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Latina Birth Outcomes in California: Not so Paradoxical

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Abstract

Objectives—To investigate Latina-White differences in birth outcomes in California from 2003 to 2010, looking for evidence of the often-cited “Latina paradox” and assessing the possible role of socioeconomic factors in observed differences.

Methods—Using statewide-representative data from the California Maternal and Infant Health Assessment, an annual population-based postpartum survey, we compared rates of preterm birth (PTB) and low birth weight (LBW) in five groups: U.S.-born non-Latina Whites (“Whites”), U.S.-born Mexican–Americans, U.S.-born non-Mexican Latinas, Mexican immigrants, and non-Mexican Latina immigrants. Logistic regression models examined the relative likelihood of PTB and LBW for women in each Latina subgroup compared with Whites, before and after adjustment for socioeconomic and other covariates.

Results—In unadjusted analyses, women in each Latina subgroup appeared more likely than White women to have PTB and LBW, although the increased likelihood of LBW among Mexican immigrants was statistically non-significant. After adjustment for less favorable socioeconomic characteristics among Latinas compared with Whites, observed differences in the estimated likelihoods of PTB or LBW for Latina subgroups relative to Whites were attenuated and (with the exception of PTB among U.S.-born Mexican Americans) no longer statistically significant.

Conclusions—We found no evidence of a “Latina paradox” in birth outcomes, which some have cited as evidence that social disadvantage is not always health-damaging. As observed in several previous studies, our findings were non-paradoxical: consistent with their socioeconomic disadvantage, Latinas had worse birth outcomes than non-Latina White women. Policy-makers should not rely on a “Latina paradox” to ensure good birth outcomes among socioeconomically disadvantaged Latina women.

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Keywords

Latina paradox; Disparities in preterm birth; Low birth weight; Socioeconomic factors

Introduction

For nearly three decades, a relatively large body of research has examined rates of preterm birth (PTB) and low birth weight (LBW) among Latinas and non-Latina European-American ("White") women in the United States [1–21]. Although Latina women who are born in the United States (U.S.) generally have been more likely to have adverse birth outcomes relative to White women [1, 3, 7, 9, 14, 17, 18], many studies have reported that Latinas overall, Latina immigrants, or Mexican-origin immigrant women experience similar or better birth outcomes compared with White or U.S.-born women overall [2, 3, 5–12, 17, 18, 22–24]. Because Latinas tend to have lower incomes, more limited education, and less adequate prenatal care than White women [3, 4, 7, 25], this reported phenomenon of relatively similar or favorable birth outcomes among Latina immigrants compared with White women has been characterized as the "Latina (or Hispanic) paradox," the "Latina epidemiologic paradox," or the "immigrant paradox." [2, 5, 15, 16, 26].

Not all prior research on birth outcomes has observed a Latina paradox, however. Multiple studies have found higher rates of PTB and LBW among Latinas, U.S. Latina immigrants overall, Mexican women overall, and/or Mexican immigrants compared with White women [3, 6, 11, 13, 14, 18, 21, 26, 27]. Several of these studies used national data [6, 9, 13, 17], while others used data from individual states [14, 15, 18, 27] or local counties or cities; [21, 26]. Annual national vital statistics data from 1989 through 2010 show consistently—although not always markedly— higher rates of PTB among Latinas overall (without nativity breakdowns) compared with White women [28].

Previous studies comparing birth outcomes among Latinas and White women have typically included limited or no information about women's socioeconomic characteristics, although evidence has linked birth outcomes with multiple socioeconomic indicators [29] including maternal education, paternal education, grandparent's education, family income [13], economic assets, welfare receipt, insurance coverage, and maternal or paternal occupation.

We conducted a study of Latina-White differences in birth outcomes using recent population-based data for a large sample of childbearing women in California, the state with the largest Latino population. Our data source included information about Latina subgroups and about several socioeconomic characteristics, allowing us to more thoroughly examine (a) whether differences in birth outcomes between Whites and Latinas were consistent with the often-cited "Latina paradox," and (b) the role of socioeconomic factors in observed birth outcome differences.

Methods and Procedures

Data and Key Variables

This study used data from the California Maternal and Infant Health Assessment (MIHA), an annual population-based survey of postpartum women in California conducted in English and Spanish since 1999. Detailed descriptions of the MIHA methodology have been published previously [30]. The MIHA survey is mailed to a stratified random sample of women, drawn from the statewide birth record file of California residents aged 15 years and older who gave birth to singletons, twins or triplets from February through May of the survey year; non-respondents are followed up by mail and by telephone. Completed surveys are linked with birth certificate data, and the final sample is weighted to reflect the population of births statewide. MIHA covers topics related to pregnancy, birth, the post-partum period, and infant health, including social and economic information. Survey data collection and analyses were approved by the State of California, Committee for the Protection of Human Subjects and the Committee on Human Research at the author's academic institution.

We combined MIHA data from the 2003–2010 annual surveys, which had annual unweighted response rates of 69 % or higher. During this time period, there were a total of 31,211 respondents, 28,764 of whom had singleton births and complete data on self-reported gestational age based on date of last menstrual period (6.3 % missing). After excluding immigrant White women and non-Latina women from other racial/ethnic groups, the study sample comprised 21,227 surveyed women, including 7367 U.S.-born non-Latina Whites, 4375 U.S.-born Mexican Americans, 1018 U.S.-born non-Mexican Latinas, 6713 Mexican immigrants, and 1754 non-Mexican Latina immigrants.

Variable Definition

Outcome Variables—*Preterm birth (PTB)* was defined as a live birth occurring at <37 weeks of gestation (i.e., 17–36 weeks), based on gestational age data from the linked birth record and calculated using mother's last menstrual period and baby's birth date. *Low birth weight (LBW)* was defined as an infant weight of <2500 g at birth, based on birth certificate data.

Primary Predictor Variable—Respondent's *racial or ethnic group* was defined based on Hispanic ethnicity and the first listed race as recorded in the birth certificate. *Nativity* was defined based on the country of birth recorded in the birth certificate. Both racial or ethnic group and nativity were used to classify women in the study sample into five mutually exclusive groups: U.S.-born non-Latina Whites (hereafter "Whites"), U.S.-born Mexican Americans, U.S.-born non-Mexican Latinas, Mexican immigrants, and non-Mexican Latina immigrants (who were combined given the small number of immigrants from other Latin American countries). Using MIHA data, we also categorized Latina immigrants by length of U.S. residence (<10 vs. 10 years or longer).

Socioeconomic Variables—*Family income* was measured in MIHA as total pre-tax income from all sources during the calendar year before the index birth and categorized

relative to family size as ≤100, 101–200, 201–300, 301–400, or >400 % of the federal poverty level. *Highest levels of maternal and paternal education* were obtained respectively from MIHA and birth certificate data, and *grandparents' education* was derived from MIHA and measured as the highest educational level of either of the respondent's parents around the time she was 13 years old; in each case, education was categorized as: did not finish high school, high-school graduate or GED, some college, or college graduate. *Health insurance coverage* before pregnancy was collected in MIHA and categorized as private insurance versus other coverage or uninsured. These factors have been previously associated with birth outcomes [29].

Other Covariates—We selected a wide array of additional covariates based on the literature identifying these variables as known or suspected risk factors for adverse birth outcomes, including measures of demographic characteristics (maternal age, paternal age, parity); health-related attitudes or behaviors (smoking, alcohol use, pregnancy intendedness); health status (self-reported pre-pregnancy health status, pre-pregnancy body mass index, gestational weight gain, gestational diabetes, and gestational hypertension); social support during pregnancy (marital status, practical or emotional support, and WIC participation); hardships during pregnancy (intimate partner violence, homelessness, job loss of respondent or partner, separation or divorce, moved during pregnancy, had a hard time paying bills, incarceration of respondent or partner, someone close to respondent had serious drug or alcohol problems, and food insecurity); and timing and adequacy of prenatal care. Table 1 includes additional details about these covariates.

For most of the variables we examined, data were missing for fewer than five percent of women in the study sample. Exceptions included family income (9.0 % missing), paternal education (9.4 %), paternal occupation (24.0 %), grandparent's education (8.7 %), pre-pregnancy body mass index or BMI (6.4 %), weight gain adjusted for duration of pregnancy (10.3 %), and private insurance before pregnancy (5.7 %); in most cases, the proportion of missing values was higher among Latinas than White women. For each of these variables, respondents with missing values were classified as a separate group and retained in all analyses. We also imputed missing data (approach described elsewhere [31]) for variables other than those (gestational age, race/ethnicity, nativity, and length of U.S. residence) used to derive the outcome and predictor variables.

Statistical Analyses

We compared rates of PTB and LBW and distributions of other variables across the race/nativity subgroups, using Chi square statistics to assess the statistical significance of observed differences.

We first estimated logistic regression models to examine the relative likelihood of PTB and LBW for women in each of the four Latina subgroups compared with White women without adjusting for covariates. Because we conceptualize socioeconomic factors as potential mediators of any observed Latina-White differences in PTB and LBW, we next adjusted for socioeconomic variables and assessed whether differences between Latina subgroups and White women persisted. Final models adjusted for a set of additional variables considered to

be potential mediators, including all covariates described above. Based on prior research that reported differences among immigrants related to length of residence in the receiving country, we repeated these analyses separately for each subgroup of Latina immigrants who had resided in the United States for less than 10 years and for those with U.S. residence of 10 years or longer. All models included a dummy variable for survey year to test for cohort effects. We ran all logistic regression models with and without imputed missing data; because the results and conclusions were not appreciably different, we present results here based on imputed data.

All analyses were conducted using SAS statistical software, version 9.3 of the SAS system, taking into account MIHA's stratified sampling design. Effects associated with p values <0.05 were considered statistically significant.

Results

Table 2 displays differences in birth outcomes and socioeconomic and other characteristics between Whites, U.S.-born Mexican Americans, U.S.-born non-Mexican Latinas, Mexican immigrants, and non-Mexican Latina immigrants. Prevalence rates of both PTB and LBW were lower among White women than among women in each of the Latina subgroups. Among Latinas, rates were lowest for Mexican immigrant women and highest for non-Mexican immigrants, with intermediate rates seen among U.S.-born Latina women. Consistent with previous studies, Latina women, regardless of nativity, generally had less favorable socioeconomic characteristics than White women. With the exception of smoking, drinking, and hypertension during pregnancy, the prevalence of most other characteristics included in this table (which have generally been associated in the literature with increased likelihood of adverse birth outcomes) was higher among Latina women in every nativity subgroup compared with White women.

Table 3 displays results from the logistic regression models estimating the relative likelihoods of PTB and LBW for women in each Latina subgroup compared with White women. Without adjustment for other factors, PTB was elevated among all four subgroups of Latina women compared to White women. Adjustment for socioeconomic characteristics substantially attenuated the estimated differences in the likelihood of PTB for all Latina subgroups relative to White women, although the odds ratios remained significantly elevated for U.S.-born Mexican Americans. After adjustment for the remaining covariates, the results remained largely unchanged. Results were similar for LBW, with elevated odds ratios for women in each Latina subgroup relative to White women, although for Mexican immigrants the confidence interval included the null. Compared with White women, none of the Latina groups had a significantly elevated risk of LBW after adjusting for socioeconomic factors. The results remained largely unchanged after adjustment for the remaining covariates, although in most cases the estimated odds ratios were slightly higher compared with those adjusted only for socioeconomic factors. Findings from separate subgroup analyses for Latina immigrants by length of U.S. residence were generally similar to the overall results reported above (Appendix Table 4).

Discussion

We did not find evidence supporting a “Latina paradox”— i.e., similar or better outcomes among Latinas compared with White women despite greater socioeconomic disadvantage—in this population-based study of more than 20,000 Latina and White childbearing women who gave birth to singleton infants in California. Rather, we found the non-paradoxical opposite: consistent with their greater socioeconomic disadvantage, women in each of the Latina subgroups we studied—U.S.-born Mexican Americans, U.S.-born non-Mexican Latinas, Mexican immigrants, and non-Mexican Latina immigrants—had higher unadjusted likelihoods of both PTB and LBW than non-Latina White women. The magnitude of the increased risks was not small: with the exception of LBW among Mexican immigrants, the unadjusted odds ratios for both PTB and LBW in each Latina subgroup relative to White women ranged from approximately 1.2–1.5. The observed differences in adverse birth outcomes were markedly attenuated after adjustments for socioeconomic characteristics, and these results remained largely unchanged after additional adjustments for other covariates, suggesting—though not proving—that socioeconomic factors may play an important role in Latinas’ adverse birth outcomes.

Multiple interrelated factors could explain discrepancies between our results and those from studies that have observed paradoxical findings. These include differences in time periods, geographic locations, characteristics of the Latina and/or White women who were studied, and/or differences in how Latina and White subgroups were categorized. Together, these factors could reflect differences in population characteristics and experiences at individual and community levels that could affect birth outcomes among Latinas and/or White women.

We used data from 2003 to 2010, while most studies that observed a Latina paradox in birth outcomes used data from 2003 or earlier [3, 5, 6, 8–10, 14, 17, 21, 24] and only a few used data from 2004 to 2007 [2, 7, 18]. Most studies that observed a paradox in LBW used national data [8, 9, 12, 17, 24], although a few used California data [14, 15, 20]. Of the studies that reported a paradox in PTB, two used national data [10, 24], two used data from Texas [7] and Utah [18], and several used data from a single city [2, 3, 5, 21]. Different data sources could reflect differences in relevant characteristics of the Latina women who were studied; for example, the Latina immigrant women included in several earlier studies [9, 10, 18, 20, 24] appear different from the Latina immigrant women in our statewide representative sample with respect to age, marital status, education, and prevalence of potentially relevant risk factors like diabetes and excessive weight gain.

Discrepant findings among different studies may also be explained by varying approaches to classifying Latinas and selecting referent groups. Some studies have examined Latinas overall without nativity distinction, and others have compared all immigrant or all U.S.-born women. Our study findings regarding higher rates of PTB in Latinas are consistent with those of other studies that used generally similar classifications of Latinas and referent groups [13, 17].

Changing patterns over time in some risk factors (e.g., marital status, pre-pregnancy body mass index, and diabetes) for adverse birth outcomes may also help explain the non-

paradoxical results we observed. Our findings are consistent with relatively recent research that found little or no evidence of Latino/a paradoxes in other health outcomes including biologic risk factors (such as cholesterol, blood pressure, and glycated hemoglobin), and infant mortality for Mexican immigrants. Based on results of earlier published studies and on NCHS data on LBW (but not PTB), a “Latina paradox” may have occurred in the past and may continue to occur in certain populations and geographic settings—for example, where recent immigrant Latina women may have sufficient sources of resilience, such as social support and norms, that promote healthier behaviors. Our overall finding that adverse birth outcomes were more prevalent among Latina relative to White women held across most Latina subgroups, though the observed elevation in LBW rates among Mexican immigrants compared with Whites was not statistically significant. While this finding could be interpreted as evidence of a Latina (or at least a Mexican immigrant) paradox, it could also be explained by sampling variation—an explanation we consider more likely given the generally consistent pattern of findings overall.

Adjustment for differences in socioeconomic characteristics attenuated the magnitude of the Latina-White differences in adverse birth outcomes for all Latina subgroups, and—with the exception of U.S.-born Mexican American women—these differences were no longer statistically significant. Although we were unable to conduct a formal mediation analysis in this cross-sectional study, this finding suggests that socioeconomic differences largely explain the non-paradoxical birth outcome disparities between the Latina subgroups and White women. Latina women in our study had substantial socioeconomic disadvantage compared to White women. Since socioeconomic factors cannot influence ethnicity, we can establish the temporal order between ethnicity and socioeconomic factors even using cross-sectional data. Based on previous literature, a causal relationship between socioeconomic factors and both PTB and LBW is highly plausible, through a range of pathways including direct exposure to physical hazards (e.g., residential exposure to environmental toxins), inadequate diet, unhealthy behaviors, and pathways involving physiologic response to chronic stress.

Our adjusted models correspond with the “direct” effect of Latina ethnicity, not mediated by socioeconomic factors only under special assumptions; in particular, that there are no unmeasured common causes of the socioeconomic factors and birth outcomes [32, 33]. When this assumption does not hold, the bias would typically lead to an underestimate of the direct effect of Latina ethnicity on birth outcomes. For example, neighborhood of residence may influence family income and birth outcomes, but was not included as a covariate in this study. The slight increases in estimated differences in birth outcomes we observed after additional adjustment for other risk factors is consistent with this possibility. Bias in mediation models due to unmeasured common causes of the mediator and health outcome may have contributed to previous evidence on the “Latina paradox.”

Our study results are most consistent with a tentative interpretation that the estimated differences in adverse birth outcomes between Latina subgroups and White women are substantially explained by socioeconomic inequalities. This implies that if the distribution of socioeconomic characteristics were equalized across the race/ethnic-nativity groups, the frequency of adverse birth outcomes would be much more similar comparing Latina

subgroups with White women—although other differences are likely to play an important role as well. For example, despite having generally less favorable socioeconomic characteristics than both U.S.-born White women and U.S.-born Latinas, Mexican immigrants tended to have better health profiles (e.g., were less likely to smoke, to consume alcohol during pregnancy, and to experience hypertension during pregnancy) that may offset the harmful effects of socioeconomic disadvantage on birth outcomes and help explain the patterns we observed. Future research should examine the possibility that socioeconomic characteristics have a differential impact on birth outcomes for Latina versus White women and whether similar socioeconomic factors explain the differentials for each Latina subgroup relative to White women.

Limitations of this study included the inability to further disaggregate the non-Mexican Latina immigrants by country of birth (e.g., Central America vs. South America) due to limited numbers. We had insufficient statistical power to estimate rates of PTB and LBW by U.S. length of residence with greater precision, in part due to missing information on duration of U.S. residence for many non-Mexican Latina immigrants. The data are cross-sectional, limiting our ability to make causal inferences; nevertheless, reverse causation is unlikely as maternal race/ethnicity-nativity precedes birth outcomes. Our findings are unlikely to reflect methodological limitations of the MIHA survey, which employs the basic methodology developed and used by the Centers for Disease Control and Prevention (CDC) for its Pregnancy Risk Assessment Monitoring System (PRAMS). MIHA has high response rates, and its quality is further reflected by its use in multiple studies in peer-reviewed journals, including publications combining PRAMS and MIHA data. Additionally, MIHA data are weighted to reflect the characteristics of childbearing women in California.

The results of this study have important implications for population health and the economy in California and nationally. PTB and LBW are strong predictors of infant mortality and of adverse health and neurodevelopmental outcomes in childhood and adolescence; they have also been linked with chronic disease or premature mortality in adulthood, and are associated with tremendous costs related to medical care, social services, and lost productivity. Even relatively small elevations in rates of adverse birth outcomes among Latinas can have a large impact on the population statewide and nationally: one in two babies in California and one in four babies in the nation are born to Latina women and those proportions are increasing.

Final Conclusions

In this large statewide-representative study of birth outcomes in California during recent years, we found no evidence to support a “Latina paradox”—a phenomenon that sometimes has been cited as evidence that socioeconomic disadvantage does not necessarily harm health. Our findings, which are consistent with those from several previous studies that perhaps have received insufficient attention, were clearly not paradoxical. Rather, as expected based on their relatively higher levels of socioeconomic disadvantage, Latina women experienced worse birth outcomes than White women. Socioeconomic factors appear to play a major role in explaining these differences. Together, the results of this study and others with similar findings should strike a cautionary note: policy-makers should not

rely on a “Latina paradox” to ensure good birth outcomes among socioeconomically disadvantaged Latina women.

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Appendix

See Table 4.

Table 4

Odds ratios and 95 % CI comparing the odds of preterm birth and low birth weight among Latinas relative to non-Latina U.S.-born White women with singleton births (MIHA, 2003–2010)

	U.S. born women			Immigrant women			
	Non-Latina Whites	Mexican Americans	Non-Mexican Latinas	Mexicans <10 years of U.S. residence	Mexicans 10+ years of U.S. residence	Non-Mexicans <10 years of U.S. residence	Non-Mexicans 10+ years of U.S. residence
	OR (95 % CI)		OR (95 % CI)	OR (95 % CI)	OR (95 % CI)	OR (95 % CI)	OR (95 % CI)
Preterm birth							
Unadjusted model	1.0 (ref)	1.42 (1.23–1.64)	1.36 (1.05–1.75)	1.17 (1.00–1.37)	1.28 (1.08–1.52)	1.40 (1.04–1.88)	1.35 (0.99–1.83)
Model adjusted for socioeconomic factors[a] and survey year	1.0 (ref)	1.20 (1.00–1.42)	1.17 (0.90–1.52)	0.87 (0.70–1.08)	0.98 (0.79–1.23)	1.08 (0.79–1.49)	1. 10 (0.79–1.53)
Model with adjustments for socioeconomic factors and all covariates in Table 1 and survey year	1.0 (ref)	1.24 (1.04–1.48)	1.23 (0.94–1.61)	1.01 (0.80–1.27)	1.04 (0.83–1.32)	1.17 (0.84–1.63)	1.11 (0.79–1.55)
Low birth weight							
Unadjusted model	1.0 (ref)	1.26 (1.04–1.55)	1.56 (1.12–2.19)	0.98 (0.78–1.24)	1.33 (1.06–1.67)	1.73 (1.19–2.51)	1.23 (0.80–1.89)
Model adjusted for socioeconomic factors[a] and survey year	1.0 (ref)	1.06 (.84–1.35)	1.35 (0.94–1.93)	0.72 (0.53–0.98)	1.01 (0.75–1.37)	1.32 (0.88–1.99)	0.99 (0.63–1.57)
Model with adjustments for socioeconomic factors and all covariates in Table 1 and survey year	1.0 (ref)	1.19 (.94–1.52)	1.57 (1.08–2.26)	0.87 (0.63–1.20)	1.13 (0.83–1.54)	1.38 (0.90–2.12)	1.09 (0.86–2.46)

Models are weighted to account tor complex sample design of MIHA

Models with imputed data

[a]Socioeconomic factors adjusted for: Maternal education, paternal education, grandparent education, private insurance before pregnancy, and family income

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Significance

What is already known on this subject?

Despite greater socioeconomic disadvantage among Latina women relative to non-Latina White women in the United States some— but not all—studies have reported lower rates of preterm birth (PTB) and low birth weight (LBW) among Latinas, a phenomenon widely referred to as the "Latina paradox."

What this study adds?

We found no evidence of a "Latina paradox" in this large statewide-representative study. Our findings were non-paradoxical: as would be expected based on their socioeconomic disadvantages Latina women had worse birth outcomes than White women. Socioeconomic factors appeared to explain the disparities in birth outcomes.

Table 1

Covariates based on a priori identification in the literature as known or suspected plausible risk factors for adverse birth outcomes

Type of variable	Variable (data source)	Description/categories
Demographic characteristics	Maternal age, paternal age, parity (birth certificate data)	Maternal age (categorized as 15–19, 20–34, or ≥35 years); paternal age (categorized as ≤19, 20–34, or ≥35 years); and parity (total live births including index birth, categorized 1–4 births, or ≥5 births)
Health-related attitudes or behaviors	Smoking, alcohol use, pregnancy intendedness (MIHA)	Smoking (categorized as any smoking during pregnancy vs. none); alcohol use (measured as any drinking during pregnancy vs. none); and pregnancy intendedness around the time of conception, measured as unintended (wanted to be pregnant later vs. never) or intended (wanted to be pregnant then, or not sure)
Health status information	Self-reported pre-pregnancy health status, pre-pregnancy body mass index, gestational weight gain, gestational diabetes and gestational hypertension (MIHA)	Self-reported pre-pregnancy health status (classified as excellent, good, or fair/poor); pre-pregnancy body mass index or BMI, classified based on 2009 Institute of Medicine BMI criteria (categorized as obese, overweight, normal, or underweight); gestational weight gain, adjusted for pre-pregnancy BMI and based on 2009 Institute of Medicine weight gain criteria (categorized as inadequate, adequate, or excessive); gestational diabetes and gestational hypertension based on self-report that a doctor, nurse, or other health care worker told respondent she had diabetes or high blood sugar, or high blood pressure during pregnancy (categorized as yes or no)
Social support during pregnancy	Marital status, practical support, WIC and emotional support (MIHA)	Marital status (categorized as married, living with a partner, or single/separated/divorced/widowed); emotional support during pregnancy, based on participant reports that she had someone she could talk to if she needed it (categorized as yes or no); practical support during pregnancy, based on respondent's reports that she had help with practical needs such as getting a ride somewhere if she needed it (categorized as yes or no); WIC, whether or not respondent reported having received benefits from the Women, Infants and Children's Supplemental Food Program during pregnancy (categorized as yes or no)
Hardships during pregnancy	Intimate partner violence, homelessness, respondent's partner or spouse job loss, separation or divorce, respondent moved during pregnancy; respondent had a lot of unpaid bills; respondent or her partner was incarcerated, drug or alcohol problems, and level of food insecurity (MIHA)	Hardship questions referred to the period during the respondent's index pregnancy with response options of yes or no. Intimate partner violence (respondent reported experiencing physical violence from a partner/spouse); homelessness (respondent reported being homeless at some point during pregnancy); partner or spouse job loss (when she wanted to continue on working); separation or divorce (respondent reported that she became separated or divorced); respondent moved during pregnancy; respondent had a lot of unpaid bills; respondent or her partner was incarcerated; someone close to the respondent had a serious drug or alcohol problem. Level of food insecurity was measured with the USDA 6-item instrument categorized as no food insecurity, food insecurity without hunger, or food insecurity with hunger
Prenatal care	Trimester of prenatal care initiation (MIHA) and inadequate number of prenatal visits (birth certificate data)	Trimester of prenatal care initiation (categorized as first, second, or third/none, excluding visits just for pregnancy tests); inadequate number of prenatal visits based on the Kotelchuck index and derived from the birth certificate (categorized as received <50 % or >50 % of expected prenatal visits based on gestational age at delivery)

Table 2

Birth outcomes and sample characteristics among U.S.-born non-Latina Whites, U.S. born Mexican Americans, U.S.-born non-Mexican Latinas, and Latina immigrant respondents with singleton births (MIHA 2003–2010, n = 21,227)

	U.S.-born women			Latina immigrant women		
	Non-Latina Whites	Mexican Americans	Non-Mexican Latinas	Mexicans	Non-Mexicans	X^2 p value[a]
n	7367	4375	1018	6713	1754	
Preterm (%)	7.3	10.1	9.57	8.9	10.6	<.0001
Low birth weight (LBW)	3.8	4.9	5.9	4.4	5.8	0.005
Maternal educational attainment						<.0001
Less than high school	5.8	21.7	19.7	41.4	41.4	
HS/GED	14.2	31.7	25.9	41.3	28.9	
Some college	34.5	33.5	37.7	12.1	19.4	
College grad	45.4	13.0	16.7	5.0	10.1	
Missing	–	.001	16.6	0.0	0.13	
Family income						<.0001
≤100 %	14.8	38.7	37.6	58.3	49.1	
101–200 %	15.6	25.6	23.0	21.6	21.9	
201–300 %	12.3	10.2	10.6	3.5	4.3	
301–400 %	11.4	5.9	6.7	1.2	2.0	
>400 %	41.3	10.9	16.4	1.7	5.3	
Missing	4.5	8.6	5.6	13.6	17.4	
Had private insurance before pregnancy	67.1	36.5	39.2	13.5	17.1	<.0001
Missing	3.8	4.9	5.0	6.2	14.2	
Paternal educational attainment						<.0001
Less than high school	6.2	25.9	17.1	59.1	45.6	
HS/GED	24.5	36.7	35.3	21.5	21.9	
Some college	24.8	18.1	20.2	7.3	12.9	
College grad	38.6	9.2	14.2	3.5	9.5	
Missing	5.8	9.8	13.1	8.6	9.9	
Grandparent’s educational attainment						<.0001
<12 years	4.9	39.1	30.7	65.5	54.5	

	U.S.-born women			Latina immigrant women		
	Non-Latina Whites	Mexican Americans	Non-Mexican Latinas	Mexicans	Non-Mexicans	X^2 *p* value[a]
HS/GED	21.8	27.1	30.1	11.7	14.0	
Some college	29.5	16.3	28.1	2.7	5.9	
College grad	41.9	8.8	19.9	3.9	9.7	
Missing	1.9	8.7	6.9	16.1	15.9	
Maternal age						<.0001
15–19	4.8	20.3	17.8	9.3	6.4	
20–24	16.9	31.6	31.5	25.7	21.9	
25–34	56.3	40.5	40.9	50.4	53.5	
35+	22.1	7.6	10.0	14.7	18.4	
Paternal age						<.0001
≤19	10.4	25.4	23.7	18.2	13.4	
20–34	49.6	44.5	43.3	49.4	49.3	
35+	33.6	12.2	17.0	24.0	29.1	
Missing	3.8	7.5	6.8	4.8	6.1	
Parity						<.0001
1–4	97.6	96.0	96.2	93.7	94.6	
5 or more births	2.4	4.0	3.8	6.3	5.4	
Smoked during pregnancy	12.9	7.4	8.3	2.2	2.2	<.0001
Missing	0.6	0.7	0.6	0.6	3.9	
Drank alcohol during pregnancy	26.1	14.5	17.1	5.7	5.9	<.0001
Missing	1.0	1.9	1.3	3.0	8.3	
Unintended pregnancy	36.2	58.2	55.9	42.6	40.6	<.0001
Missing	0.5	0.9	0.6	1.6	5.3	
Short interpregnancy interval (<15 months)	12.9	14.8	11.7	11.9	10.6	0.0003
Hypertension during pregnancy	11.7	10.3	9.4	6.8	9.1	<.0001
Missing	0.5	0.8	0.6	2.7	4.2	
Diabetes during pregnancy	6.2	8.4	7.5	13. 0	12.0	<.0001
Missing	0.5	0.6	0.6	2.6	3.6	
BMI before pregnancy						<.0001

	U.S.-born women			Latina immigrant women		
	Non-Latina Whites	Mexican Americans	Non-Mexican Latinas	Mexicans	Non-Mexicans	X^2 *p* value[a]
Obese	14.2	23.1	18.6	17.2	15.9	
Overweight	21.6	26.3	25.9	26.0	25.3	
Normal weight	58.7	44.7	49.6	37.6	40.3	
Underweight	4.0	3.5	3.7	2.9	2.7	
Missing	1.5	2.3	2.0	16.3	15.8	
Health before pregnancy						<.0001
Excellent	50.5	33.7	40.0	27.1	32.9	
Good	44.0	52.3	48.0	54.0	50.4	
Fair	4.9	12.5	10.4	17.6	15.0	
Poor	0.5	1.3	1.4	0.9	0.8	
Missing	0.2	0.2	0.4	0.4	0.9	
Adjusted gestational weight gain						<.0001
Inadequate	10.7	16.8	14.0	21.7	19.6	
Excessive	56.2	51.0	56.0	46.1	47.6	
Adequate	29.3	27.9	26.2	25.7	26.7	
Missing	3.6	4.2	3.7	6.4	6.1	
Marital status						<.0001
Married	76.5	43.6	44.2	53.1	52.0	
Living together	14.0	31.7	30.2	33.2	29.5	
Sep, div, widow	1.8	3.2	2.2	3.0	4.0	
Single	7.1	20.8	23.0	10.1	11.9	
Missing	0.5	0.7	0.3	0.5	2.6	
No emotional support	2.8	7.3	9.2	16.1	18.4	<.0001
Missing	0.7	0.7	0.7	1.2	1.9	
No practical support	4.8	10.3	11.1	27.2	27.3	<.0001
Missing	0.7	0.7	0.7	1.0	1.8	
Received WIC during pregnancy	20.9	65.8	62.6	86.2	80.2	<.0001
Missing	0.4	0.6	0.6	0.4	1.9	
Hardships during pregnancy						<.0001

	U.S.-born women			Latina immigrant women		
	Non-Latina Whites	Mexican Americans	Non-Mexican Latinas	Mexicans	Non-Mexicans	X^2 p value[a]
0–3	96.7	93.5	93.6	95.6	94.1	
4 or more	0.6	0.9	0.9	2.5	4.1	
Food insecurity						<.0001
None	90.4	82.5	81.4	70.6	69.4	
Without hunger	6.5	11.6	13.1	21.4	23.1	
With hunger	3.3	5.9	5.5	7.9	7.7	
Inadequate prenatal visits						0.01
Yes	1.2	1.9	1.6	1.6	1.8	
No	97.4	96.0	96.7	96.6	96.4	
Missing	1.4	2.1	2.1	1.8	1.9	
Prenatal care initiation						<.0001
No care	1.1	2.8	2.2	5.6	6.6	
First trimester	91.7	83.7	84.6	83.8	83.8	
Second trimester	6.9	12.4	12.0	9.6	8.4	
Third trimester	0.5	1.1	0.9	1.0	0.9	
Missing	0.0	.03	.32	0.1	0.2	

Percentages are weighted to accommodate sample design

Only singletons births are included (n = 21,227)

[a]Chi square tests for differences in proportions across race/ethnic nativity groups

Table 3

Odds ratios and 95 % CI comparing the odds of preterm birth and low birth weight among Latinas relative to non-Latina U.S.-born White women with singleton births (MIHA, 2003–2010)

	U.S.-born non-Latina Whites OR (95 % CI)	U.S.-born Mexican Americans OR (95 % CI)	U.S.-born Non-Mexican Latinas OR (95 % CI)	Mexican immigrants OR (95 % CI)	Non-Mexican immigrants OR (95 % CI)
Preterm birth					
Unadjusted model	1.0 (ref)	1.42 (1.23–1.65)	1.36 (1.06–1.75)	1.23 (1.08–1.41)	1.49 (1.22–1.82)
Model adjusted for socioeconomic factors and survey year[a]	1.0 (ref)	1.19 (1.00–1.41)	1.15 (0.88–1.48)	0.93 (0.88–1.13)	1.16 (0.92–1.46)
Model with simultaneous adjustments for socioeconomic characteristics and all covariates in Table 1 and survey year.	1.0 (ref)	1.24 (1.04–1.47)	1.20 (.92–1.57)	1.03 (.84–1.26)	1.23 (0.97–1.58)
Low birth weight					
Unadjusted model	1.0 (ref)	1.27 (1.04–1.55)	1.56 (1.12–2.2)	1.15 (0.95–1.38)	1.53 (1.17–2.00)
Model adjusted for socioeconomic factors and survey year[a]	1.0 (ref)	1.06 (.85–1.32)	1.36 (0.95–1.94)	0.86 (0.65–1.12)	1.16 (0.86–1.59)
Model with simultaneous adjustments for socioeconomic characteristics and all covariates in Table 1 and survey year.	1.0 (ref)	1.18 (0.94–1.51)	1.57 (1.09–2.26)	0.98 (.74–1.30)	1.27 (.93–1.76)

Models are weighted to account for complex sample design of MIHA

Missing data are imputed

[a]Socioeconomic factors adjusted for: maternal education, paternal education, grandparent education, private insurance before pregnancy, and family income