	
Variables	**Rate difference (95% CL)**	***P* value**	**Rate difference (95% CL)**	***P* value**
Race/ethnicity				
Non-Hispanic white	Reference		Reference	
Non-Hispanic black	−13.4% (−14.4%, −12.4%)	<.0001	−7.5% (−8.5%, −6.5%)	<.0001
Hispanic	−10.7% (−11.3%, −10.1%)	<.0001	−4.7% (−5.3%, −4.1%)	<.0001
Asian and Pacific Islander	1.2% (0.4%, 1.9%)	.004	−2.5% (−3.3%, −1.7%)	<.0001
Other	−2.2% (−3.8%, −0.6%)	.006	−0.3% (−1.9%, 1.3%)	.7
Maternal age at delivery				
25-29 y	Reference		Reference	
15-19 y	−15.1% (−16.4%, −13.8%)	<.0001	−11.4% (−12.7%, −10%)	<.0001
20-24 y	−8.9% (−9.7%, −8.1%)	<.0001	−5.5% (−6.3%, −4.7%)	<.0001
30-34 y	5.0% (4.4%, 5.7%)	<.0001	3.2% (2.6%, 3.9%)	<.0001
35-39 y	4.8% (4.0%, 5.5%)	<.0001	3.8% (3.0%, 4.5%)	<.0001
40-55 y	4.1% (2.9%, 5.4%)	<.0001	4.1% (2.8%, 5.4%)	<.0001
Prepregnancy BMI				
Normal	Reference		Reference	
Underweight	−2.1% (−3.7%, −0.5%)	.01	−0.4% (−2.0%, 1.2%)	.6
Overweight	−5.0% (−5.6%, −4.5%)	<.0001	−3.2% (−3.8%, −2.7%)	<.0001
Obese	−11.3% (−11.9%, −10.7%)	<.0001	−8.0% (−8.7%, −7.4%)	<.0001
Parity				
0	Reference		Reference	
1	−2.2% (−2.8%, −1.6%)	<.0001	−1.8% (−2.4%, −1.2%)	<.0001
>1	−3.0% (−3.6%, −2.3%)	<.0001	−1.4% (−2.1%, −0.7%)	.0002
Unknown	−0.1% (−0.9%, 0.7%)	.8	1.1% (0.3%, 1.9%)	.006
Education				
High school or less	Reference		Reference	
Some college	2.5% (1.9%, 3.1%)	<.0001	0.9% (0.2%, 1.5%)	.008
College or higher	17.6% (17.1%, 18.2%)	<.0001	11.4% (10.7%, 12.1%)	<.0001
Year of infant birth			3.9% (3.8%, 4.0%)	<.0001

*Adjusted for year of infant birth.
†Adjusted for year of infant birth and the other four maternal characteristics in the model.

Table VI. Model fitting of maternal characteristics for 159 333 children (1 child per woman)

Statistics	Education	Age at delivery	Prepregnancy BMI	Race/ethnicity	Parity
Change in QIC*					
Adjusted for YOB	−4234	−2337	−1433	−2142	−116
Adjusted for YOB, education		−774	−687	−637	−36
Adjusted for YOB, education, age			−894	−539	−132
Adjusted for YOB, education, age, BMI				−356	−88
Adjusted for YOB, education, age, BMI, race/ethnicity					−69
χ^2 of full model	1309.27	737.32	604.21	303.55	58.78
Degree of freedom	2	5	3	4	3
P value for each	<.0001	<.0001	<.0001	<.0001	<.0001

YOB, year of birth.
*Change in QIC of adjusted model with maternal covariate minus adjusted model without maternal covariate, bigger decrease in QIC means better model fit for the tested variable.