Research Article

Breastfeeding Initiation Trends by *Special Supplemental Nutrition Program for Women, Infants, and Children* Participation and Race/Ethnicity Among *Medicaid* Births

Marie E. Thoma, PhD[1]; Dane A. De Silva, PhD[2]; Jinhee Kim, PhD[1]; Leslie Hodges, PhD[3]; Joanne Guthrie, PhD, RD[3]

ABSTRACT

Objective: Describe long-term breastfeeding initiation trends by prenatal *Special Supplemental Nutrition Program for Women, Infants, and Children* (WIC) participation and race/ethnicity.

Design: Cross-sectional study of birth certificate data from 2009 to 2017 in 24 states that adopted the 2003 birth certificate revision by 2009.

Participants: Term births with hospital costs covered by *Medicaid* (N = 6,402,704).

Main Outcome Measures: Breastfeeding initiation.

Analysis: The descriptive characteristics of WIC participants and WIC-eligible nonparticipants were compared by year and race/ethnicity using the chi-square test of independence or *t* tests. Adjusted breastfeeding initiation prevalence was estimated using linear regression models with county fixed effects, controlling for sociodemographic and obstetric/health factors. Trends were compared by WIC status overall and within racial/ethnic groups. Differences and *P* values were assessed using interaction terms between WIC and year.

Results: Breastfeeding initiation increased for WIC participants and nonparticipants. *Special Supplemental Nutrition Program for Women, Infants, and Children* participants had lower adjusted breastfeeding initiation (2009: 69.0%; 2017: 78.5%) than nonparticipants (2009: 70.8%; 2017: 80.1%) ($P < 0.001$ per year). Breastfeeding initiation increased more rapidly in WIC participants than in nonparticipants for non-Hispanic Asian/Pacific Islander (21.4% and 8.6%, respectively; $P < 0.001$) and American Indian/Alaskan Native (13.6% and 8.1%, respectively; $P = 0.02$)—narrowing the gap between WIC participants and nonparticipants over time.

Conclusions and Implications: Annual birth certificate data provide detailed information for monitoring trends and disparities in breastfeeding initiation by prenatal WIC status. These findings can inform WIC and maternal child health program efforts to improve breastfeeding promotion for populations with low-income and racial/ethnic groups.

Key Words: breastfeeding, WIC, racial/ethnic disparities (*J Nutr Educ Behav.* 2023;55:170−181.)

Accepted September 23, 2022. Published online January 13, 2023.

INTRODUCTION

Breastfeeding is associated with significant short and long-term health benefits for both the mother (eg, retained gestational weight gain, type 2 diabetes) and child (eg, infectious morbidity, sudden infant death syndrome).[1] Accordingly, breastfeeding is considered a primary prevention strategy for reducing infant mortality in the US.[1,2] Intention and early attempts to breastfeed shape the trajectory for increasing the proportion of infants who are ever breastfed in the US—a metric established by Healthy People and Title V Maternal Child Health Block Grant national performance measure.[3–5] Although the US exceeded the Healthy People 2020 (HP2020) target goal of 81.9% for this objective by 2014, substantial disparities exist by race/ethnicity and socioeconomic status. In 2018, non-Hispanic Black women (75.5%) and women with

[1]Department of Family Science, School of Public Health, College Park, MD
[2]Division of Population Health Data, Office of Family Health Services, Virginia Department of Health, Richmond, VA
[3]Economic Research Service, US Department of Agriculture, Washington, DC
Conflict of Interest Disclosure: The authors have not stated any conflicts of interest.
Address for correspondence: Marie E. Thoma, PhD, Department of Family Science, School of Public Health, 4200 Valley Dr, Family Science Ste 1142, College Park, MD 20742; E-mail: mthoma@umd.edu

https://doi.org/10.1016/j.jneb.2022.09.006

income less than 100% of the federal poverty level (FPL) (76.8%) had the lowest rates of having ever breastfed and remain well below the goal set forth by HP2020.[6,7] These discrepancies have been attributed to a multitude of social and structural barriers to breastfeeding, such as racism in the job setting, mode of delivery, lack of social or provider support, lack of access to information, and limited access to maternity care practices to support breastfeeding.[8–13]

Coordinated national efforts to address these barriers are critical for ensuring support for a person's decision to breastfeed and optimal infant nutrition reaches all groups, especially those with lower breastfeeding rates. Since 2010, breastfeeding initiatives have been prioritized at the federal level through the 2011 US Surgeon General's Call to Action to Support Breastfeeding and the Centers for Disease Control and Prevention's Winnable Battles.[14,15] These activities encompassed many levels of support: individuals and families, communities, health care facilities, employers, and research and public health infrastructure. Also passed in 2010, the Affordable Care Act incorporated 2 provisions to promote breastfeeding: (1) requires insurers to provide coverage of breastfeeding supplies and support services, and (2) requires employers of employees who are not exempt from the Fair Labor Standards Act's overtime pay requirements and encourages employers of all nursing mothers, regardless of their Fair Labor Standards Act status, to provide reasonable break time and a space to express breast milk beginning on or after August 1, 2012.[16,17] States that adopted the expanded *Medicaid* coverage plan would also be entitled to coverage consistent with these provisions.

Alongside these efforts, the US Department of Agriculture's (USDA) *Special Supplemental Nutrition Program for Women, Infants, and Children* (WIC) have been a cornerstone in providing food and nutrition assistance to support the health of mothers and children living in low-income households in the US. In 2007, the USDA updated rules governing WIC foods to increase breastfeeding support and align food packages more closely with nutrition science guidelines.[18] Specifically, changes to promote breastfeeding included revising food packages to distinguish between full, partial, or no breastfeeding and incentivizing the full breastfeeding package to include more food offerings and less formula issuance overall. By October 2009, states had fully implemented these changes—marking the most comprehensive revision of WIC services since 1980.

Despite these initiatives, studies consistently show lower breastfeeding rates among WIC participants than WIC-eligible nonparticipants.[19–21] As the largest purchaser of infant formula in the US, WIC has been criticized for providing financial incentives that promote the use of infant formula.[22,23] It has also been suggested that disparities in breastfeeding by WIC status may reflect the self-selection of infant formula users or more sociodemographically disadvantaged women into the program.[24,25] Findings on whether breastfeeding improved for WIC participants after the 2009 WIC food package revision have been mixed.[26–31] However, interpretation of these findings was limited as they either evaluated only WIC populations or short-term changes in breastfeeding outcomes (ie, within 2 years of the revision). The study that examined longer-term trends after the 2009 food package revision did not detail specific trends by race/ethnicity.[20] This may, in part, be due to the reliance on survey data with an insufficient sample size to assess more detailed demographic subgroups.

In 2013, national data from the 2003 US standard birth certificate became publicly available for data years 2009 onward with new information on breastfeeding initiation at hospital discharge, prenatal WIC participation, and source of payment for the delivery.[32] Birth certificate data represent 100% of all registered births in the US and provide rich information on sociodemographic, geographic, and obstetric health outcomes, which may influence breastfeeding patterns and trends and women's access to breastfeeding programs and initiatives.[33] Therefore, the objective of this study was to use revised birth certificate data to describe long-term (2009–2017) trends in breastfeeding initiation by WIC participation and race/ethnicity among women who live in low-income households, as indicated by their infant's birth being paid for by *Medicaid*.

METHODS

Data Source and Study Population

National birth certificate data between 2009–2017 were examined. These deidentified data are collected annually and represent 100% of all registered live births in the US.[34] Data containing state and county-level information on the place of maternal residence must be reviewed and approved by the National Center for Health Statistics, Centers for Disease Control and Prevention.[35] This study was not considered human subject research by the University of Maryland, College Park Institutional Review Board and consent is not required for vital records data collection.[36]

The analytic sample was restricted to all term births in which the delivery was paid for by *Medicaid* and in which states adopted the 2003 birth certificate revision by January 1, 2009. Term deliveries were based on the obstetric estimate (OE) of gestational age, defined as "the best obstetric estimate of the infant's gestation in completed weeks based on the birth attendant's final estimate of gestation."[37] This measure has been shown to be reported with a high degree of accuracy.[33,38] These inclusion criteria ensured that the study population included: (1) births in which the mother was eligible for WIC services (ie, adjunctive eligibility for WIC via documentation of *Medicaid* enrollment, regardless of income level) and (2) that the gestational age of the pregnancy did not determine enrollment into the WIC program (ie, mothers with preterm birth would have less time to enroll into the program).

Data from 24 states were included in the final analytic sample across all years (Table 1). States with 2017 *Medicaid* thresholds higher or lower than

Table 1. Twenty-four States Included in the Final Analytic Sample and Corresponding *Medicaid* Income Eligibility Thresholds for Pregnant Women in 2017

State	*Medicaid* Income Eligibility (% Federal Poverty Level)
Colorado	265
Florida	196
Idaho	138[a]
Indiana	213
Iowa	380
Kansas	171[a]
Kentucky	200
Montana	162[a]
Nebraska	202
New Hampshire	201
New Mexico	255
New York	223
North Dakota	152[a]
Ohio	205
Oregon	190
Pennsylvania	220
South Carolina	199
South Dakota	138[a]
Tennessee	255
Texas	207
Utah	144[a]
Vermont	213
Washington	198
Wyoming	159[a]

[a]Indicates the states in which the *Medicaid* income eligibility threshold fell below the US Department of Agriculture's *Special Supplemental Nutrition Program for Women, Infants, and Children* income eligibility threshold of 185% of the federal poverty level.

WIC income eligibility (185% FPL) remained higher or lower throughout the study period. Four states had revised their birth certificates but were excluded because they had not adopted the standard version of the breastfeeding measure (California) or had at least 1 year of data flagged for data quality concerns on key variables between 2009-2017 (Georgia, Michigan, and Delaware). Detailed information on birth certificate revisions was described elsewhere.[33,34]

Study Measures

Breastfeeding initiation was determined from a birth certificate data item (Is the infant being breastfed at discharge?), for which guidelines stipulate this information should be extracted from medical records. Estimates from the birth certificate are comparable to the National Immunization Survey (83.4% and 84.1% in 2017) used to monitor trends in ever breastfed by Healthy People.[39] Participation in WIC was self-reported by the mother on the basis of her response to a survey question (Did you receive WIC food for yourself because you were pregnant with this child?). The reliability of birth certificate information on breastfeeding ($\kappa = 0.72$) and WIC status ($\kappa = 0.81$) was good compared with the Pregnancy Risk Assessment Monitoring Survey data.[40] Race and ethnicity categories are as follows: Hispanic and non-Hispanic American Indian/Alaskan Native, Black or African American, Asian/Pacific Islander, and White. The implementation of race/ethnicity questions and categories can vary by state, but race/ethnicity and other sociodemographic characteristics are recommended to be self-collected from a maternal worksheet described elsewhere.[41] One or more race/ethnicity categories could be selected.

Maternal sociodemographic and health characteristics included maternal age at birth, level of education, marital status, prepregnancy body mass index (BMI), smoking status 3 months before and during pregnancy, the timing of prenatal care initiation, and route of delivery (vaginal spontaneous, vaginal-assisted by forceps or vacuum, and cesarean delivery). Prenatal care initiation was derived from information on the date of the first prenatal care visit and OE of gestational age. Body mass index was derived from information collected on height and prepregnancy weight.

Infant characteristics included birth order, OE gestational age in weeks (37-38 weeks or early term, 39-40 weeks or full term, 41 weeks or late term, and > 42 weeks or post term), birthweight, admission to the neonatal intensive care unit (NICU) or infant transferred to another hospital, and sex. Infant sex refers to the sex (male/female) assigned on the birth certificate at the time of birth.

Statistical Analyses

Maternal and infant characteristics were examined by prenatal WIC participation status for 2009 and 2017 and across racial/ethnic demographic groups. Differences in characteristics by year or race were assessed using the chi-square test of independence or *t* tests for categorical or continuous variables. An unadjusted breastfeeding initiation prevalence was tabulated over data years by race/ethnicity and prenatal WIC status to examine trends. Percentage change in breastfeeding initiation prevalence between 2017 and 2009 was computed for prenatal WIC participants and eligible non-WIC participants.

To account for known differences between WIC participants and nonparticipants and local variation in breastfeeding programs, predicted probabilities and absolute change between 2017 and 2009 were estimated from linear probability models (LPM) with county-specific fixed effects overall and within each racial/ethnic group. The use of LPM is an alternative approach for obtaining average marginal effect estimates, which are less computationally intensive and produce results similar

to other generalized linear models when the sample size is large.[42] Models were adjusted for maternal sociodemographic and maternal and infant health characteristics, which included maternal age, marital status, educational level, birth order, the timing of prenatal care initiation, prepregnancy BMI, smoking, route of delivery, birthweight, NICU admission, and infant sex. Changes over time in predicted probabilities of breastfeeding initiation were examined. An interaction term was included to assess differences in linear trends per year by WIC status. Differences in WIC status per year were compared using the β coefficient and t test from the LPM model fit for each year. A 2-sided $P < 0.05$ was considered statistically significant. Sensitivity analyses compared adjusted breastfeeding initiation prevalence estimated from linear regression, logistic regression, and propensity score logistic regression models using inverse probability weighting to compare the robustness of our findings to potential imbalances in covariates or choice of estimation approach between WIC participants and nonparticipants. Comparison models were run without county fixed effects to reduce the computational complexity of the models during estimation.

RESULTS

The distribution of maternal sociodemographic and health characteristics changed for WIC participants and nonparticipants between 2009 and 2017 among the analytic sample (Table 2). Specifically, a higher proportion of births were born to women at older ages, at higher educational levels, and married women in 2017 compared with 2009. Prenatal care initiation in the first trimester, BMI, and NICU admission increased over time, whereas preconception smoking and first-born or term births decreased. Route of delivery, birthweight distributions, and infant sex remained relatively unchanged. All changes except infant sex were significant.

The distribution of characteristics varied by race/ethnicity, but the patterns were generally similar between WIC participants and nonparticipants (Table 3). Non-Hispanic Asian/Pacific Islander women were more likely to be older, married, have higher education, and be underweight or have normal BMI than other racial/ethnic groups. Non-Hispanic White women were more likely to initiate prenatal care in the first trimester and smoke during pregnancy, American Indian/Alaskan Native women were more likely to have had a second or higher order birth and less likely to have a cesarean delivery, and non-Hispanic Black women were more likely to have a low birth weight infant than other racial/ethnic groups.

After accounting for various sociodemographic, geographic, and health characteristics that may influence breastfeeding initiation, WIC participants had a lower adjusted prevalence than WIC-eligible nonparticipants but with a slightly higher increase in breastfeeding initiation over time (13.8% and 13.1%, respectively; $P < 0.002$) (Figure, A and Supplementary Table 1). Trends in breastfeeding initiation by WIC status varied when stratified by race/ethnicity. This gap was widest for non-Hispanic White (Figure, B) and Asian/Pacific Islander women (Figure, E) and narrowest among non-Hispanic Black (Figure, C) and Hispanic women (Figure, D). Most notably, the gap between WIC status was largest among Asian/Pacific Islanders in 2009 but narrowed considerably over time because of a greater increase in breastfeeding initiation within the WIC population (21.4% change between 2009 and 2017) compared with nonparticipants (8.6% change) (β coefficient for the difference in change over time between WIC participants and nonparticipants = 1.02; $P < 0.001$) (Figure, E and Supplementary Table 1). This pattern was also observed for American Indian/Alaskan Native, but to a lesser extent (WIC participants: 13.6% change in breastfeeding initiation between 2009 and 2017, nonparticipants: 8.1% change) (β coefficient = 0.32; $P = 0.02$) (Figure, F and Supplementary Table 1). These trends and patterns were similar, comparing unadjusted and adjusted estimates except for WIC comparisons overall, which showed slightly higher increases in breastfeeding over time among WIC participants than nonparticipants in adjusted analyses (β coefficient = 0.05; $P < 0.002$), but no difference in unadjusted analyses (β coefficient = −0.02; $P = 0.25$) (Supplementary Table 1). In addition, sensitivity analyses showed consistent findings across modeling approaches (Supplementary Table 2).

DISCUSSION

The prenatal period is a critical time for establishing breastfeeding intentions. Breastfeeding promotion efforts during this time can potentially increase both initiation and continuation of breastfeeding. Increasing the proportion of mothers who breastfeed would result in improved health for both the mother and child and improved health care cost savings.[1,43] Several national efforts to promote breastfeeding occurred simultaneously between 2009 and 2017, including revisions of WIC food packages for partially and fully breastfeeding women and other local initiatives.[14–16,18] Although breastfeeding initiation increased over time for all groups, it remained lower for WIC participants (78.5%) than in eligible nonparticipants (81.4%; $P < 0.001$) in 2017 among women enrolled in *Medicaid*. These estimates were lower than breastfeeding initiation among the overall US population in 2017 (83.4%).[44]

Despite controlling for a number of factors, including obstetric characteristics and geographic variation that may account for differences by WIC, and the use of propensity score methods, our finding of a persistently lower prevalence of breastfeeding initiation over time among WIC participants, is consistent with other literature examining national trends by WIC status.[19,20] Prior research using National Immunization Survey or the National Health and Nutrition Examination Survey data also showed that lower breastfeeding initiation among WIC participants compared with WIC-eligible nonparticipants persisted over time despite adjustment[20] or propensity score matching.[29]

Some researchers speculated that these differences might be attributed to the self-selection of women who

Table 2. Percent Distribution of Selected Maternal and Infant Characteristics by Prenatal WIC Status Among *Medicaid* Term Births: US Birth Certificate Data, 2009–2017

Maternal and Infant Characteristics	Total (%) 2009–2017	WIC Participants (%)[a] 2009	WIC Participants (%)[a] 2017	WIC-eligible, Nonparticipants (%)[b] 2009	WIC-eligible, Nonparticipants (%)[b] 2017
Maternal characteristics at the time of birth					
Maternal age at birth (y)	N = 6,402,704	n = 568,258	n = 474,146	n = 149,050	n = 230,100
≤ 20	14.5	19.2	10.9	12.2	6.6
20–24	35.0	37.3	31.1	35.9	28.0
25–29	27.0	24.6	29.6	28.7	33.0
30–34	15.3	12.4	18.1	15.1	20.9
35–39	6.6	5.3	8.4	6.5	9.4
≥ 40	1.6	1.3	2.0	1.7	2.2
Maternal age at birth (y), mean ± SD	25.7 ± 5.7	24.6 ± +5.6	27.6 ± 6.0	25.7 ± 5.6	26.4 ± 5.8
Maternal race/ethnicity	N = 6,402,704	n = 568,258	n = 474,146	n = 149,050	n = 230,100
Hispanic	34.3	34.2	35.9	23.7	26.4
Non-Hispanic Black	20.2	19.3	20.9	18.1	18.0
Non-Hispanic Asian/Pacific Islander	3.5	2.8	4.0	3.8	4.4
Non-Hispanic American Indian/Alaskan Native	1.2	1.1	1.2	1.3	1.2
Non-Hispanic White	40.4	41.9	37.7	52.3	49.5
Other[c]	0.5	0.5	0.4	0.7	0.4
Marital status	N = 6,402,652	n = 568,258	n = 474,116	n = 149,050	n = 230,078
Not married	66.7	67.4	65.8	59.6	58.4
Married	33.3	32.6	34.2	40.4	41.6
Maternal educational attainment	N = 6,373,496	n = 566,135	n = 472,006	n = 148,264	n = 228,871
No high school diploma or GED	28.9	33.9	25.1	26.1	18.8
High school diploma or GED	38.8	38.4	41.1	34.1	35.5
Some college	22.2	20.0	21.9	24.8	25.7
Bachelor's degree or higher	10.1	7.7	11.9	15.0	20.0
Prenatal care initiation	N = 6,227,459	n = 550,033	n = 462,327	n = 143,472	n = 224,029
First trimester	64.1	59.2	67.8	54.0	64.1
Second trimester	27.8	32.0	24.1	32.2	24.4
Third trimester or none	8.1	8.8	8.2	13.9	11.6
Prepregnancy body mass index	N = 6,234,353	n = 553,065	n = 463,026	n = 144,237	n = 224,330
Underweight	4.5	4.9	4.0	5.2	4.3
Normal	41.2	44.2	38.3	48.5	42.7
Overweight	25.7	25.0	26.2	24.6	26.3
Obese	28.6	25.9	31.5	21.7	26.8
Smoking status[d]	N = 6,191,486	n = 490,039	n = 471,724	n = 132,160	n = 229,159
None	81.2	77.7	84.5	77.7	84.0
Prepregnancy smoking only	3.5	3.9	3.0	4.2	3.3
Smoked during pregnancy	15.3	18.4	12.5	18.1	12.8
Route of delivery	N = 6,399,853	n = 567,912	n = 474,007	n = 148,973	n = 230, 029
Spontaneous vaginal	66.4	66.1	66.5	68.3	69.1
Assisted vaginal	3.3	3.9	2.9	3.6	2.8
Cesarean section	30.3	30.0	30.6	28.2	28.1
Infant characteristics at birth					
Birth order	N = 6,382,438	n = 565,812	n = 473,083	n = 148,229	n = 229,570
First-born	38.6	41.5	35.4	34.3	29.6
Second-born	29.0	28.6	29.2	30.4	31.5
Third-born	17.8	16.8	18.9	19.2	20.6
Fourth-born or higher	14.7	13.1	16.6	16.1	18.4

(continued)

Table 2. (*Continued*)

Maternal and Infant Characteristics	Total (%) 2009–2017	WIC Participants (%)[a]		WIC-eligible, Nonparticipants (%)[b]	
		2009	2017	2009	2017
Gestational week at birth	N = 6,395,018	n = 567,412	n = 473,991	n = 148,623	n = 229,819
37–38 (early-term birth)	30.6	33.3	31.1	33.1	30.7
39–40 (mid-term birth)	62.7	59.5	62.7	59.4	62.6
41 (late-term birth)	6.2	6.6	5.9	6.8	6.3
≥ 42 (post-term birth)	0.4	0.6	0.3	0.7	0.4
Sex	N = 6,402,704	n = 568,258	n = 474,146	n = 149,050	n = 230,100
Male	50.9	50.9	50.9	51.0	50.9
Female	49.1	49.1	49.2	49.0	49.1
Birthweight (g)	N = 6,400,088	n = 568,088	n = 474,012	n = 148,985	n = 230,008
≤ 2,500	3.5	3.4	3.6	3.5	3.6
2,500–3,999	89.8	90.0	89.6	89.9	89.2
≥ 4,000	6.8	6.6	6.8	6.7	7.2
Birthweight (g), mean ± SD	3,315 ± 461	3,309 ± 457	3,310 ± 463	3,311 ± 461	3,322 ± 466
Admission to NICU or infant transferred	N = 6,391,947	n = 568,187	n = 474,134	n = 149,041	n = 230,096
Yes	4.5	3.9	5.7	4.1	5.7
No	95.6	96.1	94.3	95.9	94.3

NICU indicates neonatal intensive care unit; WIC, *Special Supplemental Nutrition Program for Women, Infants, and Children.*
[a]Mothers who self-reported participating in WIC during pregnancy; [b]WIC eligibility was based on having *Medicaid* as the source of delivery payment; [c]Includes non-Hispanic > 1 race or Hispanic origin unknown or not stated; [d]In the 3 mo before or during pregnancy.
Note: All characteristics (except infant sex) were statistically significantly different ($P < 0.001$) between 2009 and 2017 within each WIC group on the basis of a chi-square test of independence or *t* tests for categorical or continuous variables, respectively.

enroll in WIC for the infant formula benefit.[24,25] Although our study focused on women who enrolled in WIC prenatally and before breastfeeding, this selection factor may still contribute to differences found in our study, as women may preemptively enroll in WIC with the intention to formula feed.[45] In addition, we cannot rule out that other unmeasured sociodemographic or programmatic factors may also explain these differences. Recent evidence, using an instrumental variable approach, suggests the potential for self-selection into WIC may explain some of these differences.[25]

Overall, increases in breastfeeding initiation over the study period contributed to reducing racial/ethnic disparities for both WIC and WIC-eligible nonparticipants. Non-Hispanic Black women had the steepest increase in breastfeeding initiation for both WIC participants (22.3%) and nonparticipants (24.1%). In contrast, the gap between WIC status was largest among Asian/Pacific Islanders in 2009 but narrowed considerably over time because of a larger increase in breastfeeding within the WIC population (21.4% change) compared with nonparticipants (8.6% change). This pattern was also observed for American Indian/Alaskan Native subjects, but to a lesser extent. A systematic review of targeted breastfeeding interventions for specific racial/ethnic groups found that policy and community-level interventions were most effective in improving breastfeeding among women of color, particularly when delivered through WIC, health care facilities, or community organizations.[46] The USDA, WIC state agencies, and WIC practitioners have emphasized the need to develop culturally-competent evidence-based breastfeeding counseling and education tailored to the needs of the diverse population WIC serves and have supported the development of such efforts.[47–50]

This study made innovative use of birth certificate data to understand breastfeeding initiation changes over time and how these patterns may vary for specific populations of women living in low-income households. They also provide WIC and other maternal and child health program staff information to guide them in creating more accurate and customized program efforts to improve breastfeeding initiation rates across diverse groups, particularly groups that are underrepresented in breastfeeding statistics (eg, American Indian/Alaskan Native and Asian/Pacific Islander women living in low-income households). Specifically, the birth certificate data have several advantages for examining breastfeeding trends, including that they are collected annually on all registered births in the US and provide an essential data source for monitoring key maternal and infant health indicators nationally. Its large sample size allows for more detailed comparisons and accounting for sociodemographic and obstetric characteristics that may influence breastfeeding trends and disparities than is typically possible using survey data, such as the National Immunization Survey or the National Health and Nutrition Examination Survey.[20,25] We restricted our analysis to term births to remove any bias that may arise because women with preterm births have less time to enroll in WIC during the prenatal period. In

Table 3. Percent Distribution of Selected Maternal and Infant Characteristics by Race/Ethnicity Groups and Prenatal WIC Participation Among *Medicaid* Term Births: US Birth Certificate Data, 2009–2017

	WIC Participants[a]					WIC-eligible, Nonparticipants[b]				
Maternal and Infant Characteristics	**Hispanic**	**NH Black**	**NH API**	**NH AIAN**	**NH White**	**Hispanic**	**NH Black**	**NH API**	**NH AIAN**	**NH White**
Total	1,639,624	964,788	167,301	55,478	1,927,272	401,592	284,166	69,293	20,960	841,786
Maternal characteristics at the time of birth										
Maternal age at birth (y)										
≤ 20	15.7	14.9	3.2	16.3	14.3	11.1	10.1	2.5	11.9	7.3
20–24	31.9	35.9	19.6	35.5	38.5	31.9	34.7	16.6	34.7	31.8
25–29	25.9	26.3	36.2	26.7	27.5	29.1	30.3	33.0	30.0	32.6
30–34	16.6	14.9	26.2	14.4	13.5	17.7	16.4	29.3	16.1	19.0
35–39	8.0	6.4	11.8	6.0	5.1	8.3	6.8	15.0	5.9	7.6
≥ 40	1.9	1.6	3.0	1.2	1.2	2.0	1.7	3.8	1.3	1.8
Maternal age at birth (y), mean ± SD	25.8 ± 6.1	25.3 ± 5.8	28.6 ± 5.4	25.1 ± 5.6	25.0 ± 5.4	26.3 ± 5.8	26.0 ± 5.6	29.5 ± 5.5	25.6 ± 5.5	26.7 ± 5.4
Marital status										
Not married	63.9	81.9	28.9	79.9	64.4	60.0	78.6	25.6	76.9	53.4
Married	36.1	18.2	71.1	20.1	35.6	40.0	21.4	74.4	23.1	46.7
Maternal educational attainment										
No high school diploma or GED	40.2	23.3	32.4	31.0	21.7	34.8	21.6	19.3	27.9	14.8
High school diploma or GED	35.4	39.5	30.6	36.0	42.0	33.0	36.2	25.5	36.4	34.4
Some college	17.0	26.4	15.5	25.7	25.1	20.5	27.7	18.5	26.6	29.2
Bachelor's degree or higher	7.5	10.8	21.6	7.4	11.1	11.7	14.4	36.7	9.2	21.6
Prenatal care initiation										
First trimester	62.1	59.9	63.6	56.0	68.1	56.9	51.3	58.7	48.3	64.5
Second trimester	29.0	30.2	28.0	32.2	25.5	29.6	31.4	28.3	32.1	25.9
Third trimester or none	8.8	9.9	8.8	11.8	6.4	13.6	17.3	13.1	19.6	9.6
Prepregnancy body mass index										
Underweight	3.2	3.8	11.1	2.6	4.7	3.4	3.8	9.6	2.5	5.4
Normal	41.3	36.5	60.4	32.8	43.5	42.6	38.5	59.0	35.4	48.7
Overweight	28.5	26.2	19.1	27.7	25.7	29.1	26.9	20.7	28.8	23.6
Obese	27.1	33.5	9.5	36.9	26.2	25.0	30.8	10.7	33.3	22.3
Smoking status[c]										
None	95.6	88.8	97.1	71.0	64.0	94.4	87.2	96.6	75.3	71.6
Prepregnancy smoking only	1.6	2.8	0.8	7.5	5.6	1.9	2.7	1.1	5.9	5.3
Smoked during pregnancy	2.8	8.4	2.1	21.6	30.4	3.7	10.1	2.3	18.9	23.1
Route of delivery										
Spontaneous vaginal	67.1	64.5	65.4	70.8	66.7	68.7	66.8	65.0	73.1	69.5
Assisted vaginal	2.6	2.9	5.0	3.4	3.9	2.4	2.4	4.9	3.0	3.4
Cesarean section	30.4	32.6	29.6	25.8	29.3	28.9	30.8	30.1	23.9	27.2

(continued)

Table 3. (*Continued*)

Maternal and Infant Characteristics	WIC Participants[a]					WIC-eligible, Nonparticipants[b]				
	Hispanic	NH Black	NH API	NH AIAN	NH White	Hispanic	NH Black	NH API	NH AIAN	NH White
Infant characteristics at birth										
Birth order										
First-born	35.8	39.6	41.0	34.3	40.3	30.5	26.4	39.4	26.0	32.8
Second-born	28.6	27.4	35.9	25.0	29.6	31.5	29.7	34.9	26.7	31.8
Third-born	19.6	16.9	15.1	17.8	17.0	21.1	21.1	16.2	20.9	19.6
Fourth-born or higher	16.0	16.1	8.1	23.0	13.0	17.0	22.7	9.5	26.4	15.8
Gestational week at birth										
37–38 (early-term birth)	31.5	32.8	29.3	31.8	28.9	31.6	34.3	30.9	31.3	28.3
39–40 (term birth)	62.3	60.8	63.5	60.6	64.0	62.3	59.6	62.6	61.1	63.9
41 (late-term birth)	5.7	6.0	6.8	7.1	6.7	5.8	5.6	6.2	7.1	7.3
≥ 42 (post-term birth)	0.5	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.6	0.6
Sex										
Male	50.7	50.8	51.4	50.4	51.1	50.8	50.8	51.5	50.6	51.2
Female	49.4	49.2	48.6	49.6	48.9	49.2	49.2	48.5	49.4	48.8
Birthweight (g)										
≤ 2,500	2.7	5.1	3.5	2.6	3.3	2.8	5.3	3.7	2.7	3.0
2,500–3,999	90.5	90.4	91.3	86.5	88.8	90.6	90.4	91.2	87.4	88.5
≥ 4,000	6.8	4.4	5.2	10.9	8.0	6.5	4.3	5.1	9.9	8.5
Birthweight (g), mean ± SD	3,334 ± 448	3,211 ± 453	3,267 ± 441	3,413 ± 488	3,346 ± 469	3,326 ± 447	3,202 ± 453	3,260 ± 444	3,395 ± 481	3,365 ± 469
Admission to NICU or infant transferred										
Yes	4.4	5.4	5.9	5.1	4.6	4.7	5.4	5.7	5.2	5.0
No	95.6	94.6	94.1	94.9	95.4	95.4	94.6	94.3	94.8	95.0

NICU indicates neonatal intensive care unit; WIC, *Special Supplemental Nutrition Program for Women, Infants, and Children; NH, non-Hispanic; API, Asian and Pacific Islander; AIAN, American Indian and Alaska Native.*

[a]Mothers who self-reported participating in WIC during pregnancy; [b]WIC eligibility was based on having *Medicaid* as the source of delivery payment; [c]Includes non-Hispanic ≥ 1 race or Hispanic origin unknown or not stated.

Note: All characteristics (except infant sex) were statistically significantly different ($P < 0.001$) by race/ethnicity within each WIC group on the basis of a chi-square test of independence or *t* tests for categorical or continuous variables, respectively. Missing or unknown values for each covariate were dropped when deriving percent distributions by race/ethnicity. Some distributions may exceed 100% because of rounding.

Figure. Adjusted trends in breastfeeding initiation prevalence over time by *Special Supplemental Nutrition Program for Women, Infants, and Children* (WIC) participation among Medicaid births: US birth certificate data, 2009–2017. A, Overall; B, Non-Hispanic White; C, Non-Hispanic Black; D, Hispanic/Latina; E, Non-Hispanic Asian/Pacific Islander; F, Non-Hispanic American Indian/Alaskan Native. The US Department of Agriculture's WIC adjusted linear probability models included an interaction between WIC status and year as well as adjustment for age, marital status, education, prenatal care, parity, body mass index, cigarette use before and during pregnancy, method of delivery, infant sex, birthweight, neonatal intensive care unit admission, and race/ethnicity (in the overall model or conditional on each race/ethnicity group in the stratified models). All models included county-level fixed effects to account for maternal residence. Differences in slopes between WIC participants and WIC-eligible nonparticipants (β) were compared by fitting an interaction between WIC status and year (continuous) in linear probability models. A 2-sided $P < 0.05$ was considered statistically significant.

addition, we assessed women who had enrolled in WIC prenatally, which is the period most amenable to intervention efforts to promote breastfeeding initiation and reduce barriers before giving birth.

This study also has some notable limitations. First, we did not have information on household income or other WIC eligibility criteria; therefore, we relied on *Medicaid* participation as a measure of WIC eligibility. This resulted in excluding women who were eligible or participated in WIC and who did not also participate in *Medicaid*, which may limit the generalizability of our findings. Although barriers to *Medicaid* enrollment persist,[51–53] 96% of births between 2009–2017 were covered by some form of health insurance. A further comparison of WIC participation by insurance coverage shows that *Medicaid* participants had the highest WIC participation (75.4%) compared with births covered by other insurance coverages that were excluded for this analysis (private insurance: 15.7%; other types of insurance: 48.3%; self-pay: 38.5%). Similarly, 75% of births to WIC participants were covered by *Medicaid* compared with 19% of births to those not on WIC. This is consistent with other reports showing that 88.1% of pregnant women covered by *Medicaid* have incomes < 200% FPL.[54] Taken together, these suggest considerable overlap in eligibility for both programs and income levels.

Women may have also been excluded if they were presumptively eligible for *Medicaid* but had not yet enrolled by birth. Presumptive eligibility is most often used to enroll women early to receive prenatal care and, thus, would likely have been enrolled by birth. The impact of this on WIC eligibility would vary by state. In addition, *Medicaid* income eligibility for pregnant women was lower than income eligibility for WIC services (185% of the FPL) in 7 states in our analytic sample (Idaho, Kansas, Montana, North Dakota, South Dakota, Utah, and Wyoming). Although we could not capture all mothers eligible for WIC services in our analytic sample, limiting to those whose births were covered by *Medicaid* ensures that we have a strong comparison group of similarly eligible individuals. This limitation is similar to other studies that only use the income to determine WIC eligibility, despite other criteria for WIC eligibility that may exceed the income criterion (ie, women who participate in *Medicaid*, *Supplemental Nutrition Assistance Program*, or *Temporary Assistance for Needy Families* are adjunctively eligible).[20,29,55] A further consideration during this period is the expansion of *Medicaid*, which may have increased the income levels of those eligible for WIC in some states, but national evidence shows little change (1.7% in 2008 vs 1.8% in 2016 of WIC participants with income > 185% FPL).[56,57] To account for this variability between states and over time, we adjusted for a number of sociodemographic, health, and geographic factors, but we cannot

fully rule out the potential for unmeasured confounding on eligibility and enrollment into WIC.

We also did not know the timing of prenatal enrollment in WIC; those in WIC longer could have been exposed to more breastfeeding counseling and education.[58] Information on the extent and type of WIC interaction may have also been useful in explaining variation in patterns observed in our study, given that prior research indicates that women are more likely to initiate breastfeeding when they perceived that WIC recommended breastfeeding only packages in the prenatal period.[59] Finally, our analysis was descriptive and not designed to assess the impact of breastfeeding programs, which would be difficult to disentangle given the concurrent implementation of several national breastfeeding initiatives.

Although not a limitation of the study per se, birth certificate data do not contain information on breastfeeding duration, only initiation. Current, Healthy People 2030 breastfeeding objectives focus on increasing the proportion of infants who are breastfed exclusively through 6 months and breastfed at all at 1 year rather than breastfeeding initiation.[60] Although the general US population reached HP2020 goals for breastfeeding initiation in 2014, this is not the case for certain populations living in low-income households. Detailed information on patterns and trends in initiation can further our understanding of disparities in breastfeeding duration.

IMPLICATIONS FOR RESEARCH AND PRACTICE

A greater understanding of how sociodemographic factors are related to trends and patterns in breastfeeding initiation is critical to improving breastfeeding promotion efforts for populations living in low-income households and racial/ethnic groups. These groups face greater barriers to breastfeeding initiation and, for many, have not yet reached the goals set forth by HP2020. More rapid increases in breastfeeding initiation among Asian/Pacific Islander and American Indian/Alaska Native WIC participants are encouraging, but further research is needed to understand the local programmatic variation that may explain these longer-term trends and factors that influence the effectiveness of breastfeeding promotion strategies.

Annual birth certificate data provide an important data source for monitoring current and future changes in the magnitude and disparities in breastfeeding initiation by prenatal WIC status. These data can illuminate changes in the characteristics of birthing people over time, and future linkages with outside data can expand the range of variables explored, particularly at the county level, in which programs are often administered. As all states adopted the revised national birth certificate with information on WIC participation in 2016, additional studies could examine longer-term trends in breastfeeding initiation in a broader range of states and other demographic groups. For example, a new set of recommendations to enhance breastfeeding packages as outlined in 2017 by the National Academies of Sciences, Engineering, and Medicine.[61] This included changes in the package for partially breastfeeding mothers to encourage a longer breastfeeding duration. Future research could take advantage of this rich data set to examine the relationship between such programmatic changes to breastfeeding and other health outcomes of interest to nutrition and public health, such as birth weight.

ACKNOWLEDGMENTS

This study was funded by cooperative agreement 58-4000-8-0034 between the Economic Research Service, US Department of Agriculture and the University of Maryland, College Park. The findings and conclusions in this publication are those of the authors and should not be construed to represent any official US Department of Agriculture or US Government determination or policy.

SUPPLEMENTARY DATA

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jneb.2022.09.006.

REFERENCES

1. Stuebe A. The risks of not breastfeeding for mothers and infants. *Rev Obstet Gynecol*. 2009;2:222–231.
2. Lu MC, Johnson KA. Toward a national strategy on infant mortality. *Am J Public Health*. 2014;104(suppl 1):S13–S16.
3. Centers for Disease Control and Prevention. *Breastfeeding Report Card United States*. Centers for Disease Control and Prevention; 2018. https://www.cdc.gov/breastfeeding/pdf/2018breastfeedingreportcard.pdf. Accessed April 20, 2022.
4. Healthy People 2020: Maternal, infant, and child health. https://wayback.archive-it.org/5774/20220414032744/https://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health/objectives. Accessed October 26, 2022.
5. Kogan MD, Dykton C, Hirai AH, et al. A new performance measurement system for maternal and child health in the United States. *Matern Child Health J*. 2015;19:945–957.
6. Beauregard JL, Hamner HC, Chen J, Avila-Rodriguez W, Elam-Evans LD, Perrine CG. Racial disparities in breastfeeding initiation and duration among U.S. Infants born in 2015. *MMWR Morb Mortal Wkly Rep*. 2019;68:745–748.
7. Centers for Disease Control and Prevention. Rates of any and exclusive breastfeeding by sociodemographics among children born in 2018 (web table). https://www.cdc.gov/breastfeeding/data/nis_data/rates-any-exclusive-bf-socio-dem-2018.html. Accessed April 20, 2022.
8. Griswold MK, Crawford SL, Perry DJ, et al. Experiences of racism and breastfeeding initiation and duration among first-time mothers of the black women's health study. *J Racial Ethn Health Disparities*. 2018;5:1180–1191.
9. Hedberg IC. Barriers to breastfeeding in the WIC population. *MCN Am J Matern Child Nurs*. 2013;38:244–249.
10. Jones KM, Power ML, Queenan JT, Schulkin J. Racial and ethnic disparities in breastfeeding. *Breastfeed Med*. 2015;10:186–196.
11. Sayres S, Visentin L. Breastfeeding: uncovering barriers and offering solutions. *Curr Opin Pediatr*. 2018;30:591–596.
12. Sparks PJ. Racial/ethnic differences in breastfeeding duration among WIC-

eligible families. *Womens Health Issues*. 2011;21:374–382.
13. Lind JN, Perrine CG, Li R, Scanlon KS, Grummer-Strawn LM, Centers for Disease Control and Prevention (CDC). Racial disparities in access to maternity care practices that support breastfeeding - United States, 2011. *MMWR Morb Mortal Wkly Rep*. 2014;63:725–728.
14. Centers for Disease Control and Prevention. CDC Winnable Battles Final Report. https://www.cdc.gov/winnablebattles/report/docs/winnable-battles-final-report.pdf. Accessed October 26, 2022.
15. Anstey EH, MacGowan CA, Allen JA. Five-year progress update on the surgeon general's call to action to support breastfeeding, 2011. *J Womens Health (Larchmt)*. 2016;25:768–776.
16. Hawkins SS, Dow-Fleisner S, Noble A. Breastfeeding and the Affordable Care Act. *Pediatr Clin North Am*. 2015;62:1071–1091.
17. Gurley-Calvez T, Bullinger L, Kapinos KA. Effect of the Affordable Care Act on breastfeeding outcomes. *Am J Public Health*. 2018;108:277–283.
18. US Department of Agriculture, Food and Nutrition Service. Interim final rule: revisions in the WIC food packages rule to increase cash value vouchers for women. USDA-FNS. https://www.fns.usda.gov/wic/fr-123109. Accessed April 20, 2022.
19. Centers for Disease Control and Prevention. Results: breastfeeding rates. https://www.cdc.gov/breastfeeding/data/nis_data/results.html. Accessed April 20, 2022.
20. Zhang Q, Lamichhane R, Wright M, McLaughlin PW, Stacy B. Trends in breastfeeding disparities in US Infants by WIC eligibility and participation. *J Nutr Educ Behav*. 2019;51:182–189.
21. Caulfield LE, Bennett WL, Gross SM, et al. *Maternal and Child Outcomes Associated With the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)*. Agency for Healthcare Research and Quality; 2022.
22. Kent G. WIC's promotion of infant formula in the United States. *Int Breastfeed J*. 2006;1:8.
23. Jensen E, Labbok M. Unintended consequences of the WIC formula rebate program on infant feeding outcomes: will the new food packages be enough? *Breastfeed Med*. 2011;6:145–149.
24. Jiang M, Foster EM, Gibson-Davis CM. The effect of WIC on breastfeeding: a new look at an established relationship. *Child Youth Serv Rev*. 2010;32:264–273.
25. Zhang Q, Chen C, Xue H, Park K, Wang Y. Revisiting the relationship between WIC participation and breastfeeding among low-income children in the U.S. after the 2009 WIC food package revision. *Food Policy*. 2021;101:15.
26. Schultz DJ, Byker Shanks C, Houghtaling B. The impact of the 2009 *Special Supplemental Nutrition Program for Women, Infants, and Children* food package revisions on participants: a systematic review. *J Acad Nutr Diet*. 2015;115:1832–1846.
27. Langellier BA, Chaparro MP, Wang MC, Koleilat M, Whaley SE. The new food package and breastfeeding outcomes among women, infants, and children participants in Los Angeles County. *Am J Public Health*. 2014;104 (suppl 1):S112–S118.
28. Whaley SE, Koleilat M, Whaley M, Gomez J, Meehan K, Saluja K. Impact of policy changes on infant feeding decisions among low-income women participating in the *Special Supplemental Nutrition Program for Women, Infants, and Children*. *Am J Public Health*. 2012;102:2269–2273.
29. Li K, Wen M, Reynolds M, Zhang Q. WIC participation and breastfeeding after the 2009 WIC revision: a propensity score approach. *Int J Environ Res Public Health*. 2019:16.
30. Wilde P, Wolf A, Fernandes M, Collins A. Food-package assignments and breastfeeding initiation before and after a change in the *Special Supplemental Nutrition Program for Women, Infants, and Children*. *Am J Clin Nutr*. 2012;96:560–566.
31. Joyce T, Reeder J. Changes in breastfeeding among WIC participants following implementation of the new food package. *Matern Child Health J*. 2015;19:868–876.
32. Osterman MJ, Martin JA, Curtin SC, Matthews TJ, Wilson EC, Kirmeyer S. Newly released data from the revised U.S. birth certificate. 2011. *Natl Vital Stat Rep*. 2013;62:1–22.
33. Thoma ME, De Silva DA, MacDorman MF. Examining interpregnancy intervals and maternal and perinatal health outcomes using U.S. vital records: important considerations for analysis and interpretation. *Paediatr Perinat Epidemiol*. 2019;33:O60–O72.
34. Ventura SJ. The U.S. national vital statistics system: transitioning into the 21st century, 1990–2017. *Vital Health Stat 1*. 2018;62:1–84.
35. Centers for Disease Control and Prevention, National Center for Health Statistics. Data access - vital statistics online. https://www.cdc.gov/nchs/data_access/vitalstatsonline.htm. Accessed April 20, 2022.
36. Office of Human Research Protections (OHRP). Exemptions (2018 Requirements). https://www.hhs.gov/ohrp/regulations-and-policy/regulations/45-cfr-46/common-rule-subpart-a-46104/index.html. Accessed November 7, 2022.
37. Martin JA, Osterman MJK, Kirmeyer SE, Gregory ECW. Measuring gestational age in vital statistics data: transitioning to the obstetric estimate. *Natl Vital Stat Rep*. 2015;64:1–20.
38. Dietz PM, Bombard JM, Hutchings YL, et al. Validation of obstetric estimate of gestational age on US birth certificates. *Am J Obstet Gynecol*. 2014;210:335.e1–5.
39. Chiang KV, Li R, Anstey EH, Perrine CG. Racial and ethnic disparities in breastfeeding initiation - United States, 2019. *MMWR Morb Mortal Wkly Rep*. 2021;70:769–774.
40. Ahluwalia IB, Helms K, Morrow B. Assessing the validity and reliability of three indicators self-reported on the pregnancy risk assessment monitoring system survey. *Public Health Rep*. 2013;128:527–536.
41. National Center for Health Statistics, Centers for Disease Control and Prevention. National vital statistics system: revisions of the U.S. standard certificates and reports. https://www.cdc.gov/nchs/nvss/revisions-of-the-us-standard-certificates-and-reports.htm. Accessed April 20, 2022.
42. Norton EC, Dowd BE. Log odds and the interpretation of logit models. *Health Serv Res*. 2018;53:859–878.
43. Oliveira V, Prell M, Cheng X. *The Economic Impacts of Breastfeeding: A Focus on USDA's Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)*. US Department of Agriculture, Economic Research Service; 2019. https://www.ers.usda.gov/webdocs/publications/91273/err-261.pdf?v=1014.6. Accessed April 20, 2022.

44. Martin JA, Hamilton BE, Osterman MJK, Driscoll AK, Drake P. Births: final data for 2017. *Natl Vital Stat Rep*. 2018;67:1–50.
45. May L, Borger C, Weinfield N, et al. *WIC Infant and Toddler Feeding Practices Study 2: Infant Year Report*. US Department of Agriculture, Food and Nutrition Service; 2017:207. https://www.fns.usda.gov/wic/wic-infant-and-toddler-feeding-practices-study-2-infant-year-report.
46. Segura-Pérez S, Hromi-Fiedler A, Adnew M, Nyhan K, Pérez-Escamilla R. Impact of breastfeeding interventions among United States minority women on breastfeeding outcomes: a systematic review. *Int J Equity Health*. 2021;20:72.
47. US Department of Agriculture, Food and Nutrition Service. WIC special project grants. 2008. https://www.fns.usda.gov/wic/2008-wic-special-project-grants. Accessed December 3, 2021 .
48. Seth JG, Isbell MG, Atwood RD, Ray TC. Addressing language barriers in client-centered health promotion: lessons learned and promising practices from Texas WIC. *Health Promot Pract*. 2015;16:320–328.
49. Lichter E, Friese D, O'Connor B, Dutram K, Hodgkins L. Maine WIC special project grant: revitalizing nutrition education through value enhanced nutrition assessment (VENA): skill building for cultural and linguistic competence. http://muskie.usm.maine.edu/Publications/Skill-Building-for-Cultural-and-Linguistic-Competence-report.pdf. Accessed October 26, 2022.
50. US Department of Agriculture, Food and Nutrition Service. *WIC Nutrition Services Standards*. US Department of Agriculture, Food and Nutrition Service; 2013. https://wicworks.fns.usda.gov/resources/wic-nutrition-services-standards. Accessed June 27, 2022.
51. Cook WK, John I, Chung C, Tseng W, Lee JP. *Medicaid* expansion and healthcare access: lessons from Asian American and Pacific Islander experiences in California. *J Immigr Minor Health*. 2017;19:995–999.
52. Stuber J, Bradley E. Barriers to *Medicaid* enrollment: who is at risk? *Am J Public Health*. 2005;95:292–298.
53. Twersky SE. Do state laws reduce uptake of *Medicaid*/CHIP by U.S. citizen children in immigrant families: evaluating evidence for a chilling effect. *Int J Equity Health*. 2022;21:50.
54. *Medicaid* and CHIP Payment and Access Commission. *Access in Brief: Pregnant Women and Medicaid*. MACPAC; 2018. https://www.macpac.gov/wp-content/uploads/2018/11/Pregnant-Women-and-Medicaid.pdf. Accessed April 20, 2022.
55. Gregory EF, Gross SM, Nguyen TQ, Butz AM, Johnson SB. WIC participation and breastfeeding at 3 months postpartum. *Matern Child Health J*. 2016;20:1735–1744.
56. US Department of Agriculture, Food and Nutrition Service. WIC participant and program characteristics 2008. https://www.fns.usda.gov/wic/wic-participant-and-program-characteristics-2008-0. Accessed April 19, 2022.
57. US Department of Agriculture, Food and Nutrition Service. WIC participant and program characteristics 2016. https://www.fns.usda.gov/wic/wic-participant-and-program-characteristics-2016. Accessed April 19, 2022.
58. Bersak T, Sonchak-Ardan L. Marginal changes, marginal impacts: the limits of changes to WIC and their ability to influence breastfeeding rates. *Child Youth Serv Rev*. 2021;126:106043.
59. Zhang Q, Lamichhane R, Wouk K, Guthrie J, Li K. Prenatal perception of breastfeeding recommendations predicts early breastfeeding outcomes of participants in the Special *Supplemental Nutrition Program for Women, Infants, and Children* (WIC). *Am J Clin Nutr*. 2021;114:1949–1959.
60. Office of Disease Prevention and Health Promotion. Healthy People 2030: objectives and data. https://health.gov/healthypeople/objectives-and-data. Accessed December 3, 2021.
61. National Academies of Sciences, Engineering, and Medicine. *Review of WIC Food Packages: Improving Balance and Choice: Final Report*. The National Academies Press; 2017.

ORCIDs

Marie E. Thoma: http://orcid.org/0000-0001-9267-4384
Dane A. De Silva: http://orcid.org/0000-0001-6558-2716
Jinhee Kim: http://orcid.org/0000-0001-9764-415X
Leslie Hodges: http://orcid.org/0000-0001-8474-192X
Joanne Guthrie: http://orcid.org/0000-0002-9143-5944