

Low birthweight rate differences associated with distinct perinatal staffing mixes at federally funded health centers

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Abstract

Health centers (sometimes referred to as “federally qualified health centers”) can play an important role in addressing perinatal inequities. However, there is limited information on how different staffing models in health centers contribute to perinatal outcomes, including the availability of certified nurse midwives (CNMs). Using 2011–2021 Uniform Data System files, we examined 4 staffing models in 1385 health centers: those with no CNMs or obstetricians–gynecologists (OBs) (“non-CNM/OB”), CNM-only, OB-only, and both CNMs and OBs (“CNM/OB”). We predicted adjusted low birthweight (LBW) rates across these staffing types using a generalized linear model approach, adjusting for both time and center fixed effects as well as relevant patient, staffing, organizational, and community characteristics. We found that CNM-only health centers had the lowest LBW rates across all staffing models (7.6%) and non-CNM/OB centers had the highest (10.1%). Among Black births, LBW rates ranged from 10.1% (CNM-only) to 13.5% (non-CNM/OB). Findings indicate the importance of building and supporting the CNM workforce and ensuring adequate staffing at health centers, particularly as part of a comprehensive approach to addressing inequities in perinatal outcomes including addressing the scope of practice of CNMs, as more CNM-staff health centers were in areas with independent scope of practice.

Lay summary

Perinatal health inequities in the United States are well documented. Data have shown that Black/African American infants are more than twice as likely to be born with a low birthweight (LBW) than White infants. Health centers, funded by the Health Resources and Services Administration, can play an important role in helping address these inequities through their services. Using data from the Uniform Data System, descriptive statistics, and multi-level analyses, this study examines perinatal staffing models (those with certified nurse midwives [CNMs] and obstetrician–gynecologists [OBs], CNM-only, OB-only, and no CNMs/OBs) from 2011 to 2021 to evaluate differences in LBW rates, as well as other patients, organizational, and community-level factors. This study found that LBW rates increased over time. Certified nurse midwife-only health centers had the lowest LBW rates across all staffing mixes and LBW rates tended to be lower in health centers staffed by CNMs. Findings from this study are consistent with current literature showing that midwifery-led care models are associated with better birth outcomes and play a critical role in addressing perinatal inequities.

Key words: perinatal outcomes; certified nurse midwives; health center staffing; health workforce.

Introduction

Significant inequities in perinatal outcomes exist in the United States, including low birthweight (LBW) births, defined as a newborn weighing less than 2500 g at the time of birth. Recent data show that Black infants are over twice as likely to be born LBW compared with White infants.^{1–3} Low birthweight births are an important population health indicator, as LBW infants are at higher risk for adverse physical and cognitive health outcomes and premature death.^{2,4} These risks increase markedly for those born very low (<1500 g) or extremely low (<1000 g) birthweight.⁵ Low birthweight births can provide indication of the birthing parent’s health and care during pregnancy—1 study found that pregnant individuals in the United States who did not receive prenatal care, compared with those who do, are 3–5 times more likely to

experience adverse perinatal health outcomes such as a LBW birth.⁶ Low birthweight rates have worsened in the United States in recent years, with inequities continuing to persist.⁷ While a number of social and economic factors may contribute to these inequities,⁸ racism is a major underlying factor,^{9,10} both interpersonal and structural (racism embedded in laws and policies that determine the allocation of resources, opportunities such as employment, and access to high-quality health care).^{8,11–13} Inequities in outcomes can be compounded by geography, such as living in a maternity care desert (MCD) (counties with no or limited access to perinatal care).¹⁴ Nearly 7 million people and half a million babies live or are born in MCDs, with Native American and Black pregnant people and communities disproportionately affected.^{14,15}

Health centers (sometimes referred to as “federally qualified health centers”) funded under Section 330 of the Public Health

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Services Act and administered by the Health Resources & Services Administration (HRSA)¹⁶ can play an important role in addressing perinatal inequities. Health centers provide a wide range of services primarily in and/or to medically underserved areas and populations. In 2021, over 1300 health centers, many with multiple sites, catered to more than 30 million people.¹⁷ Health centers serve roughly one-third of all low-income women of reproductive age (defined as ages 15-44 years)¹⁸ and 8% of pregnant individuals across the country, with higher proportions from underserved and historically marginalized populations.¹⁹ An estimated two-thirds of health centers provide prenatal care directly.¹⁹ Health centers employ a variety of health professionals who can provide perinatal services (meaning prenatal, labor and delivery, and postpartum care) as well as gynecologic and contraceptive care, including obstetricians–gynecologists (OBs), certified nurse midwives (CNMs), nurse practitioners (NPs), and family medicine physicians, although the number and types of providers may vary across health centers.¹⁴ Care provided by CNMs may differ by state due to state scope of practice restrictions.²⁰

While many clinicians can provide perinatal care, evidence demonstrates that access to midwifery care matters for improving perinatal outcomes. Midwifery-led care, compared with other models of care (eg, provided by an obstetrician), is associated with improved outcomes such as reduced preterm birth, fewer medical interventions during birth, fewer cesarean sections, and a more positive birth experience.²⁰⁻²³ Care provided by midwives is also associated with reduced racial and socioeconomic disparities in respectful care, infant mortality, and preterm births.²⁴⁻²⁶

While health centers are known to play important roles in providing perinatal care, more specific information is needed as to how staffing models in health centers, including the availability of CNMs, contribute to perinatal outcomes. Studies have examined either staffing or outcomes, but not the association between them. For example, 1 study²⁷ showed that health centers close to MCDs had more clinic visits for general practitioners (NP and family practice doctors) than for specialists (OBs and CNMs), meaning that general practitioners are likely filling gaps where there are fewer specialists available, a tradeoff that the study did not explicitly examine. Another study examining perinatal outcomes found that the establishment of a health center was not enough to impact prenatal care initiation and LBW or preterm births, but the study did not examine the extent to which staffing within the center may play a role.²⁸

This study aims to identify how different health center perinatal staffing configurations, including the availability and use of CNMs, relate to perinatal health outcomes. Understanding staffing differences and how staffing may associate with perinatal health outcomes is valuable to workforce planners searching for approaches to reduce perinatal health inequities.

Data and methods

For this longitudinal study, we compiled national data from 2011 to 2021 including health center organizational, staffing, and patient characteristics, perinatal outcomes, and community-level factors. Health center-specific data, including perinatal outcomes reported by the health center, came from the Uniform Data System (UDS), an annual administrative reporting system with standardized information from HRSA-funded

health centers.²⁹ To describe community demographics and health resources available in the counties these health centers served, we retrieved county-level variables from HRSA's Area Health Resource File (AHRF) and the Centers for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry Social Vulnerability Index (SVI) data.³⁰ Data were linked via federal information processing standards in the AHRF and SVI with health center ZIP code in the UDS file. The study was not considered human subjects research according to the [redacted university name] Institutional Review Board.

Variables

We created a primary independent variable that categorized health centers into one of 4 staffing types based on availability of perinatal staff: (i) those with no CNM or OB Full Time Equivalents ([FTE]; “non-CNM/OB health centers”), (ii) those with only CNM FTEs (“CNM-only”), (iii) those with OBs only (“OB-only”), and (iv) those with both CNMs and OBs (“CNM/OB”). While family physicians (MDs/DOs) and NPs can also provide perinatal services, we did not create a separate type for either provider because we did not have access to detailed information on the extent to which they delivered perinatal services. The UDS also does not provide information on certified midwives other than for CNMs. Given that health centers may change their staffing over time, we allowed for health centers to shift between groups.

Our dependent variable of interest, created based on data in the UDS, was LBW rates per 100 births. This variable was created by dividing the number of infants weighing less than 2500 g when born by the total number of births. We further examined LBW rates by race according to the groups available in the UDS data (ie, Asian, Native Hawaiian and other Pacific Islander, Black/African American, American Indian/Alaska Native, White, more than 1 race, and unreported race and/or ethnicity). Low birthweight data were available by Hispanic and non-Hispanic identities; however, we chose to examine each racial group in totality (inclusive of both Hispanic and non-Hispanic identities). Low birthweight rates for each race/ethnicity group were defined as the number of LBW births of that race/ethnicity divided by the total number of births of the same race/ethnicity group.

We examined a range of health center organizational and patient characteristics, as well as community and resource characteristics that may be associated with staffing models and perinatal outcomes based on relevant literature and availability of data.^{19,27}

From the UDS, other health-center-specific perinatal-related variables that we examined included percent female patients (in total and of reproductive age [defined as females aged 18-45]), the number of deliveries by health center provider, the percent prenatal patients (in total and among high-risk categories—those 18 years or less, 45 years or more, or HIV positive), and the percent prenatal patients who entered prenatal care in their first, second, or third trimesters. We looked at overall health center patient characteristics including total number of patients, percent patients according to race/ethnic identity, age (less than 18, 19-64, and 66+ years of age), insurance type (Medicare, Medicaid, uninsured, and private), visits per FTE (calculated using total FTEs), medical visits per FTE, and FTEs of selected provider types.

Using AHRF, we extracted the following county-level variables: percent of population under age 65 with no insurance, number of hospitals, providers (NP, DO, and MD) per 100 000 population, registered nurses per 100 000 population, urban influence codes (UICs) to categorize rural/urban location of health centers, and variables needed for MCD classification (percent of females without health insurance and number of hospitals with obstetric care, OBs, CNMs, and certified midwives). Using the March of Dimes definition, we classified counties based on access to obstetric care as follows: (1) MCD defined as no hospitals with obstetric care and no obstetric providers (including certified midwives, CNMs, and OBs); (2) low access defined as <1 hospital with obstetric care, 60 obstetric providers per 10 000 births, and >10% of women do not have health insurance; (3) moderate access defined as <1 hospital offering obstetric care, <60 OB providers per 10 000 births, and <10% of women without health insurance; and (iv) full access defined as >2 hospitals with obstetric care or >60 obstetric providers per 10 000 births.¹⁴ There are inconsistencies between our categorization of perinatal staffing models and MCD categorization (ie, some OB-only health centers were categorized as being in an MCD county) due to a lack of annual county-level OB data available in the AHRF and different sources of data (AHRF vs UDS). We grouped the UIC into a dichotomous rural (UICs 3-12) and urban/metropolitan (UICs 1 and 2) variable. From the SVI data, we used the socioeconomic status vulnerability index variable (this includes the % of the population below 150% poverty, unemployed, with housing cost burden, no high school diploma, and/or no health insurance), which ranges from 0 to 1, with numbers closer to 1 indicating higher vulnerability.

At the state level, we created 2 variables that may affect access to and availability of perinatal care. First, we created a binary variable for whether the health center was in a Medicaid expansion state based on data from the Kaiser Family Foundation.³¹ Second, we created a midwifery scope of practice variable, using information from the American College of Nurse Midwives to categorize states into one of 5 levels of independence for CNMs (with the following list in order of independence): independent practice and hospital privileges, independent practice, hybrid model (some restrictions in place), collaborative agreement required, and supervision required.³²

Several other potential variables at the county level were not included in our final analysis due to minimal differences between health center types or because their inclusion did not substantially affect our results. This included calculating the Index of Concentration at the Extremes, a proximate measure for inequities between Black and White populations as an effort to account for the effect of structural racism on perinatal outcomes.

Analysis

Descriptive statistics were performed to evaluate LBW rate differences, as well as the organizational, patient-, and community-level differences, across the 4 different perinatal staffing models using Pearson χ^2 and ANOVA tests. We then conducted multi-level analyses using a generalized linear model approach, adjusting for both time and center fixed effects and using a log-transformed dependent variable due to the dependent variable being heavily right skewed. We used the model output to predict adjusted means for LBW rates (overall and by race/ethnicity), which accounted for the relevant

patient, staffing, organizational, and community characteristics. We chose to use a generalized linear model approach to account for prediction errors that can occur when transforming the model's predictions from the log-scale back to the raw scale. Covariates included percent patients who are Black, percent patients that have Medicaid or private insurance, percent prenatal patients, percent prenatal patients who are HIV positive, total medical services per FTE, number of family physician FTEs, MCD designation, and SVI. Covariates were selected based on current literature; of those that were highly correlated with each other, the variable with the greatest effect on our predictor of interest was chosen. We conducted a sensitivity analysis using data restricted to those health centers in the data at least 5 of the 11 time periods. Since this did not substantially change the analysis, all health centers were included.

To further explore potential health center and county-level differences that may underly differences in LBW rates, we created health center quartiles according to LBW rates and examined health center staffing differences as well as differences in county-level characteristics across the quartiles.

Results

Description of health centers according to perinatal staffing mix

The final sample consisted of 1385 health centers. The largest proportion of health centers was non-CNM/OB types (60.9%), with the smallest proportion being CNM only (10.5%). While 409 of the 1385 health centers changed types at least once over the time period, the overall distribution of each type remained stable (not shown). Overall, health centers had 0.5 CNM FTEs and 0.9 OB FTEs—this was relatively stable over time (Figure 1). Among health center types, CNM/OB health centers had higher average OB (FTE = 2.3) and CNM (FTE = 1.8) FTEs compared with OB-only (FTE = 1.4) or CNM-only (FTE = 1.2) centers (Table 1).

LBW rates according to perinatal staffing mix

Low birthweight rates increased over time, with slightly faster growth among non-CNM/OB health centers (Figure 2) and an overall average of 9.4% across the 2011-2021 time period (Table 1). This growth trend was similar when examining LBW rates by race and/or ethnicity, with Black births having the highest average LBW rates overall (12.4%) (see Figure S1 and Table S1). Unadjusted, non-CNM/OB health centers had the highest LBW rates overall (10.6%) and Black LBW rates (14.4%), compared with CNM-only clinics, which had the lowest LBW rates overall (7.5%) and among Black LBW rates (10.3%) (Table 2). Adjusted LBW rates, controlled for the relevant patient, staffing, and community characteristics, exhibited a similar pattern. Among the 4 different health center staffing models, adjusted overall LBW rates ranged from 7.6% in CNM-only health centers (95% CI, 6.8-8.3) to 10.1% in non-CNM/OB health centers (95% CI, 9.6-10.7). Among Black births, adjusted LBW rates ranged from 10.1% (95% CI, 8.1-12.1) in CNM-only health centers to 13.5% (95% CI, 12.5-14.6) among non-CNM/OB health centers. Obstetrician/gynecologist-only and CNM/OB-combined health centers had similar adjusted LBW rates both overall and among Black births (Table 2). This pattern was consistent among White LBW births (Table 2) and among most other race/ethnicity groups (Table S2).

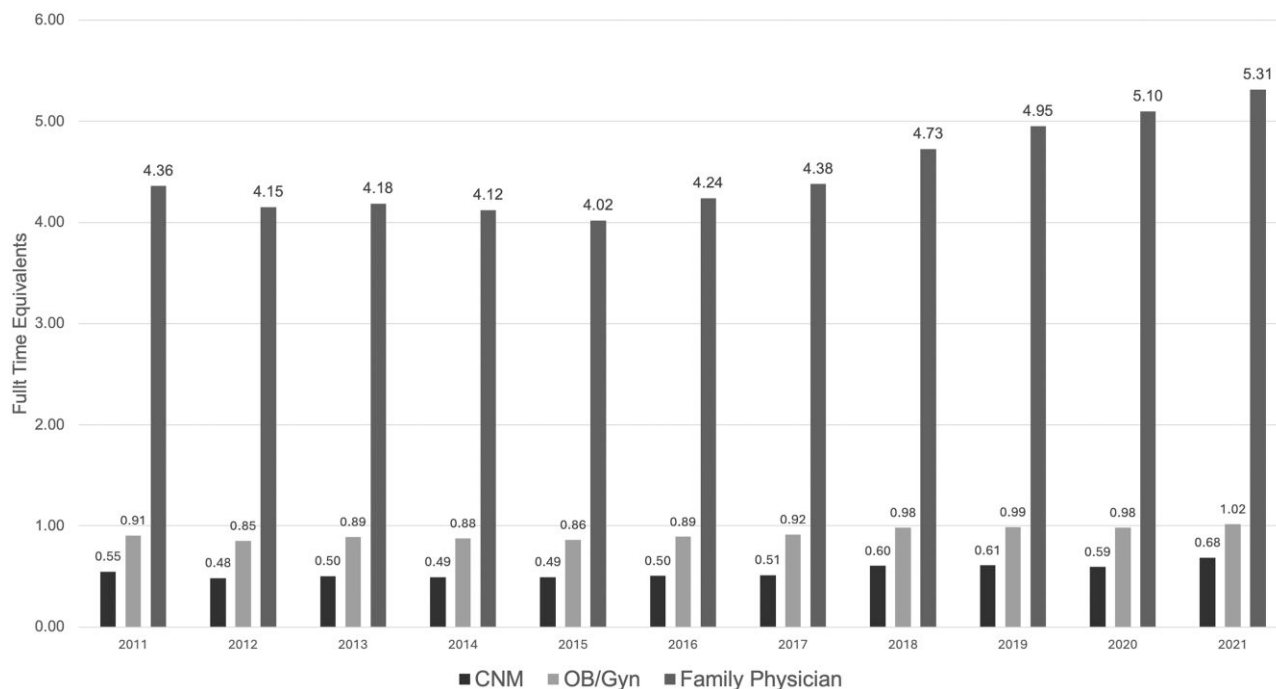


Figure 1. Average perinatal provider full-time equivalents at federally funded health centers in the United States, 2011-2021. CNM, certified nurse midwife; OB/Gyn, obstetric gynecologist.

Comparison of health center types: patient and org characteristics

Certified nurse midwife/OB health centers had the largest number of patients ($n = 34\,761$), ~3 times more than non-CNM/OB health centers ($n = 10\,516$), and twice as many as CNM-only ($n = 16\,732$). All 4 types served similar proportions of patients who were uninsured; however, non-CNM/OB health centers served a higher proportion of Medicare-insured patients (11.7%) and a lower proportion of Medicaid-insured patients (36.2%) compared with the other 3 types (Table 1).

Certified nurse midwife/OB health centers overall had 2-4 times more deliveries by health center providers and 2-3 times more births compared with health centers with only 1 type of provider (CNM-only and OB-only). Certified nurse midwife-only, OB-only, and CNM/OB health centers had similar proportions of prenatal patients overall (between 2% and 3%) and percent of prenatal patients who were high risk (CNM-only = 11.0%, CNM/OB = 11.1%, and OB-only = 12.8%). Non-CNM/OB health centers had significantly lower deliveries, percent prenatal patients, and number of births compared with all other types.

Non-CNM/OB health centers had lower average FTEs across all staffing groups, including family medicine providers and NPs (Table 1). Among the 3 health center types with perinatal providers, CNM-only and OB-only health centers had similar staffing across most provider groups except for pediatrics and overall had lower average FTEs of all staff compared with CNM/OB health centers (Table 1).

Comparison of health center types: community characteristics

Non-CNM/OB health centers were concentrated more in rural areas (37.9%) whereas CNM/OB health centers were concentrated more in urban/metropolitan areas (88.8%)

(Table 1). Over one-third of non-CNM/OB health centers were in MCD-designated counties (20%) and low maternity care access counties (17%); conversely, almost all CNM/OB health centers were in full maternity care access counties (94%) (Table S2). Certified nurse midwife-only and OB-only health centers were similarly concentrated in rural areas (CNM-only = 19%; OB-only = 17%) and in low and medium access MCD counties (CNM-only = 10%; OB-only = 13%) (Table 1 and Table S2).

More health centers with CNMs (both CNM-only and CNM/OB health centers), compared with OB-only health centers, were in states with independent scope of practice for CNMs; more OB-only health centers were in states requiring a collaborative agreement compared with CNM-only and CNM/OB (Table S2). Few CNM-only health centers (2.8%, $n = 4$) were in states where supervision of CNMs was required, compared with 7.2% ($n = 61$) of non-CNM/OB health centers. Most health centers were in a Medicaid expansion state (Table S2).

Staffing at health centers with the highest rates of LBW births

When examining health centers with the highest rates of LBW births (those in LBW quartile 4), fewer were CNM-only (6.1%) and non-CNM/OB (19.7%) types (Table S3). On average, this LBW quartile had very few perinatal staff (average CNM FTE = 0.3 and OB FTE = 0.6). Compared with the other quartiles, slightly fewer health centers in the highest LBW quartile were in Medicaid expansion states (78.2%) and more were in states where a collaborative agreement or supervision was required for CNMs to practice (39.3%) (Table S3).

Table 1. Health center characteristics according to perinatal staffing mixes at federally funded health centers in the United States, 2011-2021.

	Total (N = 1385)	No CNMs or OBs (N = 844)	CNM only (N = 145)	OB only (N = 515)	CNM/OB combined (N = 394)	P-value ^a
Patient and organizational characteristics						
Patients, mean (SD)	18 825 (22 205)	10 516 (20 858)	16 732 (13 577)	22 937 (21 560)	34 761 (31 675)	<.01
Visits per FTE, mean (SD)	482.7 (172.6)	465.4 (197.6)	432.0 (123.1)	499.3 (166.1)	498.4 (34.5)	<.01
Medical visits per FTE, mean (SD)	955.4 (301.5)	925.8 (314.8)	863.1 (269.7)	1004.7 (366.7)	977.2 (281.8)	<.01
Percent female patients, mean (SD)	56.6 (6.6)	54.8 (7.1)	57.5 (5.4)	58.4 (5.4)	59.4 (4.7)	<.01
Percent female patients of reproductive age (15-49 years), mean (SD)	25.3 (7.2)	24.2 (7.7)	25.2 (6.8)	26.6 (7.1)	27.0 (5.8)	<.01
Percent prenatal patients, mean (SD)	1.6 (1.8)	0.7 (1.0)	2.0 (1.7)	2.0 (1.7)	3.0 (2.1)	<.01
Percent prenatal patients that are high-risk, mean (SD)						
Prenatal patients under age 19	10.1 (6.6)	10.7 (7.7)	10.4 (5.1)	12.0 (6.3)	10.8 (4.2)	<.01
Prenatal patients over age 45	0.4 (0.9)	0.4 (1.3)	0.3 (1.4)	0.3 (0.5)	0.3 (0.8)	<.05
Prenatal patients with HIV	0.7 (4.7)	1.1 (6.2)	0.3 (1.2)	0.5 (3.1)	0.2 (0.3)	<.01
Percent patients in health centers by insurance type, mean (SD)						
Uninsured	29.5% (18.4)	30.7% (19.5)	30.0% (18.2)	30.3% (19.2)	27.6% (16.2)	.07
Medicaid	40.8% (17.4)	36.2% (17.2)	43.9% (16.0)	44.4% (17.1)	47.8% (15.1)	<.01
Medicare	10.3% (6.7)	11.7% (7.3)	9.2% (5.3)	8.8% (5.7)	8.2% (5.0)	<.01
Private	1.0% (2.1)	0.8% (2.4)	0.9% (1.6)	1.2% (2.7)	1.5% (2.9)	<.01
Other public	19.1% (12.3)	21.1% (13.2)	16.6% (11.0)	16.5% (11.1)	15.6% (10.0)	<.01
Deliveries by health center providers, mean (SD)	133.9 (322.9)	17.9 (85.5)	83.7 (196.6)	175.7 (349.6)	339.1 (494.8)	<.01
Health centers in rural areas, N (%)	337 (24.3)	320 (37.9)	28 (19.3)	89 (17.3)	44 (11.2)	<.01
Provider FTEs, mean (SD)						
CNM	0.5 (1.4)	0.0 (0.0)	1.2 (1.4)	0.0 (0.0)	1.8 (2.3)	<.01
OB	0.9 (2.0)	0.0 (0.0)	0.0 (0.0)	1.4 (1.9)	2.3 (3.0)	<.01
Pediatrics	2.0 (3.8)	0.7 (1.3)	1.4 (1.7)	2.6 (3.4)	4.4 (6.0)	<.01
Family medicine	4.2 (6.2)	2.8 (3.7)	4.6 (5.8)	4.9 (6.8)	7.2 (9.0)	<.01
NP	5.9 (6.2)	4.1 (4.1)	6.1 (4.9)	6.7 (6.4)	9.8 (8.9)	<.01
PA	2.2 (3.7)	1.5 (2.3)	2.3 (3.3)	2.4 (4.1)	3.6 (5.6)	<.01
RN	12.0 (16.4)	7.3 (9.6)	10.8 (10.6)	13.8 (16.3)	20.9 (23.8)	<.01
Outreach	1.9 (3.1)	1.3 (2.4)	1.9 (2.5)	2.2 (3.0)	3.2 (4.6)	<.01
Perinatal outcomes						
Trimester of entry to prenatal care, mean (SD)						
First trimester	76.7% (13.1)	79.8% (14.2)	73.6% (12.7)	72.7% (12.5)	72.2% (11.6)	<.01
Second trimester	18.9% (10.4)	16.8% (11.9)	21.5% (10.3)	21.9% (10.0)	22.4% (9.1)	<.01
Third trimester	4.7% (5.0)	3.9% (5.2)	4.9% (4.2)	5.5% (4.2)	5.4% (3.5)	<.01
Births, mean (SD)	214.6 (385.0)	50.1 (115.7)	186.2 (258.9)	281.4 (411.4)	523.9 (548.9)	<.01
LBW births, mean (SD)	16.7 (29.7)	4.1 (9.0)	12.8 (16.1)	22.4 (31.6)	40.7 (43.0)	<.01
Percent LBW births, mean (SD)	9.4 (12.4)	10.6 (17)	7.5 (8.3)	9.1 (8.7)	8.3 (5.1)	<.01
Black/White LBW births ratio, mean (SD)	1.7 (1.9)	1.4 (2.5)	1.7 (2.5)	1.7 (2.0)	1.7 (1.5)	.28

^aANOVA and *t*-test of means for significant difference between groups.

CNM, certified nurse midwife; FTE, full-time employee; LBW, low birthweight; NP, nurse practitioner; OB, obstetrician-gynecologist; PA, physician assistant; RN, registered nurse; SD, standard deviation.

Discussion

This study provides novel information on how LBW rates may differ between health centers based on their perinatal staffing mix. Findings highlight notable differences between staffing mix types and the positive role of CNMs, with CNM-only health centers having the lowest LBW rates across all 4 health center types. Certified nurse midwives' positive role was relatively consistent among Black and White LBW rates as well as among other race/ethnicity groups. Non-CNM/OB health centers, which had the highest LBW rates, tended to be smaller and more rural, with a smaller prenatal patient population and significantly fewer births. Certified nurse midwife-only health centers had a similar patient insurance mix, percent prenatal patients, and percent high-risk prenatal patients compared with OB-only and CNM/OB health centers, but a lower average number of births and deliveries by health center providers. When examining health centers by LBW quartiles, a higher

percentage of health centers in the highest quartile were non-CNM/OB (66%). This quartile also had the lowest average CNM and OB FTEs.

Specific to different staffing models, our findings show that LBW rates are, on average, lowest at health centers staffed by CNMs, which is consistent with current literature demonstrating that midwifery-led care models are associated with better birth outcomes.^{20,21,33-36} Despite these benefits, barriers exist to increasing access to and use of the midwifery workforce, such as state laws that restrict midwifery scope of practice.^{20,37,38} Our study finds that states with autonomous scope of practice had higher proportions of health centers with CNMs. We also saw that health centers in the highest LBW quartiles (ie, with the highest LBW rates) were less likely to be in Medicaid expansion states and in states with the independent scope of practice for CNMs. This further highlights the connection between staffing, scope of practice, and birth outcomes.

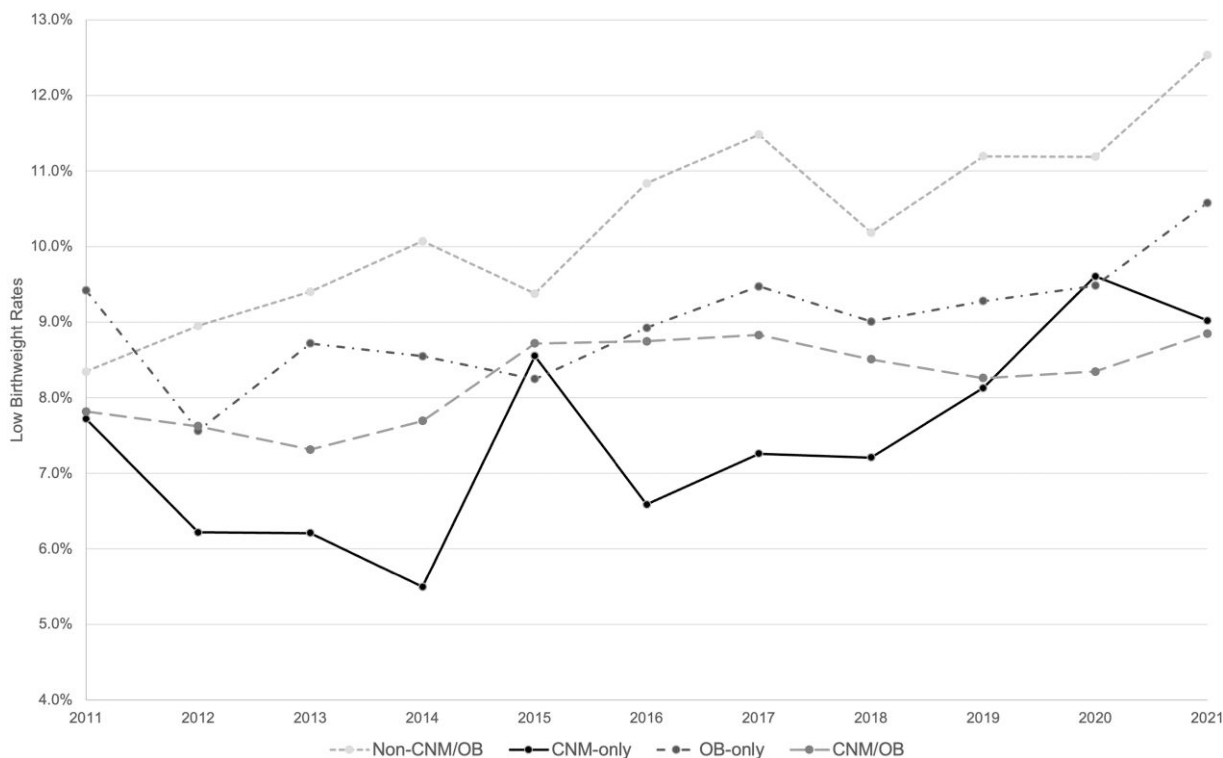


Figure 2. The 2011-2021 low birthweight rates according to perinatal staffing mixes at federally funded health centers in the United States. CNM, certified nurse midwife; OB, obstetric gynecologist.

The impact scope of practice restrictions can have on the availability of CNMs is also important to consider with respect to inequities in outcomes, as Black LBW rates were lowest at health centers with CNMs; this aligns with other studies that have demonstrated this association between midwifery-led care and reduced inequities in birth outcomes.^{25,26,39} Our findings show that OB-only and CNM-only facilities have similarities relative to their patient insurance mix, proportions of high-risk prenatal patients, and the number of centers located in rural areas and low maternity access counties, but average LBW rates are consistently lower in CNM-only facilities. Finally, with respect to LBW rates among Black births, we see a larger difference between non-CNM/OB and CNM-only health centers compared with non-CNM/OB and OB-only health centers. Altogether, these findings emphasize the critical role CNMs can play in addressing perinatal inequities, including in resource-limited areas, as has been called for in other reports.¹⁴ Racial inequities in LBW rates persist nationally, as was also observed in our sample, further emphasizing the urgent need for implementing evidence-based strategies—such as increasing access to midwifery care—to reduce such gaps.⁴⁰ While we know that scope of practice restrictions can act as barriers to the availability of midwives more broadly,^{38,41} more research is needed to understand how such restrictions may specifically limit health centers' ability to recruit and leverage the use of CNMs.

Few studies examining the health center role in addressing perinatal inequities have considered staffing mix or explored staffing differences among health centers with high LBW rates. Studies on birth outcomes in health centers have mainly focused on services provided, access to health centers, and

proximity to MCD.^{19,27,42} Only 1 study examined the collocation of mental health providers and found an association with reduced LBW in Hispanic populations, but the study did not explore the role of other types of staff. By explicitly focusing on the workforce, our study findings suggest that increasing access to CNMs at health centers may significantly reduce perinatal inequities. In addition to increasing access to CNMs, health centers can emphasize other evidence-based approaches, such as group prenatal care models, doula services, and racially concordant and respectful care, all of which are positively associated with pregnancy and birth outcomes.⁴³⁻⁴⁶ Staffing and models of care need to be part of larger policy and structural changes, including extended postpartum coverage through Medicaid, increased access to a diverse perinatal care workforce including community-based doulas and perinatal community health workers, and perinatal regionalization to support risk-appropriate care.^{14,47,48} Additionally, there is a need to address how the regulatory environment, such as insurance coverage, may hinder access to CNMs and other types of midwives (eg, licensed midwives) and barriers to midwifery education including the availability of, and issues of bias and discrimination in, programs.^{25,49,50}

Several limitations should be noted. Uniform Data System reports a limited number of perinatal indicators and does not include other important measures such as rates of extremely low birthweight or preterm births and delivery types (eg, vaginal and cesarean section). Second, because the UDS is center specific, we have limited information on how staffing across the specific sites within health centers may contribute to variations in outcomes. Finally, the cross-sectional nature of UDS data treats staffing changes as 1 point in time and thus limits

Table 2. Unadjusted and adjusted low birthweight rates according to perinatal staffing mixes at federally funded health centers in the United States, 2011-2021.

	Unadjusted			Bivariate ^a			Full model ^{a,b}			
	Non-CNM/OB	CNM-only	OB-only	Non-CNM/OB	CNM-only	OB-only	Non-CNM/OB	CNM-only	OB-only	CNM/OB
Percent LBW, mean (SD)	10.6 (10.2-11.1)	7.5 (6.9-8.2)	9.1 (8.8-9.4)	8.3 (8.1-8.5)	7.6 (6.9-8.2)	9.1 (8.7-9.5)	8.3 (8.0-8.6)	7.6 (6.8-8.3)	8.6 (8.2-9.0)	8.6 (8.1-9.0)
Percent LBW by race/ethnicity, mean (SD)										
Black/African American	14.4 (13.4-15.4)	10.3 (8.8-11.7)	12.3 (11.7-12.9)	11.2 (10.8-11.6)	10.1 (8.4-11.9)	12.3 (11.6-12.9)	11.2 (10.7-11.6)	10.1 (8.1-12.1)	11.7 (11.1-12.3)	11.6 (11.0-12.2)
White	10.1 (9.5-10.6)	6.8 (6.1-7.6)	7.9 (7.5-8.3)	7.3 (7.1-7.6)	6.8 (6.1-7.6)	7.9 (7.5-8.3)	7.3 (7.0-7.6)	6.4 (5.6-7.1)	7.7 (7.2-8.2)	7.7 (7.2-8.2)
Black/White LBW ratio	1.7 (1.6-1.8)	1.6 (1.4-1.9)	1.6 (1.3-1.8)	1.8 (1.6-1.9)	1.6 (1.3-1.9)	1.8 (1.6-2.0)	1.7 (1.6-1.8)	1.6 (1.3-1.9)	1.7 (1.5-1.9)	1.7 (1.6-1.9)

^aBivariate and full model adjusted for time and unit fixed effects and included robust standard errors to account for clustering.

^bFull model adjusted for the following: percent of patients who are Black/African American, percent of patients on Medicaid insurance, percent of patients with private insurance, percent prenatal patients, percent prenatal patients with HIV, total medical services per FTE, family physician FTE, maternity care desert designation, socio-economic vulnerability index. CNM, certified nurse midwife; LBW, low birthweight; OB, obstetrician-gynecologist; SD, standard deviation.

our ability to account for the timing of staffing changes in our analysis. However, this study provides an important and useful first step in understanding how structural differences in health centers, such as staffing, may be related to differences in birth outcomes.

Conclusion

This study highlights the value certain types of perinatal staff bring, particularly as part of a comprehensive approach to addressing inequities in perinatal outcomes. Health centers with CNMs reported better birth outcomes overall, speaking to the importance of building and supporting this workforce. Future research is needed to better understand and help implement effective policies and strategies for increasing access to CNMs and for ensuring adequate perinatal staffing in health centers, including understanding the role of family medicine providers and collaborative models of care that include doulas and community health workers. A well-prepared, supported, and diverse perinatal workforce is critical to advancing perinatal health equity.

Supplementary material

Supplementary material is available at *Health Affairs Scholar* online.

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Conflicts of interest

Please see ICMJE form(s) for author conflicts of interest. These have been provided as [supplementary materials](#).

Authors have no conflicts of interest to declare.

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