

Immigration Policy and the Health of Latina Mothers and Their Infants

Brittany J. Raffa^{1,2}  Jonas J. Swartz³ · Shabbar I. Ranapurwala⁴ · Congwen Zhao⁵ · Rushina Cholera^{6,7,8}

Accepted: 16 March 2023 / Published online: 5 April 2023

Abstract

Restrictive immigration policies may adversely affect the health of Latina mothers and their infants. We hypothesized that undocumented Latina mothers and their US born children would have worse birth outcomes and healthcare utilization following the November 2016 election. We used a controlled interrupted time series to estimate the impact of the 2016 presidential election on low birth weight (LBW), preterm birth, maternal depression, well child visit attendance, cancelled visits, and emergency department (ED) visits among infants born to Latina mothers on emergency Medicaid, a proxy for undocumented immigration status. There was a 5.8% (95% CI: -0.99%, 12.5%) increase in LBW and 4.6% (95% CI: -1.8%, 10.9%) increase in preterm births immediately after the 2016 election compared to controls. While these findings were not statistically significant at $p < 0.05$, the majority of our data suggest worsened birth outcomes among undocumented Latina mothers after the election, consistent with larger prior studies. There was no difference in well child or ED visits. While restrictive policies may have contributed to worse birth outcomes among undocumented Latina mothers, our findings suggest that Latino families still attend infants' scheduled visits.

Keywords Immigration policy · Latina · 2016 election · Birth outcomes · Healthcare utilization

✉ Brittany J. Raffa
braffa@unc.edu

- ¹ Division of General Pediatrics and Adolescent Medicine, Department of Pediatrics, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA
- ² The Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA
- ³ Division of Women's Community and Population Health, Department of Obstetrics and Gynecology, Duke University, Durham, NC, USA
- ⁴ Department of Epidemiology, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA
- ⁵ Department of Biostatistics and Bioinformatics, Duke University, Durham, NC, USA
- ⁶ Department of Pediatrics, Duke University School of Medicine, Durham, NC, USA
- ⁷ Duke Margolis Center for Health Policy, Duke University, Durham, NC, USA
- ⁸ Department of Population Health Sciences, Duke University School of Medicine, Durham, NC, USA

Background and Conceptual Framework

Anti-immigration rhetoric and restrictive policies surrounding the 2016 presidential election promoted a climate of fear and distrust among Latino/Latina/Latinx (herein Latino or Latina) immigrant families [1–4]. Latino immigrants account for 50% of the US immigrant population. Among youth, Latino children account for 25% of the U.S pediatric population, and one quarter of Latino children live with an undocumented parent [5, 6]. Exclusionary immigration policies can directly affect the health and well-being of immigrant families through restricting access to health services and government safety-net programs such as Medicaid. Additionally, policies such as denying eligibility for driver's licenses or in-state tuition can indirectly impact health by creating obstacles to employment, food, transportation and education [1, 3, 4]. Anti-immigrant sentiment can also create an environment of discrimination and stigma, leading to fear of accessing services even when families qualify for them [3].

Restrictive immigration policies have been associated with a number of negative health impacts for Latino populations, including an increase in preterm birth, limited prenatal care, increased anxiety among Latino adolescents,

decreased primary care visits among undocumented adults and children, and increased cancelled visits among uninsured Latino children [2, 7–10]. Changes around the 2016 election included campaign promises for a 2,000 mile border wall and a massive deportation program, an increase in hate crimes and violence, increased immigration enforcement including a doubling of noncriminal arrests by Immigration and Custom Enforcement (ICE), increased obstacles for asylum seekers such as the Migrant Protection Protocols (also known as Remain in Mexico), and attempts to end the Deferred Action for Childhood Arrivals (DACA) [11–14]. These changes had the potential to impact care seeking practices due to fear of detainment, deportation and family separation. Studies examining the impact of anti-immigrant sentiment and policy change surrounding the 2016 presidential election have considered various time points, aiming to capture the impact of rising contextual anti-immigrant rhetoric during this period. For example, multiple studies compare outcomes before and after the November 2016 election while others use the inauguration as an inflection point as multiple executive orders on immigration were enacted in January 2017, including the 287(g) Program, which empowered state and local law enforcement to collaborate with the federal government to enforce federal immigration laws [2, 7, 8, 15–18]. Still other studies have chosen the date of Donald Trump’s announcement of candidacy or used multiple time points [9, 19]. While various time points have been used in these studies, the common thread is a hypothesized change in outcome following a specified period surrounding the 2016 election.

Less is known about the effects of discriminatory policy on mixed-status families in which family members include people with different legal documentation status. In particular, it is unclear how undocumented mothers and their U.S. born infants might be affected. Untangling the potential impacts of restrictive immigration policies on the infants of undocumented Latina mothers is important, as early childhood experiences and parent-infant attachment can have lifelong impacts on multiple health outcomes [20–22]. We examined the effect of the 2016 presidential election and subsequent restrictive immigration policies on birth outcomes, maternal depression, and infant healthcare utilization in the first year of life among Latina mother/baby dyads who delivered with emergency Medicaid, compared to their non-Latina counterparts. We chose the inflection date as the 2016 election because it was a climatic event the result of which legitimized the threat of policy changes hitherto debated in the campaign. Emergency Medicaid at delivery is an accurate proxy for undocumented status in North Carolina (NC), as over 99% of those using it are undocumented [23]. Like most other states, NC Medicaid does not cover the costs of prenatal care during pregnancy or postpartum care for undocumented pregnant women, but

only covers the costs of delivery itself through Emergency Medicaid [24]. We hypothesized that undocumented Latina immigrant women and their US born infants would have poorer birth outcomes and less healthcare utilization after the 2016 presidential election compared to Latina and non-Latina women with traditional Medicaid. While we hypothesized that these changes would affect all Latina mothers and their infants, we expected a greater impact on those with emergency Medicaid.

Methods

Study Population

We used data from Duke University Health System (DUHS) health system electronic health record (EHR). Our study population consisted of infants of women delivering with traditional or emergency Medicaid between January 1, 2014 and February 29, 2020 at an academic medical center in the Southeast. The population of infants and mothers were divided into three groups of dyads: our population of interest which was infants of Latina mothers with emergency Medicaid; our first control group which was infants of non-Latina mothers with traditional Medicaid (control non-Latina); our second control group which was infants of Latina mothers with traditional Medicaid (control Latina) (Fig. 1). Latina mothers were defined as those with Hispanic/Latina ethnicity or with preferred Spanish language as reported in the EHR. Women with stillbirths and those delivering with emergency Medicaid but who did not identify as Latina or Spanish-speaking were excluded. This study was reviewed and approved by the Duke University Institutional Review Board.

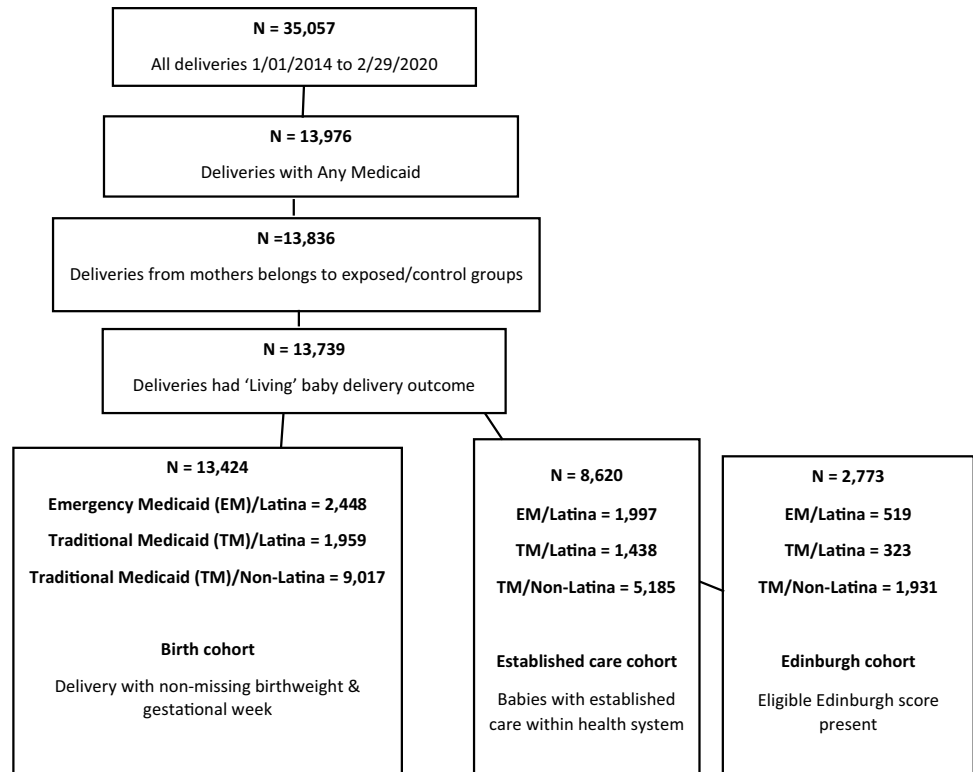
Measures and Outcomes

We examined three types of outcomes: birth outcomes (preterm birth and low birth weight), healthcare utilization (well child check (WCC) adherence, cancelled visits and emergency department (ED) visits), and maternal depression. All outcomes were calculated quarterly due to variability in the outcome by month to produce quarterly time series datasets which were then used for statistical analysis.

Birth Outcomes

The proportion of preterm infants was calculated by the number of preterm infants defined as <37 weeks gestational age in each quarter divided by all infants in that quarter. Low birth weight (LBW) was defined as a birth weight of <2500 g. The proportion of LBW infants was calculated

Fig. 1 Flow diagram of sample derivation



by the number of infants with LBW in each quarter divided by all infants in that quarter.

Health Care Utilization Outcomes

Infant health care utilization was assessed among infants who established care within DUHS health system after birth, and included well child check (WCC) adherence, cancelled visits and ED visits in the first year of. Establishment of care was defined as at least two visits within the first 45 days of life at a DUHS health system-affiliated clinic.

WCC adherence was calculated as the number of well child encounters attended out of 6 standard recommended well child visits by the end of the 13th month [25]. Encounters were anchored to the birth month. For infants born within a year of the election, WCC adherence was calculated by the total number of well visits before the election divided by the total possible number of well visits before the election (Appendix F). A weighted mean for each quarter was then calculated weighted by the population size in the quarter.

Cancelled visits and ED visits were calculated by the sum of the mean of cancelled and ED visits of all quarters in each period (e.g., pre- or post-immigration) divided by the total number of quarters in that time period.

Maternal Depression

Mean Edinburgh scores for mothers of infants between 15 days to ≤ 7 months were calculated for each quarter. If more than one screen was completed in this period, the first screen was used. The Edinburgh Postnatal Depression Scale (EPDS) is a 10-question self-rating scale that is reliable as a screening tool in the early postpartum period with scores ranging from 0 to 30, with scores ≥ 10 suggestive of depression [26–29]. Mean scores were examined rather than dichotomized scores because of few women in the pre-election period with non-missing scores, which led to even fewer positive screens (Appendix D).

Statistical Analysis

An interrupted time series (ITS) design was chosen to retrospectively evaluate the effect of an intervention on population-health outcomes [30]. ITS uses a continuous series of observations to establish an underlying trend which is then “interrupted,” and the hypothetical scenario had the intervention not occurred, or counterfactual, is compared to the observed trend [30]. The use of controls decreases confounding due to co-interventions and seasonal trends at the time of the intervention [31]. We conducted a controlled interrupted time series (CITS) analysis to compare outcomes before and after the election among Latina mothers on EM and their infants compared to the two control groups.

All infants were US citizens by birth and eligible for traditional Medicaid. Autoregressive integrated moving average regression (ARIMA) models were used to account for autocorrelation of outcomes due to secular trends, therefore controlling for confounders such as socioeconomic status and demographics. The primary intervention was the November 2016 presidential election. The pre-immigration action period ranged from 01/01/2014 to 10/31/2016 (11 quarters) and the post-immigration action period ranged from 11/01/2016 to 02/29/2020 (13 quarters).

The CITS model is depicted below:

$$\begin{aligned} \lambda(T, X) = & \beta_0 + \beta_1 T + \beta_2 I(T > T_{2016\text{election}}) \\ & + \beta_3 (T - T_{2016\text{election}}) * I(T > T_{2016\text{election}}) \\ & + \beta_4 X + \beta_5 T * X + \beta_6 I(T > T_{2016\text{election}}) * X \\ & + \beta_7 (T - T_{2016\text{election}}) * I(T > T_{2016\text{election}}) * X + \epsilon \end{aligned}$$

in which $\lambda(T, X)$ represents the outcome at time (T, in quarters) for exposure group X (1 = EM Latina mothers or their infants, 0 = traditional Medicaid Latina or non-Latina mothers) and $T_{2016\text{election}}$ is the 11th quarter in which the 2016 election occurred (where T = 24 quarters total), I is an indicator function that is 1 if the inside argument is true, and 0 otherwise, and ϵ is the model error term. Of main interest are β_6 and β_7 that show the immediate and sustained changes in the outcome trends following the election among emergency Medicaid Latina mothers and their infants compared to traditional Medicaid Latina or non-Latina mothers and their infants.

Sensitivity Analyses

Sensitivity analyses were conducted as follows: the primary intervention was changed from the election (November 2016) to the month following the inauguration (February 2017) to explore the effect of the change in office and subsequent policy changes (that also occurred that same month) on outcomes [15, 16, 32, 33]; the mean number of WCC visits was examined; the established care definition was changed from 2 visits to 1 visit in the first 45 days to examine potential selection bias towards families more likely to adhere to visits; and infants of all Latina mothers (emergency Medicaid and control Latina cohorts) were compared to the control non-Latina cohort.

Results

In total, 13,739 infants were included (Fig. 1). Of these, 13,424 infants had non-missing birthweight and gestational age and 2,448 infants (18.2%) were born to Latina mothers on emergency Medicaid, with the remaining born to mothers on traditional Medicaid including non-Latina (n = 9,017,

67.2%) and Latina (n = 1,959, 14.6%) mothers. Nearly two-thirds of infants (N = 8,620, 63%) established care within the “XXX” health system after birth, and of these 1,997 (23.2%) were born to Latina mothers on emergency Medicaid and the remaining were born to mothers on traditional Medicaid including non-Latina (n = 5,185, 60.0%) and Latina (n = 1438, 16.7%) mothers. Preterm birth rates were lower in both Latina cohorts (pre-election: emergency Medicaid 8.7%, control-Latina 9.6%; post-election: emergency Medicaid 8.4%, control-Latina 8.3%) compared to the control non-Latina cohort (pre-election: 16.5%, post-election 15.0%). LBW rates were lower in both Latina cohorts (pre-election: emergency Medicaid 6.2%, control-Latina 9.1%; post-election: emergency Medicaid 6.6%, control-Latina 7.1%) compared to the control non-Latina cohort (pre-election: 16.9%, post-election: 15.8%). Mean Edinburgh scores were lower in both Latina cohorts compared to the control non-Latina cohort (Table 1).

Controlled Interrupted Time Series Analysis

Association of 2016 Election on Birth Outcomes

We observed an immediate increase in LBW and preterm births among the emergency Medicaid cohort compared to the control non-Latina cohort. The absolute immediate increase in the LBW risk was 5.8% (95% CI: -0.99%, 12.5%). The absolute immediate increase in preterm birth risk was 4.6% (95% CI: -1.8%, 10.9%). While p -values for birth outcomes were not statistically significant at <0.05 , the majority of data (80–90%) suggests an increased risk of LBW and preterm births [34–36]. We found no sustained differences (Table 2).

Sensitivity analyses conducted by changing (1) the primary intervention from the election month to the month following the inauguration and (2) the established care definition from 2 visits to 1 visit in the first 45 days of life, were consistent with the primary analysis. (Appendices A and B).

Sensitivity analysis comparing all Latina mothers (emergency Medicaid and control Latina cohorts) to control non-Latina mothers showed absolute immediate increases in both LBW [4.7% (95% CI: -0.4%, 9.8%)] and preterm births [4.2% (95% CI: -0.8%, 9.2%)] immediately after the election among all Latina women (emergency Medicaid and control Latina cohorts) compared to the control non-Latina cohort (Table 3).

Effect of the 2016 Election on Maternal Depression

There was no immediate or sustained difference in the mean postpartum depression screen score among emergency

Table 1 Study population by maternal medicaid status, ethnicity and time period

	Pre-immigration action time period (1/01/14–10/31/16)			Immigration action time period (11/01/2016–2/29/2020)		
	Emergency medicaid/Latina	Traditional medicaid/Latina	Traditional medicaid/Non-Latina	Emergency medicaid/Latina	Traditional medicaid/Latina	Traditional medicaid/Non-Latina
Inpatient cohort						
No. of infants	850	1,100	4,122	1,598	859	4,895
Maternal age (years) Mean (SE)	29 (6.1)	27 (6.4)	26.3 (5.7)	29 (6.4)	26.1 (6.7)	27 (5.7)
Low birth weight (<2500 g)	53 (6.2%)	100 (9.1%)	698 (16.9%)	106 (6.6%)	61 (7.1%)	774(15.8%)
Preterm (<37 weeks)	74 (8.7%)	106 (9.6%)	679 (16.5%)	135 (8.4%)	71 (8.3%)	736 (15.0%)
Established care cohort						
No. of infants	667	809	2,372	1,330	629	2,813
WCC adherence, % Mean (SE)	68.3 (19.2)	65.3 (22.6)	60.5 (29.3)	60.8 (20.8)	59.7 (25.1)	55.8 (29.4)
ED visits (count) Weighted mean	0.45	0.43	0.42	0.39	0.37	0.39
Cancelled appointments (count) Weighted mean	0.75	0.74	0.81	0.79	0.79	0.85
Deliveries with non-missing Edinburgh score						
No. of infants	74	91	634	445	232	1,297
Edinburgh score (count) Mean (SE)	3.5 (3.6)	3.9 (4.9)	4.6 (5.3)	4.0 (4.4)	3.7 (4.7)	5.1 (5.6)

Table 2 Quarterly-level outcomes among different groups pre- and post-intervention

Outcome	Emergency medicaid/Latino families compared to traditional medicaid/Latino families				Emergency medicaid/Latino families compared to traditional medicaid/Non-Latino families			
	Immediate change after election (95% CI)	<i>P</i>	Sustained trend after election (95% CI)	<i>P</i>	Immediate change after election (95% CI)	<i>P</i>	Sustained trend after election (95% CI)	<i>P</i>
Preterm infants (%)	1.15 (−5.85, 8.15)	0.75	0.39 (−0.63, 1.41)	0.46	4.55 (−1.80, 10.90)	0.17	0.61 (−0.31, 1.53)	0.20
Low birth weight (%)	2.33 (−5.59, 10.25)	0.57	−0.08 (−1.24, 1.08)	0.89	5.77 (−0.99, 12.53)	0.10	0.04 (−0.94, 1.02)	0.94
WCC adherence (%)	6.43 (−2.49, 15.35)	0.17	−0.51 (−1.80, 0.78)	0.44	−0.72 (−6.91, 5.47)	0.82	−0.03 (−0.93, 0.87)	0.95
ED visits (count)	0.062 (−0.09, 0.21)	0.41	0.00 (−0.02, 0.02)	0.87	−0.03 (−0.15, 0.09)	0.67	0.01 (−0.01, 0.03)	0.29
Cancelled appointments (count)	0.085 (−0.05, 0.22)	0.23	0.00 (−0.02, 0.02)	0.80	−0.02 (−0.11, 0.08)	0.76	0.001 (−0.13, 0.01)	0.85
Edinburgh score (count)	1.19 (−3.12, 5.51)	0.59	0.17 (−0.45, 0.80)	0.59	1.184 (−2.44, 4.81)	0.53	0.33 (−0.20, 0.86)	0.23

Medicaid compared to control cohorts (Table 2). Sensitivity analysis comparing all Latina mothers (emergency Medicaid and control Latina cohorts) to control non-Latina mothers demonstrated a 0.3 increase in the sustained trend for mean Edinburgh score ($p=0.04$) (Appendix C).

Effect of 2016 Election on Healthcare Utilization

There was no immediate or sustained difference in WCC adherence after the election among the emergency Medicaid cohort compared to the control non-Latina cohort

(Table 2). There was a suggested 6.4% (95% CI: −2.49, 15.35, $p=0.17$) increase in WCC adherence immediately after the election among the emergency Medicaid cohort compared to the control Latina cohort. However, this was related to observed decreased WCC adherence among the control Latina group (Appendix E). There was no immediate or sustained change in rate of cancelled appointments or ED visits after the election among emergency Medicaid compared to control cohorts (Table 2) which was consistent with our sensitivity analysis (Appendix B).

Table 3 Quarterly-level outcomes among latino compared to non-latino families pre- and post-intervention

	Latino families compared to non-Latino families			
	Immediate change after election, % (95% CI)	<i>P</i>	Sustained trend after election, % (95% CI)	<i>P</i>
Outcome				
Preterm infants (%)	4.18 (−0.86, 9.22)	0.11	0.45% (−0.26, 1.18)	0.24
Low birth weight (%)	4.68% (−0.40, 9.76)	0.08	0.13% (−0.60, 0.86)	0.74
WCC adherence (%)	−2.90% (−9.37, 3.57)	0.38	−0.08 (−1.02, 0.86)	0.87
ED visits (count)	−0.043 (−0.15, 0.06)	0.43	0.007 (−0.01, 0.02)	0.40
Cancelled appointments (count)	−0.046 (−0.12, 0.03)	0.24	−0.001 (−0.01, 0.01)	0.87
Edinburgh score (count)	0.875 (−1.10, 2.85)	0.39	0.311 (0.02, 0.60)	0.04

Discussion

In this analysis of undocumented Latina mothers and their U.S. born infants, our data suggest an immediate increased risk of preterm birth and LBW among infants of undocumented Latina mothers compared to documented non-Latina mothers immediately following the 2016 election. While estimates for both preterm birth and LBW were statistically non-significant at $p < 0.05$, 80–90% of our data suggest an increased risk. We found no difference in healthcare utilization for their US born infants in the first year of life. Our findings are consistent with studies with larger sample sizes that observed an increase in preterm birth among immigrant women without consideration for documentation status and suggest the need for further examination of our study question with a larger sample size [7, 19].

Anti-immigrant policies at local, state, and federal levels have been associated with a myriad of poor immigrant health outcomes [2, 7, 18, 37–39]. Our study highlights how anti-immigrant discourse impacts Latino communities and families, and not just individuals lacking documentation status by examining birth outcomes of undocumented mothers and healthcare utilization patterns of US born citizen children. Among all Latina women in our study population, over 55% were undocumented, underscoring the prevalence of mixed-status families in the Latino community. The proliferation of anti-immigrant attitudes and enforcement activities has been associated with increased anxiety among US born adolescents(2), increased risk of LBW infants among both US-born and immigrant Latina mothers(37), decreased prenatal visits among immigrant Latina mothers [10], and decreased primary care visits among undocumented adults and children [9]. However, understanding the mechanisms underlying these findings and the complexities of how family members in mixed status families are differentially impacted is important in informing efforts to promote health equity.

Mechanisms hypothesized to contribute to poor birth outcomes include increased maternal stress from discrimination and fear of deportation leading to physiologic changes in utero [7]. Maternal stress is a known risk factor of preterm birth, with stronger associations found in early pregnancy [40–42]. While previous work found preterm births among Latina women peaked at periods corresponding to conception or the second trimester at the time of the election, our study found an immediate change in birth outcomes following the election and the inauguration, which correspond to an even earlier conception and second-trimester period [7]. Anti-immigrant rhetoric began soon after the announcement of Trump’s presidential candidacy, with Google trends of anti-immigrant rhetoric showing a mode inflection date of July 2015. It is plausible that the anti-immigrant environment experienced in the year prior to the election impacted maternal stress and birth outcomes, but also highlights the complexities of singling out specific mechanisms of preterm birth surrounding the election [10].

The expansion of the 2019 Public Charge Rule, which restricted lawful permanent residency to immigrants who received certain public benefits, may have contributed to decreased prenatal care and missed opportunities to improve birth outcomes. While the policy change did not penalize children or pregnant women, it led to a “chilling effect” phenomenon in which immigrant families did not enroll in or disenrolled from public benefits and avoided health care utilization [43, 44]. Prior work demonstrated a decrease in healthcare utilization consistent with the “chilling effect” among uninsured (as a proxy for undocumented) Latino children but no change among insured Latino children [8]. Our study similarly found that, despite anti-immigrant policies and stigma, US born infants of undocumented Latina mothers continued to attend scheduled visits. These different findings may be due to variations in perceived risk, with increased perceived risk of stigma and deportation associated with

their undocumented child. In other words, certain subgroups perceived to be at higher risk of discrimination are “living in the shadows,” as found in the National Latino Health and Immigration Survey, which measured avoidance of everyday activities due to not wanting to be asked about citizenship status [45]. While our study explored the possible “chilling effect” among US born infants who established care in the “XXX” health system, we were not able to examine these effects among infants who did not establish care within “XXX” health system. We also were unable to examine other public benefit enrollment such as Women, Infants and Children program (WIC), and Supplemental Nutrition Assistance Program (SNAP).

The geographic context of our study is important as emergency Medicaid in “XX” does not cover prenatal nor postnatal care for undocumented pregnant mothers, only the cost of the delivery itself [46]. Restrictive state policies for immigrant prenatal coverage have been associated with a higher uninsured rate of US born children of undocumented mothers compared to those with immigrant citizen mothers [47]. In contrast, inclusive policies such as Oregon’s expanded emergency Medicaid to cover prenatal and postnatal services for undocumented mothers, have been associated with increased well child adherence and vaccination among their US born children, and decreased infant mortality [48]. In our study, the “XXX” health system catchment area, which includes the “XXX”, has more inclusive policies than surrounding counties affected by local ICE raids [49]. Healthcare utilization and birth outcomes may therefore not be representative of other areas of the state. Further exploration of the interaction between local context and health outcomes is needed to better understand potential solutions to improve birth outcomes and promote appropriate health care utilization.

We used a quasi-experimental design with two control groups to rigorously examine if the study outcomes changed due to events surrounding the election rather than overlapping unrelated events. This design allows conclusions at a population level, but we cannot make conclusions for individual mothers and infants. Furthermore, while our study examines the mother’s documentation status, the status of the father is unknown, which may lead to increased

immigration related fear among those with two undocumented parents, or less fear among families with a documented father. We may have also miscategorized women who delivered by emergency Medicaid who may have been eligible for traditional Medicaid but whose paperwork was not yet processed. Conversely, there is a small probability that some undocumented immigrants may have received traditional Medicaid. Finally, despite several years of data our sample size of mothers with emergency Medicaid was small and our study may have been underpowered to detect differences in outcomes.

New Contributions to the Literature

Our results suggest a trend that is consistent with prior larger studies showing that Latina mothers had increases in preterm birth compared to other women following the 2016 election, however a larger sample size is needed to support this conclusion in our study [7]. Our findings suggest that Latino families overcome barriers to attend their US born infants’ health visits. By considering both undocumented mothers and their U.S. born infants together, this work examines the complex and potentially differential impacts of anti-immigrant policies on health-seeking behaviors and health outcomes in mixed-status families. Additional research is needed to further clarify these complexities including facilitators and barriers to care for undocumented pregnant women and their infants, perceptions of public benefit eligibility and enrollment, and to advocate for inclusive and equitable policies including the expansion of emergency Medicaid.

Appendix A

Sensitivity analysis by intervention.

See Tables 4, 5.

Table 4 Quarterly outcomes pre- and post-inauguration date

	Pre-inauguration time period (1/01/14–1/31/17)			Post-inauguration time period (2/1/2017–2/29/2020)		
	Emergency medicaid/Latina	Traditional medicaid/Latina	Traditional medicaid/Non-Latina	Emergency medicaid/Latina	Traditional medicaid/Latina	Traditional medicaid/Non-Latina
Inpatient cohort						
No. of infants	951	1,165	4,464	1,497	794	4,553
Maternal age (years) Mean (SE)	28.9 (6.1)	27 (6.4)	26.3 (5.7)	29.1 (6.4)	26 (6.7)	27 (5.7)
Low birth weight (<2500 g)	62 (6.5%)	105 (9.0%)	755 (16.9%)	97 (6.5%)	56 (7.1%)	717 (15.7%)
Preterm (<37 weeks)	80 (8.4%)	113 (9.7%)	731 (16.4%)	129 (8.6%)	64 (8.1%)	684 (15.0%)
Established care cohort						
No. of infants	756	852	2,567	1,241	586	2,618
WCC adherence (%) Mean (SE)	67.7 (19.5)	64.5 (23.1)	60.3 (29.4)	60.6 (20.8)	60.4 (24.7)	55.6 (29.4)
ED visits (count) Weighted mean	0.44	0.43	0.42	0.39	0.37	0.39
Cancelled appointments (count) Weighted mean	0.75	0.74	0.81	0.79	0.80	0.86
Deliveries with non-missing Edinburgh score						
No. of infants	90	99	697	429	224	1,234
Edinburgh score (count) Mean (SE)	3.6 (3.7)	3.9 (4.8)	4.7 (5.3)	4.0 (4.4)	3.6 (4.7)	5.1 (5.6)

Table 5 CITS outcomes among different groups pre- and post-intervention

	Emergency medicaid/Latino families compared to traditional medicaid/Latino families				Emergency medicaid/Latino families compared to traditional medicaid/Non-Latino families			
	Immediate change after inauguration, (SE)	<i>P</i>	Sustained trend after inauguration, (SE)	<i>P</i>	Immediate change after inauguration, (SE)	<i>P</i>	Sustained trend after inauguration, (SE)	<i>P</i>
Preterm infants	2.95% (3.50)	0.40	0.32% (0.50)	0.53	5.17% (3.22)	0.12	0.41%(0.46)	0.38
Low birth weight	0.44% (4.01)	0.91	−0.16% (0.58)	0.78	4.58% (3.43)	0.19	−0.19% (0.49)	0.71
WCC adherence	0.74% (4.95)	0.88	−0.72% (0.71)	0.32	0.34% (3.10)	0.91	−0.01 (0.45)	0.98
ED visits (count)	0.071 (0.074)	0.34	−0.001 (0.011)	0.94	0.001 (0.057)	0.98	0.010 (0.008)	0.22
Cancelled appointments (count)	0.061 (0.067)	0.38	−0.001 (0.010)	0.94	−0.061 (0.047)	0.20	0.002 (0.007)	0.72
Edinburgh score (count)	0.442 (2.181)	0.84	0.131 (0.314)	0.68	0.438 (1.837)	0.81	0.289 (0.265)	0.28

Appendix B

Sensitivity analysis by WCC adherence.
See Tables 6, 7, 8.

Table 6 Study population by mean WCC adherence

	Pre-election time period (1/01/14 – 10/31/16)			Post-election time period (11/01/2016– 2/29/2020)		
	Emergency med- icaid/Latina	Traditional med- icaid/Latina	Traditional medic- aid/Non-Latina	Emergency med- icaid/Latina	Traditional med- icaid/Latina	Traditional medicaid/Non- Latina
Established care cohort						
No. of infants	667	809	2,372	1,330	629	2,813
WCC adherence Mean, % (SE)	68.3 (19.2)	65.3 (22.6)	60.5 (29.3)	60.8 (20.8)	59.7 (25.1)	55.8 (29.4)
WCC visits Weighted mean	4.1	3.93	3.64	3.65	3.58	3.35

Table 7 Quarterly-level WCC outcomes among different groups pre- and post-intervention

	Emergency medicaid/Latino families compared to traditional medicaid/Latino families				Emergency medicaid/Latino families compared to tradi- tional medicaid/Non-Latino families			
	Immediate change after election (SE)	<i>P</i>	Sustained trend after election, (SE)	<i>P</i>	Immediate change after election (SE)	<i>P</i>	Sustained trend after election, (SE)	<i>P</i>
WCC adherence, %	6.43% (4.55)	0.17	−0.51% (0.66)	0.44	−0.72% (3.16)	0.82	−0.03% (0.46)	0.95
WCC visits	0.381 (0.272)	0.17	−0.030 (0.039)	0.46	−0.036 (0.190)	0.85	−0.001 (0.028)	0.96

Table 8 CITS results for establish care at least 1 follow-up visits in 45 days

	Emergency medicaid/Latino families compared to traditional medicaid/Latino families				Emergency medicaid/Latino families compared to traditional medicaid/Non-Latino families			
	Immediate change after election, % (SE)	<i>P</i>	Sustained trend after election, % (SE)	<i>P</i>	Immediate change after election, % (SE)	<i>P</i>	Sustained trend after election, % (SE)	<i>P</i>
Preterm infants, %	1.15% (3.57)	0.75	0.39% (0.52)	0.46	4.55% (3.24)	0.17	0.61% (0.47)	0.20
Low birth weight, %	2.33% (4.04)	0.57	−0.08% (0.59)	0.89	5.77% (3.45)	0.10	0.04% (0.50)	0.94
WCC adherence	5.91% (4.67)	0.21	−0.26% (0.68)	0.70	−2.39% (3.23)	0.46	−0.003% (0.47)	0.99
ED visits (count)	0.060 (0.074)	0.42	0.003 (0.011)	0.75	−0.035 (0.061)	0.57	0.009 (0.009)	0.30
Cancelled appointments (count)	0.086 (0.069)	0.22	0.005 (0.010)	0.62	−0.005 (0.048)	0.92	0.003 (0.007)	0.69
Edinburgh score (count)	0.854 (2.129)	0.69	0.106 (0.309)	0.73	0.703 (1.883)	0.71	0.249 (0.273)	0.37

Appendix C

Sensitivity analysis by study population.

See Table 9.

Table 9 Subgroup analysis by ethnicity and time period

	Pre-election action time period (1/01/14–10/31/16)		Post-election time period (11/01/2016–2/29/2020)	
	Latina	Non-Latina	Latina	Non-Latina
Inpatient Cohort				
No. of infants	1,950	4,122	2,457	4,895
Maternal age (years) Mean (SE)	27.9 (6.4)	26.3 (5.7)	28 (6.6)	27 (5.7)
Low birth weight (<2500 g)	153 (7.8%)	698 (16.9%)	167 (6.8%)	774 (15.8%)
Preterm (<37 weeks)	180 (9.2%)	679 (16.5%)	206 (8.4%)	736 (15.0%)
Established care cohort				
No. of infants	1,476	2,372	1,959	2,813
WCC adherence Mean, % (SE)	66.7 (21.2)	60.5 (29.3)	60.4 (22.3)	55.8 (29.4)
ED visits (count) Weighted mean	0.44	0.42	0.38	0.39
Cancelled appointments (count) Weighted mean	0.75	0.81	0.79	0.85
Deliveries with non-missing Edinburgh score				
No. of infants	165	634	677	1,297
Average count of encounter measured Edinburgh score	1.1 (0.3)	1.1 (0.3)	1.1 (0.4)	1.2 (0.6)
Edinburgh score Mean (SE)	3.7 (4.4)	4.6 (5.3)	3.9 (4.5)	5.1 (5.6)

Appendix D

See Table 10.

Table 10 Dichotomized Edinburgh scores

Deliveries with non-missing Edinburgh score						
No. of infants	74	91	634	445	232	1,297
Positive Edinburgh (≥ 10)	5 (6.8%)	11 (12.1%)	112 (17.7%)	55 (12.4%)	28 (12.1%)	263 (20.3%)

Appendix E

CITS figures. See Figs. 2, 3, 4, 5, 6, 7.

Fig. 2 LBW among EMS and control non-Latino cohorts

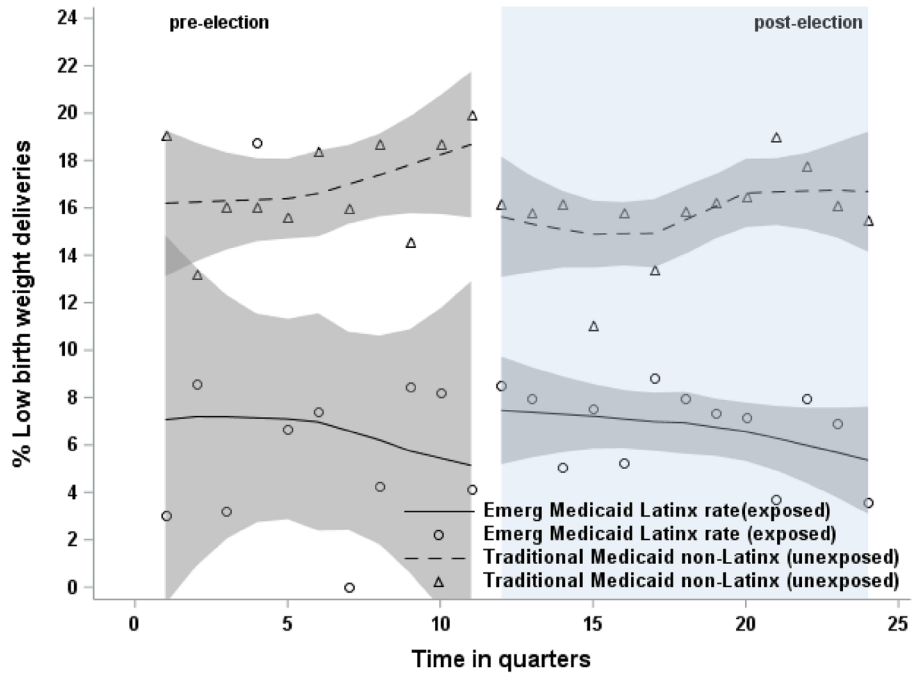


Fig. 3 Preterm births among EMS and control non-Latino cohorts

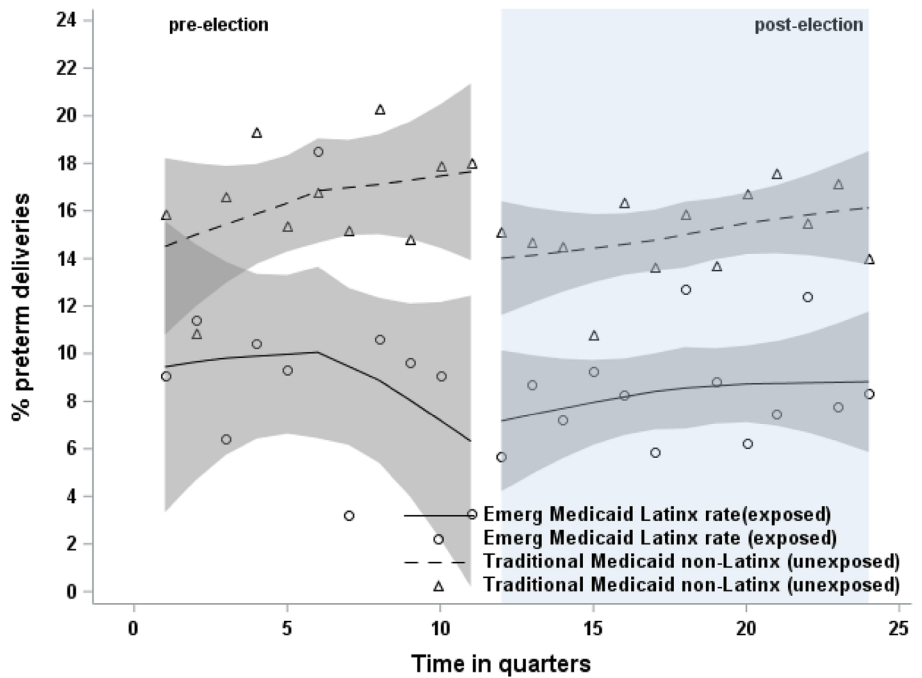


Fig. 4 WCC adherence among EMS and control non-Latino cohorts

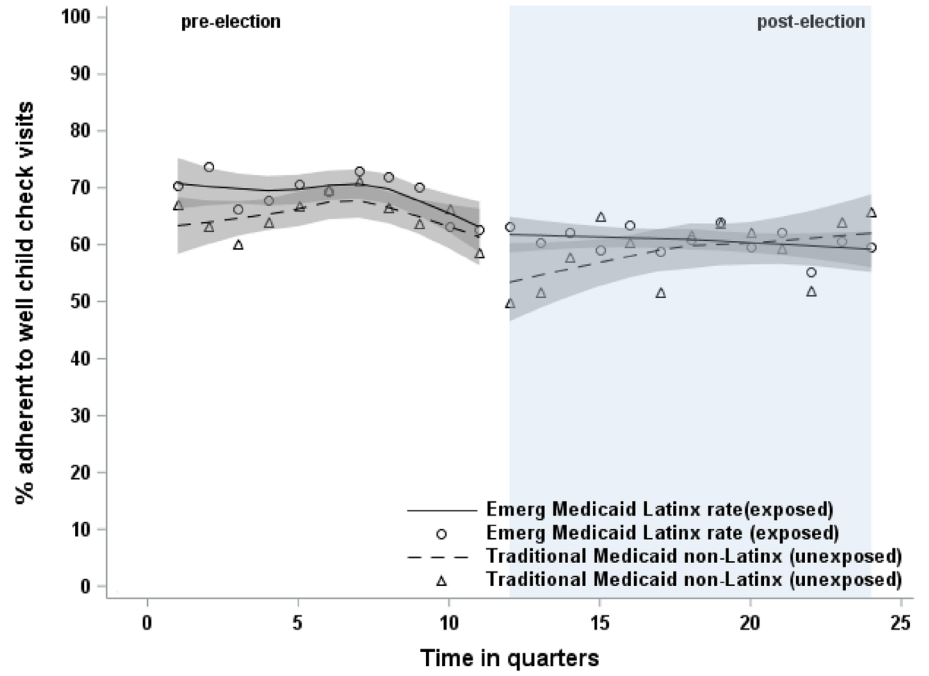


Fig. 5 LBW rate among EMS and control Latino cohorts

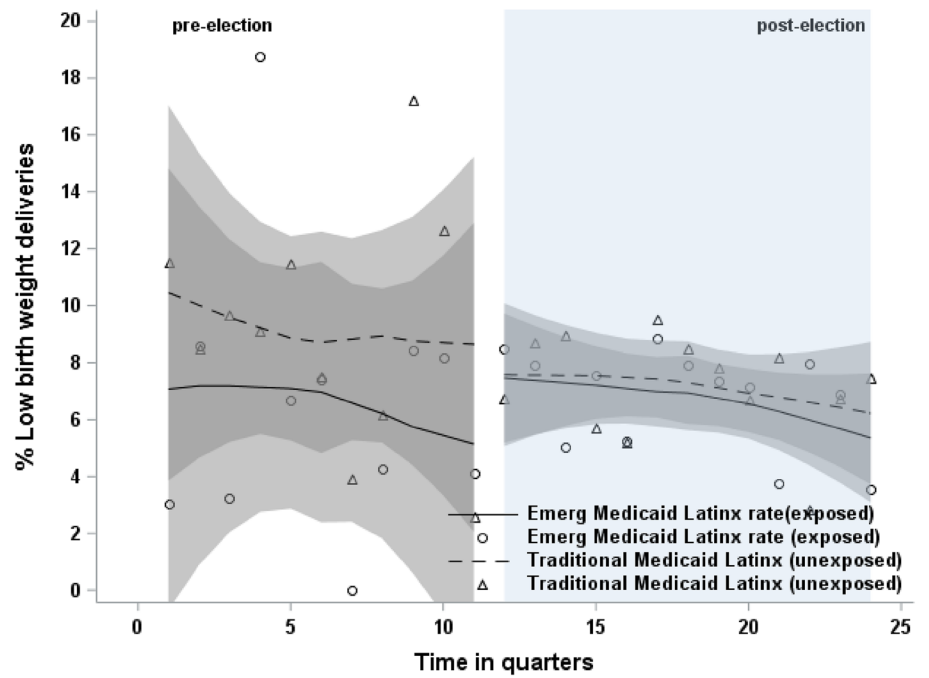


Fig. 6 Preterm birth rate among EMS and control Latino cohorts

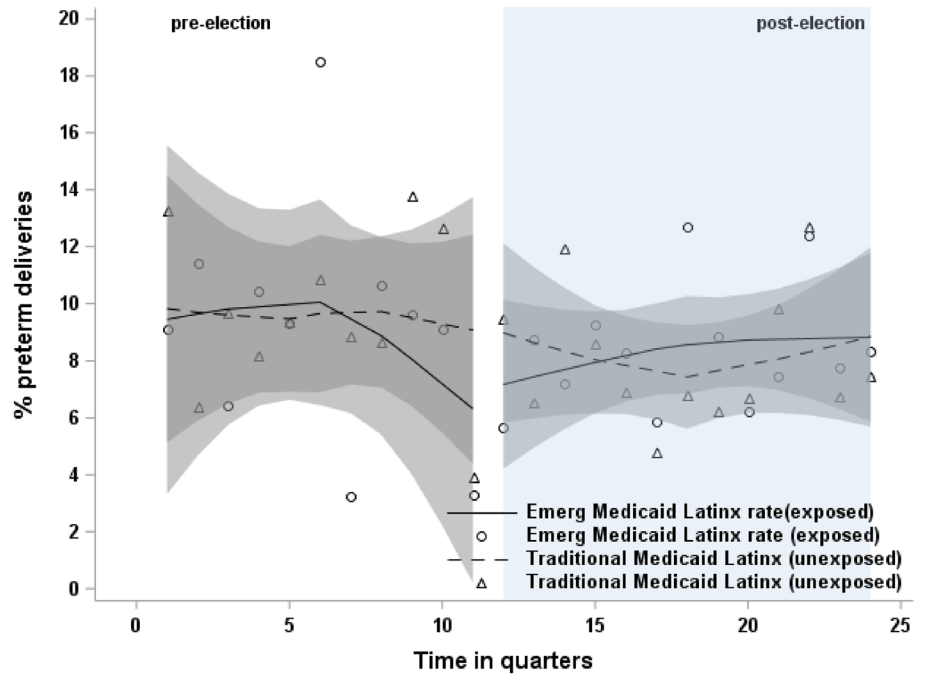
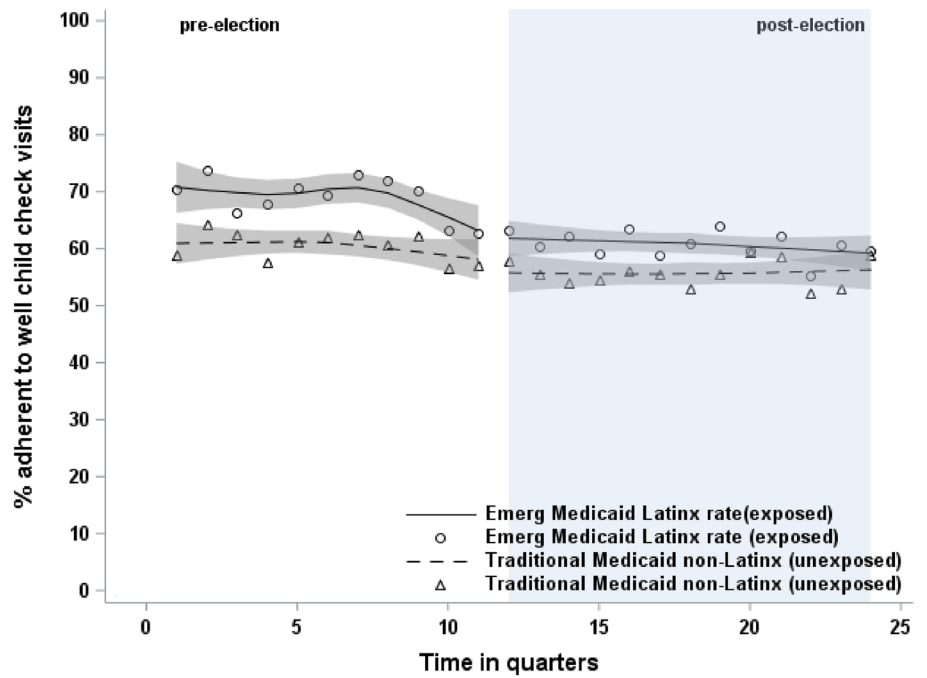


Fig. 7 WCC adherence among EMS and control Latino cohorts



Appendix F

WCC adherence definition

- I. For those infants born before November 1, 2015 and after November 1, 2016 use the following definition:

Anchor the percent of WCC adherence to the birth month and calculate the well visits out of 6 possible encounters through the end of the 13th month of life. I.e., infant born Jan 2019, then look a year from birth to see how many well visits they had and anchor the percent WCC adherence to that birth month. I.e., all kids born in Jan 2019 attended on average 95% of well visits.

- II. For those infants born between November 1, 2015 and November 1, 2016 use the following:
 - a. Born September 1, 2016 to October 31, 2016 (2 to 0 months old on November 1, 2016—1 visit expected.
 - b. Born July 1, 2016 to August 31, 2016 (4 to 2 months old on November 1, 2016—2 visit expected
 - c. Born May 1, 2016 to June 30, 2016 (6 to 4 months old on November 1, 2016—3 visits expected
 - d. Born February 1, 2016 to April 30, 2016 (9 to 6 months old on November 1, 2016—4 visits expected
 - e. Born November 1, 2015 to January 31, 2016 (12 to 9 months old on November 1, 2016—5 visits expected.

Acknowledgements Daniel Deng, MS, for his assistance early in the project with a preliminary data analysis.

Funding Funding was provided by the Children’s Miracle Network Hospitals Program. Dr. Cholera was supported by K12HD105253 from the National Institute of Child Health and Human Development (NICHD). Dr. Swartz is supported by grant K12HD103083 from the National Institute of Child Health and Human Development (NICHD) of the U.S. National Institutes of Health. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Declarations

Conflict of Interest The author declare that they have no conflict of interest.

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