Social Disparities in Maternal Morbidity During Labor and Delivery Between Mexican-Born and US-Born White Californians, 1996–1998

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Objectives. To assess maternal health disparities, we compared maternal morbidities during labor and delivery among Mexican-born and US-born White, non-Latina women residing in California.

Methods. This population-based study used linked hospital discharge and birth certificate data for 1996–1998 (862 723 deliveries). We calculated the frequency, and observed and adjusted odds ratios for obstetric complications. Covariates included maternal age, parity, education, prenatal care initiation and payment source, and hospital quality of care.

Results. Approximately 1 in 5 deliveries resulted in a obstetric complication. After control for covariates, Mexican-born women were significantly less likely to have 1 or more maternal morbidities than White, non-Latina women but more likely to have complications that reflect the quality of intrapartum care.

Conclusions. Maternal morbidities during labor and delivery are a substantial burden for women in California. The favorable overall outcome of Mexican-born women over US-born White, non-Latinas is surprising given their lower educational attainment, relative poverty, and greater barriers to health care access. The favorable outcomes obscure vulnerabilities in those complications that are sensitive to the quality of intrapartum care. (*Am J Public Health.* 2005;95: 2218–2224. doi:10.2105/AJPH.2004.051441)

Maternal morbidity is a key indicator of how well a health system responds to the needs of women, as pregnancy and birth complications are largely preventable.[1] Because most serious complications of pregnancy occur during childbirth, the primary national effort is aimed at reducing maternal complications during hospitalized labor and delivery from 31.2 to 24 per 100 deliveries.[2,3] In response to this challenge, the Division of Reproductive Health at the Centers for Disease Control and Prevention (CDC), with various partners, has been defining the collective conditions resulting from pregnancy that affect women's health during childbirth.[4,5] Estimating the prevalence of these conditions and understanding variations between and within populations is an important step towards reducing social disparities in maternal health, identifying risk and protective factors, and developing targeted interventions.

Globally, the major social contributors to maternal morbidity are poverty, lack of education, early and frequent child bearing, inadequate health care, and low status in society.[6] Consequently, we would expect Mexican-born women living in the United States, who have low socioeconomic status, delayed access to prenatal care, and high fertility, to stand at higher risk of maternal complications compared to US-born White, non-Latina women.[7] Evidence is scant and controversial. One study found that Latina women of diverse national origins were more likely than White, non-Latina women to die of pregnancy-related causes.[8] Women born in Mexico and delivering in the United States had a higher risk of pregnancy-related death than Mexican American women.[8] In contrast, California hospital discharge data from 1987 to 1992 revealed the odds of hospitalization for pregnancy complications at 10% lower for Latinas than for White, non-Latinas.[9] Whereas health disparities in birth outcomes between infants born to White, non-Latina and Mexican-born women have been amply studied, and generally show lower rates of low birthweight and preterm births in infants of Mexican-born women, disparities in maternal complications during pregnancy have not been evaluated. Hence, it is not known whether the health advantage of the Mexican-born population also extends to maternal morbidity.

This article compares maternal morbidity during labor and delivery of Mexican-born women and US-born White, non-Latina women residing in California. California is the state with the largest number of deliveries in the country, and a good testing ground for examining the health status of Mexican-born immigrants. Since 2001, over 1 in 4 births in the state are to women born in Mexico.[10] The rapid growth and nationwide dispersion of the Mexican population resulting from immigration and high fertility requires that we develop a better understanding of the maternal morbidities affecting this population.

METHODS

We used data from the California Office of State Health Planning and Development (OSHPD) for 1996–1998. The database, which links birth certificates to maternal and infant hospital discharge records,[11] includes 98% of all California deliveries. OSHPD includes data on patient characteristics, medical diagnoses, and procedures; the latter are coded according to the *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*).[12]

Study subjects were limited to US-born White, non-Latina and Mexican-born women. Because of the heterogeneity of health profiles of other racial/ethnic groups, such as African Americans and Asians, we chose to exclusively focus on social disparities between these 2 populations. This comparison allowed

us to contrast nonimmigrant women, representing mainstream society, with women belonging to one of the fastest growing immigrant populations in the United States. Because evidence suggests that immigrant risk factors and health outcomes change from one generation to the next, we excluded US-born Mexican Americans.[7,8] Women not residing in California at the time of delivery (n=3400), or whose records were missing maternal birthplace information, were excluded. A birth of multiples was counted as 1 delivery. Of the approximately 1.5 million deliveries in California between 1996 and 1998, 57% were to women in the 2 study groups (30% to White, non-Latina and 27% to Mexican-born women).

Maternal Morbidities

We used a modified method of that used by Danel et al. to characterize maternal morbidities during labor and delivery with *ICD-9* codes of obstetric complications.[5] An obstetric complication is a condition arising during delivery that is caused by the pregnancy itself, or by its management, that is not considered normal or that cannot be managed adequately without detrimental health effects. For instance, first- and second-degree lacerations are considered normal, whereas third- and fourth-degree lacerations are not. In keeping with expert consensus, we interpret excess risk of third- and fourth-degree lacerations, postpartum hemorrhage, and major puerperal infections as indicating suboptimal intrapartum obstetric care.[13–16] Conditions that affected the fetus but not the woman's physical health were excluded. Mental health conditions were also excluded because of underreporting problems. The specific *ICD-9* codes used for each morbidity are available from the authors.

Independent Variables

We postulated that obstetric complications during labor and delivery in the 2 study groups are influenced by a woman's nativity, social profile, and access to health care services. The social profile consisted of the following: mother's age, parity, maternal education, and economic status, indicated by the funding source for prenatal care. Women who paid out-of-pocket or from public funds (Medicare, Medi-Cal, including the California's Comprehensive Perinatal Services Progam, Title V: *Maternal and Child Health* funds, and other governmental and nongovernmental programs) were considered poorer than those who paid through private insurance (Blue Cross/Blue Shield) and/or prepaid HMO plans. Access-to-care variables measured the initiation of prenatal care (PNC), following Kotelchuck,[17] and the quality of obstetric care received during pregnancy.

Quality of Obstetric Care

Scant tools for measuring population-based quality of obstetric care are available. Case-mix–adjusted neonatal mortality depends partly upon the quality of both obstetric care and neonatal care,[18–20] and was used as a proxy for quality of hospital obstetric care. Hospital obstetric care allows for screening, diagnosis, and treatment of maternal and fetal complications. Neonatal mortality data were obtained from California's Perinatal Quality Improvement Project for 1994–1997 and 1999.[21] In order to estimate quality of care, each hospital's expected neonatal death rate was compared to its observed neonatal death rate. A hospital's expected death rate was calculated on the basis of its case mix on major risk factors[22] (birthweight, sex, race/ethnicity, and plurality) using the mortality experience of all births in California with the same characteristics during this time period. If the observed neonatal mortality was lower than the expected mortality given the hospital's case mix, this was coded as "significantly better quality of care" at a $P<.05$, and as "marginally better quality" for $P<.10$. Higher than expected levels of neonatal mortality were coded similarly and indicated worse quality of care.[21]

Data Analysis

We used SAS, version 8.2 (SAS Institute Inc, Cary, NC), to compare sociodemographic and health care access characteristics to calculate the frequency of each morbidity per 1000 deliveries and the odds ratios (ORs) and 95% confidence intervals (CIs) for Mexican-born and US-born White, non-Latina women. We also calculated aggregated morbidities and ORs for any eclampsia or preeclampsia, any infection, and 1 or more morbidities. In order to control for the sociodemographic profile (maternal age, parity, education, and funding source for prenatal care) and access to health care services (initiation of prenatal care and quality of obstetric care), we performed a logistic regression for each morbidity. In addition, to assess whether maternal morbidities in Mexican-born women were similar to those of US-born women of Mexican descent (Mexican Americans), we calculated adjusted ORs for 1 or more morbidities comparing the 2 populations.

RESULTS

Social Profile

Of the 862 723 deliveries, 47.5% were to Mexican-born women and 52.5% were to White, non-Latina women. On average, compared to White, non-Latina women, Mexican-born women were younger and more multiparous (Table 1). Although older, White, non-Latina women were more likely to be primiparous: 42% versus 31%. White, non-Latina women were better educated: of the Mexican-born group, 63% had not completed high school at the time of delivery, whereas less than 5% of White, non-Latina women had comparable educational levels. Far more Mexican-born than White, non-Latina women had publicly funded insurance coverage (70% vs. 24%) for their prenatal care, indicating lower economic status.

Access to Health Care Services

In both populations, most women began prenatal care during the first trimester, and only a small fraction received no prenatal care (Table 2). However, women in the Mexican-born group were more than twice as likely as those in the White, non-Latina group to delay prenatal care until the fifth month or later. Almost all deliveries were covered by insurance. Most women delivered in "average" quality hospitals. However, White, non-Latina women were somewhat more likely to deliver in hospitals with lower-than-expected, risk-adjusted neonatal mortality.

Morbidities

Morbidities during labor and delivery are common in both groups (Table 2). Approximately 1 in 5 deliveries (19% to Mexican-born women and 21% to White, non-Latina women) resulted in at least 1 obstetric complication. In

TABLE 1—Demographic Characteristics and Access to Health Care Services: California, 1996–1998

	Mexican-Born Women		US-Born White, Non-Latinas	
	No. (%) (n = 409 765)	Missing	No. (%) n = 452 958	Missing
Mother's age, y	Mean = 26.6 (SD = 5.8)		Mean = 29.0 (SD = 6.2)	
< 18	15 315 (3.7)		11 507 (2.5)	
18–24	146 541 (35.8)		101 340 (22.4)	
25–29	125 310 (30.6)		119 820 (26.5)	
30–34	80 020 (19.5)		130 465 (28.8)	
35	42 513 (10.4)	66	89 819 (19.8)	7
Parity	Mean = 2.4 (SD = 1.4)		Mean = 2.0 (SD = 1.1)	
Delivery 1	126 884 (31.0)		189 141 (41.8)	
Delivery 2 or 3	208 566 (50.9)		223 875 (49.4)	
Delivery ≥ 4	74 004 (18.1)	311	39 767 (8.8)	175
Education, y	Mean = 9.0 (SD = 3.4)		Mean = 13.8 (SD = 2.2)	
0–6	129 795 (32.2)		718 (0.2)	
7–11	119 989 (29.7)		18 974 (4.2)	
12	26 594 (6.6)		23 916 (5.3)	
13–16	116 098 (28.8)		258 632 (57.4)	
> 16	11 228 (2.8)	6061	148 115 (32.9)	2603
Economic status (payment source for PNC)				
Self pay	15 424 (3.8)		6220 (1.4)	
Public insurance	282 602 (69.9)		105 622 (23.5)	
HMO prepaid	69 738 (17.3)		207 242 (46.1)	
Private insurance	36 585 (9.1)	5416	130 532 (29.0)	3342
Prenatal care initiation (Kotelchuck[16])	Mean = 3.33 (SD = 0.85)		Mean = 3.62 (SD = 0.68)	
1 = No PNC or began PNC months 7, 8, or 9	20 601 (5.23)		10 316 (2.33)	
2 = Began PNC months 5, 6	36 242 (9.20)		18 632 (4.20)	
3 = Began PNC months 3, 4	129 815 (32.94)		101 710 (22.94)	
4 = Began PNC months 1, 2	207 409 (52.63)		312 713 (70.53)	
Quality of Care				
Significantly better (i.e., significantly lower NMR)	20 698 (5.1)		50 956 (11.4)	
Marginally better (i.e., marginally lower NMR)	12 115 (3.0)		7759 (1.7)	
Not significantly different from expected	338 372 (82.9)		352 299 (78.5)	
Marginally worse (i.e., marginally higher NMR)	8543 (2.1)		14 864 (3.3)	
Significantly worse (i.e., significantly higher NMR)	28 679 (7.0)	1358	22 882 (5.1)	4198

Note. NMR = neonatal mortality adjusted for birthweight, sex, race/ethnicity, and plurality; PNC = prenatal care.
Sources. California Office of State Health Planning and Development 1996–1998, and the Perinatal Quality Improvement Project, 1996–1997.[11]

both populations, the most common specific obstetric complication was lacerations (third and fourth degree), followed by genitourinary infections, and preeclampsia and eclampsia.

The observed odds of having 1 or more maternal morbidities was lower for Mexican-born than for White, non-Latina women (OR=.84, 95% CI=.83, .85) (Table 3). Using logistic regression to control for the social profile and health care access covariates, Mexican-born women remained significantly less likely to have 1 or more maternal morbidities than White, non-Latina women (OR=.92, 95% CI=.91, .93), although the difference was not as large. We also calculated the adjusted OR for 1 or more maternal morbidity for noncesarean deliveries only. Even in this restricted population, results favored Mexican-born women (OR=.91, 95% CI=.89, .92) (data not shown).

Additionally we compared the likelihood of 1 or more maternal morbidities in Mexican-born and Mexican American women to assess if this advantage persisted. After control for covariates, the odds of suffering 1 or more maternal morbidities was higher among Mexican American than among Mexican-born women (OR=1.11, 95% CI=1.09, 1.13), and was comparable to that of White, non-Latinas (OR=1.02, 95% CI=1.00, 1.03) (data not shown).

The importance of examining specific complications and controlling for age, parity, health care access, and other covariates is illustrated in Table 4. Although the odds of 1 or more maternal morbidities were lower

TABLE 2—Observed Maternal Morbidity During Labor and Delivery: California, 1996–1998

	Mexican-Born		US-Born White, Non-Latinas	
	No. Cases	Cases per 1000 Deliveries	No. Cases	Cases per 1000 Deliveries
Hemorrhage				
Antepartum	5940	14.50	8582	18.95
Postpartum	9853	24.05	10 937	24.15
Preeclampsia and eclampsia				
Preeclampsia and eclampsia	10 700	26.11	13 455	29.70
Severe preeclampsia	2848	6.95	2809	6.20
Eclampsia	355	0.87	277	0.61
Obstetric trauma				
Third/fourth-degree laceration	15 085	36.81	21 844	48.23
Fourth-degree laceration	4743	11.57	6124	13.52
Other obstetric trauma	7733	18.87	9559	21.10
Ruptured uterus	303	0.74	410	0.91
Infection				
Any infection	29 783	72.68	33 020	72.90
Genitounrinary infection	12 806	31.25	13 705	30.26
Amnionitis	7766	18.95	7195	15.88
Other infection	7568	18.47	10 695	23.61
Fever	3654	8.92	5921	13.07
Major puerperal infection	4064	9.92	3085	6.81
Postpartum fever of unknown origin	2102	5.13	1712	3.78
Sepsis	101	0.25	90	0.20
Other obstetric complications not listed above				
Other puerperal complication	6494	15.85	9200	20.31
Distress, shock, arrest, etc.	1373	3.35	2108	4.65
Anesthesia complication	1050	2.56	1905	4.21
Wound complication	1476	3.60	1959	4.32
Deep venous thrombosis	200	0.49	287	0.63
Gestational liver disease	151	0.37	197	0.43
Late Vomiting	178	0.43	525	1.16
Pulmonary or amniotic embolism	41	0.10	84	0.19
Cerebrovascular accident	106	0.26	145	0.32
1 or more maternal morbidities	76 089	185.69	96 545	213.14

Source. Data are from the California Office of State Health Planning and Development, 1996–1998.[11]

among Mexican-born women, we found, after adjustment for covariates, that the odds of postpartum hemorrhage, third- and fourth-degree lacerations, and major puerperal infections—important indicators of the quality of intrapartum care—were higher. Furthermore, the odds of eclampsia and preeclampsia, amnionitis, maternal fever, and postpartum fever of unknown origin were also higher among Mexican-born women.

As for specific predictors, our proxy for quality of obstetric care was the most powerful explanatory variable, after parity and age, in the logistic regression model for 1 or more maternal morbidities. Parity and age were often the strongest predictors in regression models for specific morbidities. Quality of obstetric care ranked among the 3 strongest predictors in 11 out of 20 models, and was a significant predictor in all models except eclampsia.

DISCUSSION

During 1996–1998, 19% of deliveries to Mexican-born women and 21% of deliveries to White, non-Latina women resulted in 1 or more maternal morbidities during childbirth. This is a high burden of morbidity for women from conditions that are largely preventable through appropriate prenatal care and perhaps, more importantly, through optimal intrapartum care. Less serious complications during childbirth, and those experienced prior to delivery, can affect a woman's quality of life substantially, and are not included in this calculation of burden of disease. In other vulnerable populations, such as African Americans, the burden of disease is higher.[9]

Our findings show that, despite their lower educational status, greater delays in obtaining access to prenatal care, and a lower likelihood of giving birth in hospitals that provide significantly better-than-average quality of obstetric care based on their case-mix–adjusted neonatal mortality, Mexican-born women generally enjoyed comparably fewer maternal morbidities during labor and delivery when compared with White, non-Latina women; these differentials persisted even after adjustment for several social and health care covariates. These results suggest that the paradox of more favorable outcomes among the Mexican-born population found for birth outcomes extends to maternal morbidity during childbirth.

However, along with these favorable conditions, Mexican-born women in California show vulnerabilities with respect to certain important maternal morbidities. Our data show Mexican-born women having a higher risk of amnionitis, preeclampsia, and eclampsia. Third- and fourth-degree lacerations, postpartum hemorrhage, and major puerperal infections were also higher among Mexican-born women than White, non-Latina women, after controlling for other covariates. Excess risk in the latter morbidities may be associated with suboptimal intrapartum care. Further studies based on more detailed clinical evaluations are necessary to determine whether Mexican-born women are differentially exposed to suboptimal care during labor and delivery and the extent to which there is suboptimal care in labor and delivery units.

The relative advantage in overall maternal health, as indicated by a lower incidence of 1 or more complications during labor and delivery among Mexican-born women, could be the result of the healthy migrant effect.

TABLE 3—Observed and Adjusted Odds Ratios for Specific Maternal Morbidities in Mexican-Born Relative to US-Born White, Non-Latina Women During Labor and Delivery: California, 1996–1998

	Observed OR	Adjusted OR[a]
	OR (95% CI)	OR (95% CI)
Hemorrhage		
Antepartum	0.76 (0.74, 0.79)	0.72 (0.69, 0.76)
Postpartum	1.00 (0.97, 1.02)	**1.06 (1.02, 1.11)**
Preeclampsia and eclampsia		
All preeclampsia and eclampsia	0.88 (0.85, 0.90)	0.87 (0.84, 0.90)
Severe preeclampsia	1.12 (1.06, 1.18)	1.20 (1.11, 1.30)
Eclampsia	1.42 (1.21, 1.66)	1.41 (1.14, 1.75)
Obstetric trauma		
Third/fourth-degree laceration	0.75 (0.74, 0.77)	**1.16 (1.12, 1.19)**
Fourth-degree laceration	0.85 (0.82, 0.89)	1.11 (1.05, 1.17)
Other obstetric trauma	0.89 (0.87, 0.92)	0.83 (0.80, 0.87)
Ruptured uterus	0.82 (0.70, 0.95)	
Infection		
Any infection	1.00 (0.98, 1.01)	0.99 (0.96, 1.01)
Genitourinary infection	1.03 (1.01, 1.06)	**0.83 (0.81, 0.86)**
Amnionitis	1.20 (1.16, 1.24)	1.41 (1.35, 1.48)
Other infection	0.78 (0.76, 0.80)	0.66 (0.63, 0.69)
Fever	0.68 (0.65, 0.71)	**1.16 (1.09, 1.23)**
Major puerperal infection	1.46 (1.39, 1.53)	1.33 (1.25, 1.42)
Postpartum fever of unknown origin	1.36 (1.27, 1.45)	1.37 (1.26, 1.49)
Sepsis	1.24 (0.93, 1.65)	
Other obstetric complications not listed above		
Other puerperal complication	0.78 (0.75, 0.80)	0.80 (0.76, 0.84)
Distress, shock, arrest, etc.	0.72 (0.67, 0.77)	**0.97 (0.88, 1.07)**
Anesthesia complication	0.61 (0.56, 0.66)	0.77 (0.70, 0.86)
Wound complication	0.83 (0.78, 0.89)	0.80 (0.72, 0.88)
Deep venous thrombosis	0.77 (0.64, 0.92)	
Gestational liver disease	0.85 (0.69, 1.05)	
Late vomiting	0.37 (0.32, 0.44)	
Pulmonary or amniotic embolism	0.54 (0.37, 0.78)	
Cerebrovascular accident	0.81 (0.63, 1.04)	
1 or more maternal morbidities	0.84 (0.83 0.85)	0.92 (0.91, 0.93)

Note. CI = confidence interval; OR = odd ratio. Bold text indicates statistically significant results.
[a]Adjusted for age, parity (2 variables, 1 indicating primiparous status, the other indicating parity 4 or higher), education, economic status (PNC payment source, public/self vs. private), prenatal care initiation (variable with 4 levels, each level with an earlier PNC initiation), and quality of care (2 variables, 1 indicating significantly or marginally better hospitals [hiqual], the other indicating significantly or marginally worse hospitals [lowqual]). The model for major lacerations and fourth-degree lacerations included an additional indicator for macrosomia (birthweight > 4000 grams). Thus, the logistic regression model used was: Morbidity = B_0 + B_1Mexican-born + B_2Age + B_3Par1 + B_4Par4 + B_5Education + B_6Publicpayment + B_7Kotelpnc + B_8lowqual + B_9 hiqual. Logistic regression models for ruptured uterus, sepsis, deep venous thrombosis, gestational liver disease, late vomiting, embolism, and cerebrovascular accident were not significant; logistic OR's were not calculated for these outcomes.
Source. California Office of State Health Planning and Development, 1996–1998.[11]

Women who attempt to migrate and succeed are probably among the sturdiest women in their sending communities.[23] They might also selectively follow behaviors that support better health, and might have more control over reproductive decisions compared to women who stay in Mexico.[24] Further research is needed to compare Mexican-born women residing in the United States to those residing in their sending communities to determine whether selection factors affect maternal morbidities. However, these findings describe actual performance among this pregnancy cohort in California, and give us important management information about the health conditions of this immigrant population. Furthermore, the data indicate that the ratio of 1 or more maternal morbidities in Mexican-born women differs from that of Mexican American women, who more closely resemble White, non-Latinas.

Mexican-born women are less likely than White, non-Latina women to postpone their first birth until an advanced reproductive age. Furthermore, an exploratory study suggests that Mexican-born women may engage in behaviors that decrease fatigue and stress during pregnancy.[24] Compared with nonimmigrant women in the United States, Mexican-born women engage in more healthful lifestyles, including less consumption of tobacco, illegal drugs, and alcohol, before and during pregnancy, and have healthier diets.[25]

Similar to Mexican-born women, the most common obstetric complications for White, non-Latina women were third- and fourth-degree lacerations (4.8%), genitourinary infections (3.0%), and preeclampsia and eclampsia (3.0%). The prevalence rates for these complications were similar to those reported by Danel et al. in their national study of maternal morbidities during labor and delivery.[5] These morbidities require continued efforts in appropriate management to prevent them from becoming life-threatening and to minimize long-term sequelae.

Our findings must be interpreted cautiously given some limitations. We used linked hospital discharge and birth certificate data. OSHPD diagnostic codes are determined from the hospital discharge face sheets; thus, failure to note conditions will result in undercounts. Physicians completing face sheets are unlikely to apply consistent case definitions, and constructing such definitions requires access to the original medical records. Nonetheless, a recent study by Handa et al., validating California OSHPD data against medical records, found that coding for anal (fourth degree) lacerations was accurate, with sensitivity and positive predictive values of 90.3% and

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[a]Adjusted for age, parity (2 variables, 1 indicating primiparous status, the other indicating parity 4 or higher), education, economic status (PNC payment source, public/self vs. private), prenatal care initiation (variable with 4 levels, each level with an earlier PNC initiation), and quality of care (2 variables, 1 indicating significantly or marginally better hospitals [hiqual], the other indicating significantly or marginally worse hospitals [lowqual]). The model for major lacerations and fourth-degree lacerations included an additional indicator for macrosomia (birthweight > 4000 grams). Thus, the logistic regression model used was: Morbidity = B_0 + B_1Mexican-born + B_2Age + B_3Par1 + B_4Par4 + B_5Education + B_6Publicpayment + B_7Kotelpnc + B_8lowqual + B_9 hiqual.

Logistic regression models for ruptured uterus, sepsis, deep venous thrombosis, gestational liver disease, late vomiting, embolism, and cerebrovascular accident were not significant; logistic OR's were not calculated for these outcomes.

Source. California Office of State Health Planning and Development, 1996–1998.[11]

91.5%, respectively.[26] In addition, the results of a study in Washington State indicate that a linked birth and hospital discharge file was better than either data source alone, and that discharge data used for reimbursement purposes were particularly accurate.[27]

We found higher ratios of missing data for demographic and health care variables among Mexican-born women than among White, non-Latina women, suggesting a possible misclassification bias. This was true even when we restricted the dataset to women in prepaid HMOs, assuming that HMOs tend to routinize and standardize their record keeping and would, therefore, have more complete records. Unfortunately, we cannot address this potential bias directly, and it could contribute to the finding that Mexican-born women have better outcomes. Nonetheless, serious morbidities are determined by changes in vital signs, the need for blood, specific drugs, and procedures that are less prone to reporting bias. Furthermore, coding bias should result in consistent findings for all morbidities, and, although we found an advantage for Mexican-born women for many morbidities, we did not find such an advantage for all women. Finally, although our measure of quality of obstetric care based on case-mix–adjusted neonatal mortality is a global measure of obstetric and neonatal management that captures important hospital-level data on operational capability, it falls short of being an accurate reflection of the quality of intrapartum care in labor and delivery units.

Our findings indicate that maternal morbidities during labor and delivery constitute a substantial burden for women in California. A favorable outcome for Mexican-born women compared with White, non-Latina women is reflected in the lower incidence of one or more maternal morbidities, suggesting that the paradox of more favorable outcomes among Mexican immigrants extends beyond birth outcomes to include maternal morbidities. Future studies need to confirm this finding and, if confirmed, to link the specific maternal outcomes to sociocultural determinants, such as protective behaviors and coping mechanisms of Mexican-born women during pregnancy, that could be encouraged in other groups. However, our findings also identify excess risk in certain obstetric complications that may reflect suboptimal intrapartum care in the Mexican-born cohort. Quality of care needs to be monitored closely to improve the intrapartum experience and promote safe motherhood among Mexican immigrants. This improvement would be timely and compelling, given the rapid growth and dispersion

of Mexican immigrants nationwide and our national goal of reducing health disparities among ethnic/racial groups.[2] ■

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This article was accepted February 6, 2005.

Contributions

Sylvia Guendelman originated the study, participated in the analysis and interpretation of the data, led in the writing of the article, and supervised all aspects of the study implementation. Dorothy Thornton was involved in the conceptualizing ideas and in the data programming, analysis, and interpretation, and helped write portions of the article. Jeffrey Gould provided data on quality of care and participated in the conceptualization of ideas, interpretation of the findings, and reviewed drafts of the article. Nap Hosang assisted with the data analysis, participated in the interpretation of the findings, and reviewed drafts of the article.

Acknowledgments

This study was funded by UC Mexus-CONACIT, the Center for Latin American Studies, the Center for Latino Policy Research, the Center for Health Research, and a COR faculty grant at the University of California, Berkeley.

We wish to thank Anne Foster Rosales for her helpful comments and Lora Santiago for clerical assistance. We especially thank Cynthia Berg for her guidance and feedback.

Human Participant Protection

This study was approved by the University of California's institutional review board, as well as by the California Office of Statewide Health Planning and Development.

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