Adverse Pregnancy Outcomes: Differences between US- and Foreign-Born Women in Major US Racial and Ethnic Groups

Gopal K. Singh, PhD, and Stella M. Yu, ScD, MPH

ABSTRACT

Objectives. This study examined whether there were significant differentials between US-born and foreign-born women in risks of infant mortality, low birthweight, and preterm birth and whether these differentials, if they existed, varied across major US racial/ethnic groups.

Methods. Multivariate logistic regression was applied to national linked birth/infant death records for 1985 through 1987 to estimate overall and ethnic-specific maternal nativity effects on pregnancy outcomes.

Results. Substantial maternal nativity differences in risks of infant mortality and low birthweight were found, with the magnitude of the nativity effect varying significantly across racial/ethnic groups. Overall, foreign-born status was associated with 7% and 20% lower risks of low birthweight and infant mortality, respectively. However, the reduced risk of adverse pregnancy outcome associated with immigrant status tended to be substantially larger for Blacks, Cubans, Mexicans, and Chinese than for other ethnic groups.

Conclusions. Maternal nativity status, along with ethnicity, may serve as an important axis of differentiation in birth outcome studies. Further research needs to be conducted to assess the effects of behavioral, cultural, and psychosocial factors in explaining the nativity differentials observed here. (*Am J Public Health.* 1996;86:837–843)

Introduction

The nativity composition of the US population has changed substantially in the past 3 decades, largely as a result of increased immigration from Asia and Latin America following the adoption of the Immigration Act of 1965.[1] The proportion of the foreign-born US population rose by 70% from 1970 to 1990 (from 4.7% to about 8%). Indeed, the foreign-born population in 1990—19.8 million—was the largest in US history.[1-3] In spite of this impressive growth of the foreign-born population, nativity status (i.e., whether the individual is US born or foreign born), as a primary factor of interest, has received relatively little attention in the analysis of health outcomes in general and pregnancy outcomes in particular.[4]

Foreign-born mothers have generally been shown to have significantly better pregnancy outcomes than their US-born counterparts, even after a number of sociodemographic risk factors have been controlled for.[4-11] However, the studies that have examined the role of maternal nativity status have mostly focused on a few ethnic groups, particularly those of Hispanic origin.[5-8] Moreover, some of these studies have been based on localized samples or data sets and are therefore limited in their generalizability to the entire nation.[8-11] National-level data have not been used to examine the impact of maternal nativity status on pregnancy outcomes for various race and ethnic groups in the United States.

The main purpose of this study was to examine (1) whether there are significant differentials between US-born and foreign-born mothers in risks of three adverse pregnancy outcomes—infant mortality, low birthweight, and preterm birth—even after a number of sociodemographic risk factors have been controlled and (2) whether these differentials, if they exist, vary across different race and ethnic groups.

For our analysis, we considered the following major race and ethnic groups: non-Hispanic Whites, Blacks, Chinese, Japanese, Filipinos, "other Asian and Pacific Islanders," Mexicans, Puerto Ricans, Cubans, and Central and South Americans. Hawaiians and American Indians were excluded from the analysis because they are, by definition, native born. The other Asian and Pacific Islanders category, henceforth referred to as "other Asians," was largely made up of Asian Indians, Koreans, and Vietnamese.[12]

Methods

Data

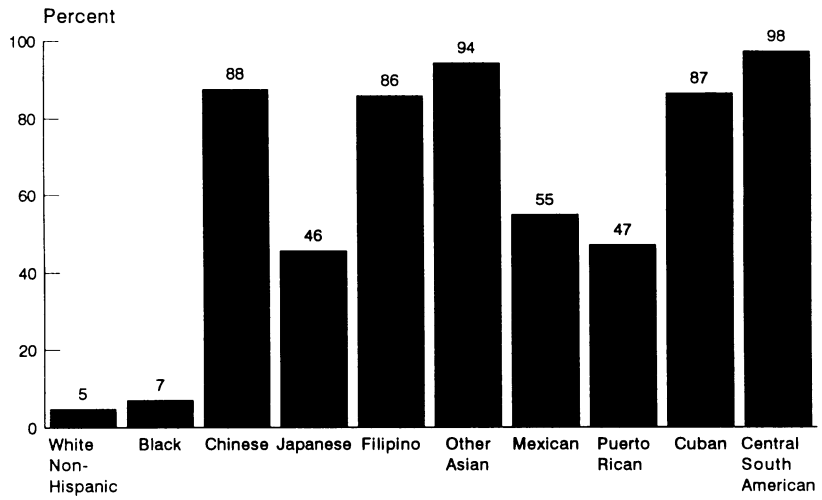
The data used in this study were derived primarily from the National Linked Birth and Infant Death data sets for the 1985, 1986, and 1987 birth cohorts.[13-15] The analysis of the linked files was supplemented by additional analyses of the 1988 National Maternal and Infant Health Survey and 1992 birth certificate data tapes. Detailed descriptions of the

Gopal K. Singh is with the Division of Vital Statistics, National Center for Health Statistics, Hyattsville, Md. Stella M. Yu is with the Bureau of Maternal and Child Health, Health Resources and Services Administration, Rockville, Md.

Requests for reprints should be sent to Gopal K. Singh, PhD, Division of Vital Statistics, National Center for Health Statistics, Centers for Disease Control and Prevention, 6525 Belcrest Rd, Room 840, Hyattsville, MD 20782.

This paper was accepted September 26, 1995.

Note: The opinions expressed in this paper are the authors' and not necessarily those of their institutions.



Source. Data were derived from the Linked Birth and Infant Death data sets, 1985, 1986, and 1987 birth cohorts.

FIGURE 1—Percentage of births to mothers born outside the 50 states and the District of Columbia, by maternal race/ethnicity: United States, 1985 through 1987.

latter data sets have been provided elsewhere.[16-19]

Three years of data from linked birth–infant death records were pooled in order to provide stable and robust estimates of pregnancy outcome measures for US- and foreign-born Asian and Hispanic subgroups. The study sample for most of the analysis consisted of 2 112 607 live births for non-Hispanic Whites, 1 782 007 for Blacks, 312 030 for Asian Americans, and 1 016 558 for Hispanics. Numbers of live births for the specific Asian American and Hispanic subgroups were as follows: Chinese, 50 572; Japanese, 23 919; Filipinos, 63 060; other Asians, 174 479; Mexicans, 740 382; Puerto Ricans, 109 874; Cubans, 29 935; and Central and South Americans, 136 367. It is important to note that all infant deaths and live births were classified according to maternal race and ethnicity.

Linked data on Hispanic origin were available only for 23 states and the District of Columbia. Therefore, we decided to exclude Hispanic origin from the pooled national-level analyses shown in Table 2, which were based on 100% data for Asian Americans during 1985 through 1987 and 2% and 5% random subsamples, respectively, of all White and Black live births in 1986 from all 50 states and the District of Columbia. The smaller samples for the two latter groups yielded sufficiently large numbers of live births and infant deaths. This precluded us from having to perform the costly and impractical task of conducting a multivariate analysis of all White and Black births, which totaled nearly 3.6 million in 1986 alone.

Variables

The dependent variables in this study were risk of infant mortality, low birthweight, and preterm birth. Infant mortality was defined as risk of death at less than 1 year of age. Infants weighing less than 2500 g at birth were considered low birthweight, and those with less than 37 weeks of gestation were considered preterm. Infant mortality and low birthweight were modeled as functions of the main covariates of interest (i.e., nativity status and race/ethnicity) and such control variables as maternal age, marital status, education, birth order, place of residence, and timing of prenatal care. The preterm birth model included all of the covariates except prenatal care. The covariates just described have been identified in several studies as important risk factors for the three pregnancy outcomes[20-24]; they were measured here as categorical variables (as shown in Table 2).

Statistical Analysis

Multivariate logistic regression was used to analyze overall as well as ethnicity-specific nativity differentials in the pregnancy outcome measures just described. The parameters of the logistic models, which represented the effects of covariates (including those of nativity and ethnicity), were estimated by the maximum likelihood method; the LOGISTIC procedure of SAS, version 6,[25] was used in these estimations.

Results

Figure 1 shows the nativity composition of mothers by ethnicity during 1985 through 1987. US-born mothers in this study consisted of women born in the 50 states and the District of Columbia. Foreign-born or immigrant mothers included women born outside the 50 states and the District of Columbia. For Puerto Rican mothers, the differentials are shown between women born in the 50 states and the District of Columbia and those born in Puerto Rico or abroad. With the exception of Japanese and Mexicans, Asian and Hispanic mothers were predominantly immigrants. About 46% of Japanese and 55% of Mexican mothers were foreign born. Over 47% of Puerto Rican mothers were born outside the 50 states and the District of Columbia. The Central and South American group included the highest proportion (98%) of foreign-born mothers; non-Hispanic Whites and Blacks evidenced the lowest proportions (5% and 7%, respectively).

Table 1 provides descriptive data on pregnancy outcomes and selected sociodemographic characteristics by nativity status and race/ethnicity. As can be seen in this table, foreign-born women had lower infant mortality rates than US-born women for all race/ethnic groups except Central and South Americans. Of all ethnicity and nativity groups, Chinese and Japanese immigrants had the lowest infant mortality rates, while US-born Blacks, Cubans, and Puerto Ricans had the highest rates. The largest nativity differentials in infant mortality were found for Cubans, other Asians, and Blacks.

Ethnic and nativity differences in rates of low birthweight and preterm birth revealed a somewhat similar pattern. Except for other Asians, immigrants generally had lower rates of low birthweight than those born in the United States, with Blacks, Chinese, and Mexicans showing the largest nativity differentials. Chinese and Mexican immigrants had the lowest rates of low birthweight, while US-born Blacks and Puerto Ricans had the highest rates. Except for other Asians and non-

TABLE 1—Pregnancy Outcomes and Selected Sociodemographic Characteristics, by Maternal Nativity Status and Race/Ethnicity: United States, 1985 through 1987

Characteristics	Non-Hispanic Whites[a]	Blacks	Chinese	Japanese	Filipinos	Other Asians	Mexicans[a]	Puerto Ricans[a]	Cubans[a]	Central and South Americans[a]
US-born mothers[c]										
Infant mortality rate[b]	8.3	18.5	7.0	7.1	8.9	11.2	8.8	11.4	11.6	7.5
Low birthweight, %	5.5	13.1	6.5	6.5	8.0	6.3	6.6	9.4	7.0	6.8
Preterm birth, %	8.0	18.5	7.9	8.5	11.5	9.8	11.8	12.8	10.3	10.6
Maternal age <20 y, %	9.6	24.4	2.3	3.8	15.9	9.8	22.7	26.4	19.1	25.3
Maternal education <12 y, %	14.9	32.3	3.2	2.9	13.8	12.3	42.3	43.8	22.4	29.9
Maternal education ≥16 y, %	19.2	6.5	54.3	41.4	8.5	37.1	3.8	4.5	14.3	13.6
Mean education, y	13.0	11.9	14.8	14.4	12.6	13.7	11.4	11.4	12.6	12.3
Unmarried, %	14.0	64.0	8.9	10.2	29.0	18.9	29.6	54.2	23.2	65.1
Nonmetropolitan county, %	40.0	33.3	10.4	19.3	21.7	20.4	29.8	6.0	9.1	9.5
Live birth order ≥4, %	8.1	13.9	3.9	3.7	9.4	7.2	15.0	8.0	3.5	5.1
Prenatal care in 1st trimester, %	81.2	61.2	89.8	88.0	74.2	76.1	62.7	57.1	66.6	65.8
No prenatal care, %	1.1	3.8	0.4	0.5	1.0	1.5	3.7	9.4	4.4	2.8
No. live births	2 013 179	1 657 672	6 281	13 011	8 849	9 805	333 073	58 066	3 968	3 454
Foreign- or Puerto Rican–born mothers										
Infant mortality rate[b]	7.6	13.7	5.8	6.1	6.9	7.9	7.6	10.4	7.1	7.8
Low birthweight, %	5.2	8.8	4.7	5.9	7.1	6.4	5.0	8.7	5.6	5.7
Preterm birth, %	8.0	13.1	7.1	7.2	10.8	10.9	10.0	12.3	9.0	10.1
Maternal age <20 y, %	4.1	6.7	0.6	1.4	3.4	5.3	13.1	14.5	4.8	7.7
Maternal education <12 y, %	11.2	28.1	15.2	5.5	12.7	23.7	74.6	46.7	19.5	35.8
Maternal education ≥16 y, %	26.6	13.9	33.8	39.0	42.2	30.9	2.6	5.5	16.2	8.3
Mean education, y	13.3	11.8	13.2	14.0	13.8	12.3	8.2	11.1	12.6	11.3
Unmarried, %	9.2	40.4	2.8	5.2	9.2	8.6	25.9	50.0	14.9	36.8
Nonmetropolitan county, %	21.4	6.6	9.1	16.7	14.8	20.1	15.7	6.5	3.5	3.0
Live birth order ≥4, %	8.7	13.7	4.3	4.3	7.1	16.5	20.9	16.1	5.9	11.5
Prenatal care in 1st trimester, %	82.5	60.8	80.8	82.8	78.2	70.2	57.1	58.3	83.5	59.2
No prenatal care, %	1.1	5.6	1.0	0.9	0.9	1.8	5.7	9.2	1.4	5.8
No. live births	99 428	124 335	44 291	10 908	54 211	164 674	407 309	51 808	25 967	132 913

Source. Data were derived from the Linked Birth and Infant Death data sets, 1985, 1986, and 1987 birth cohorts.
[a]Based on data from 23 reporting states and the District of Columbia.
[b]Per 1000 live births.
[c]Born in the 50 states and the District of Columbia.

Hispanic Whites, immigrants had lower proportions of preterm birth than those born in the United States. Other Asian immigrants evidenced a higher proportion of preterm birth than their US-born counterparts. Blacks and Mexicans showed the largest nativity differentials in the rate of preterm birth.

Table 1 also shows considerable ethnic and nativity differences in sociodemographic characteristics known to influence pregnancy outcomes. In general, the ethnic–nativity groups with the most favorable pregnancy outcomes appeared to have a lower prevalence of several of the risk factors. For instance, regardless of ethnicity, immigrants reported substantially lower rates of teenage birth than did those born in the United States; Chinese and Japanese immigrants had the lowest rates (0.6% and 1.4%, respectively). Immigrants were also considerably less likely to have out-of-wedlock births; the proportion of births to unmarried mothers was the lowest among Chinese and Japanese immigrants and the highest among US-born Blacks and Puerto Ricans. In addition, of all ethnic and nativity groups, US-born Chinese mothers (54%) were most likely to have completed 4 or more years of college, followed by Filipino immigrants (42%) and US- and foreign-born Japanese (41% and 39%); Mexican and Puerto Rican mothers, irrespective of their nativity status, were least likely to have completed 4 or more years of

TABLE 2—Multivariate Logistic Regressions Showing Net Differentials in Pregnancy Outcomes, by Maternal Nativity Status and Other Sociodemographic Characteristics: United States, 1985 through 1987

Covariate	Odds Ratio (95% Confidence Interval)		
	Infant Mortality	Low Birthweight	Preterm Birth
Maternal nativity status			
Foreign born	1.00 ...	1.00 ...	1.00 ...
US born	1.24 (1.10, 1.39)	1.08 (1.04, 1.13)	0.99 (0.95, 1.03)
Race/ethnicity			
White	1.00 ...	1.00 ...	1.00 ...
Black	1.81 (1.58, 2.07)	2.13 (2.01, 2.25)	1.93 (1.84, 2.02)
Chinese	0.92 (0.77, 1.10)	1.03 (0.97, 1.10)	0.98 (0.92, 1.03)
Japanese	0.90 (0.74, 1.09)	1.26 (1.18, 1.35)	1.09 (1.03, 1.16)
Filipino	1.06 (0.90, 1.24)	1.59 (1.50, 1.69)	1.45 (1.38, 1.52)
Other Asian	1.19 (1.03, 1.37)	1.38 (1.31, 1.46)	1.43 (1.37, 1.50)
Maternal age, y			
20–34	1.00 ...	1.00 ...	1.00 ...
≤19	1.30 (1.14, 1.48)	1.10 (1.04, 1.16)	1.39 (1.33, 1.45)
≥35	1.18 (1.06, 1.32)	1.25 (1.20, 1.30)	1.24 (1.20, 1.28)
Marital status			
Married	1.00 ...	1.00 ...	1.00 ...
Unmarried	1.36 (1.22, 1.50)	1.33 (1.28, 1.39)	1.45 (1.40, 1.50)
Birth order			
2–3	1.00 ...	1.00 ...	1.00 ...
1	0.92 (0.85, 0.99)	1.32 (1.28, 1.36)	0.97 (0.95, 0.99)
≥4	1.09 (0.97, 1.21)	0.94 (0.89, 0.98)	1.21 (1.16, 1.25)
County of residence			
Nonmetropolitan	1.00 ...	1.00 ...	1.00 ...
Metropolitan	0.93 (0.85, 1.01)	1.02 (0.98, 1.02)	0.94 (0.92, 0.97)
Plurality			
Single	1.00 ...	1.00 ...	1.00 ...
Twin/multiple	6.02 (5.31, 6.82)	21.80 (20.68, 22.97)	6.67 (6.33, 7.03)
Maternal education, y			
<12	1.00 ...	1.00 ...	1.00 ...
12	0.93 (0.82, 1.05)	0.85 (0.81, 0.90)	0.83 (0.80, 0.87)
≥13	0.78 (0.69, 0.89)	0.77 (0.73, 0.80)	0.72 (0.69, 0.75)
Unknown	0.99 (0.88, 1.11)	0.80 (0.76, 0.84)	0.87 (0.84, 0.90)
Trimester in which prenatal care began			
1st	1.00 ...	1.00 ...	... ...
2nd	0.99 (0.90, 1.08)	1.00 (0.97, 1.04)	... ...
3rd	0.74 (0.61, 0.89)	0.99 (0.93, 1.06)	... ...
No care	2.95 (2.52, 3.46)	2.56 (2.38, 2.76)	... ...
Model chi-square	1 208.47*	14 226.12*	8 935.09*
df	19	19	16
No.	387 083	386 718	378 723

Source. Data were derived from the Linked Birth and Infant Death data sets, 1985, 1986, and 1987 birth cohorts. Adjustments were made for race/ethnicity, maternal age, marital status, education, nativity status, county of residence, birth order, plurality, and prenatal care; the adjustment for preterm birth excluded prenatal care.
*$P < .001$.

college. Because of higher immigrant fertility, the foreign-born women were generally more likely to have fourth- and higher order births than the US-born women; however, the proportion of these high-parity births was lowest among the US- and foreign-born Chinese and Japanese. Furthermore, not surprisingly, immigrants in most ethnic groups (except Cubans and non-Hispanic Whites) were somewhat less likely to receive prenatal care in the first trimester than those born in the United States.

Table 2 presents the results from the multivariate logistic analyses for the total population, showing the adjusted effect of each of the covariates on infant mortality, low birthweight, and preterm birth. Overall, regardless of ethnicity and other sociodemographic characteristics, US-born women had 24% and 8% higher risks of infant mortality and low birthweight, respectively, than their immigrant counterparts. No significant differential in the risk of preterm birth was found between those born in the United States and those born elsewhere. In terms of ethnic differentials in infant mortality, only the Black and other Asian groups were found to have significantly higher risks than Whites—81% and 19%, respectively—after nativity and other covariates had been controlled. However, relatively larger ethnic differentials existed in the risks of low-weight and preterm births. In comparison with Whites, Blacks, Filipinos, other Asians, and Japanese, respectively, had 113%, 59%, 38%, and 26% higher relative risks of low birthweight. The corresponding figures for the excess relative risk of preterm birth were 93%, 45%, 43%, and 9%.

The pregnancy outcome effects of the remaining covariates in Table 2 were consistent with those reported in previous studies.[4,12,20,22,24] Specifically, births to mothers 19 years of age or younger and 35 years of age or older, out-of-wedlock and high-parity births, twin and multiple births, lower maternal education, and lack of prenatal care were all associated with increased risks of infant mortality, low birthweight, and preterm birth.

Table 3 shows how US- and foreign-born differentials in risks of pregnancy outcomes differed according to race and ethnicity before and after adjustments for various sociodemographic characteristics through logistic regression. For the total population, the unadjusted (crude) nativity differentials were all significant, with US-born mothers showing 51%, 22%, and 8% higher risks of infant mortality, low birthweight, and preterm birth, respectively, than foreign-born mothers. The adjusted nativity differentials in risk of pregnancy outcomes for the total population (also shown in Table 2) were much narrower, suggesting that the more favorable maternal risk profile for immigrants as compared with US-born women may partially account for the observed nativity differentials.

The conventional sociodemographic characteristics considered here do little to account for the observed nativity differentials in the three pregnancy outcomes for most of the ethnic groups. Because crude and adjusted nativity differentials were generally similar (see Table 3), only adjusted differentials were interpreted. The race/ethnic groups for which immigrants had significantly lower risks of infant mortality than those born in the

United States included Blacks, other Asians, Mexicans, Puerto Ricans, and Cubans. However, the reduced infant mortality risk was most pronounced for Cuban, other Asian, and Black immigrants, who exhibited 39%, 27%, and 25% lower risks, respectively, than their US-born counterparts of equivalent sociodemographic backgrounds.

Not only was the immigrants' risk of low birthweight significantly lower than that of the US-born women, but the beneficial effect of immigrant status tended to vary according to race and ethnicity. For example, while US-born Mexicans, Chinese, and Blacks had 38% to 61% higher risks of low birthweight than their immigrant counterparts, US-born Puerto Ricans, Central and South Americans, and Cubans showed only 10% to 24% higher risks than their immigrant or Puerto Rican–born counterparts. Moreover, other Asian immigrants showed an 11% higher risk of low birthweight than their US-born counterparts. A fairly similar pattern held for ethnic-specific nativity effects on preterm births. While US-born Blacks showed a 31% higher risk of preterm birth than their immigrant counterparts, the US- and foreign- or Puerto Rican–born differential was between 6% and 17% for Puerto Ricans, Japanese, and Mexicans. Once again, other Asian immigrants showed a 16% higher risk of preterm birth than their US-born counterparts.

While the beneficial effect of immigrant status may partly reflect positive selectivity (i.e., the "healthy immigrant effect"), it may also serve as a proxy for a host of protective behavioral, cultural, and psychosocial factors such as low rates of tobacco, alcohol, and other substance use during pregnancy; social origin influences, including childhood socioeconomic status; better nutritional practices (e.g., higher levels of breast-feeding, better/more balanced diets, lower levels of obesity); positive cultural attitudes toward maternity; and strong social and familial support.[4-11,20,26]

Although many of the cultural and psychosocial factors are difficult to operationalize and could not be addressed with vital statistics data, we can nonetheless present nativity-specific data on some of the behavioral and social factors, such as prenatal substance use, exposure to environmental tobacco smoke, household structure, breast-feeding, and whether the pregnancy was wanted. For instance, our analysis of the most recent birth certificate data indicates a considerably greater rate of cigarette smoking during pregnancy among US-born mothers than among foreign-born mothers.[18] Figure 2 displays such information by race and ethnicity. As can be seen from this figure, US-born Hispanics, Blacks, and Asians were, on average, three to five times more likely to smoke cigarettes than their immigrant counterparts. Even among non-Hispanic Whites, US-born mothers were almost twice as likely to smoke as their foreign-born counterparts. The rate of cigarette smoking was lowest among Chinese and Mexican immigrants and highest among US-born non-Hispanic Whites, Hawaiians, and Puerto Ricans.[18] Furthermore, based on the analysis of the 1988 National Maternal and Infant Health

TABLE 3—Crude and Adjusted Differentials in Risks of Infant Mortality, Low Birthweight, and Preterm Birth between US- and Foreign-Born Mothers, by Race and Ethnicity: United States, 1985 through 1987

Race/Ethnicity	Odds Ratio (95% Confidence Interval) Crude[a]	Adjusted[b]	No. Live Births
Infant mortality			
White (non-Hispanic)[c]	1.04 (0.93, 1.17)	0.98 (0.87, 1.10)	824 780[d]
Black	1.33 (1.22, 1.45)	1.33 (1.21, 1.45)	592 297[e]
Chinese	1.19 (0.85, 1.66)	1.18 (0.84, 1.66)	48 652
Japanese	1.11 (0.80, 1.55)	1.12 (0.80, 1.57)	23 416
Filipino	1.25 (0.97, 1.60)	1.03 (0.78, 1.35)	61 895
Other Asian	1.42 (1.16, 1.74)	1.37 (1.11, 1.68)	165 997
Mexican[c]	1.14 (1.09, 1.20)	1.16 (1.09, 1.22)	718 558
Puerto Rican[c,f]	1.17 (1.03, 1.31)	1.18 (1.04, 1.33)	104 975
Cuban[c]	1.69 (1.22, 2.35)	1.63 (1.15, 2.30)	29 629
Central and South American[c]	0.86 (0.56, 1.32)	0.80 (0.52, 1.23)	132 240
Total	1.51 (1.41, 1.62)	1.24 (1.10, 1.39)	387 083
Low birthweight			
White (non-Hispanic)[c]	1.08 (1.03, 1.13)	1.04 (0.99, 1.09)	823 818[d]
Black	1.60 (1.54, 1.65)	1.61 (1.55, 1.67)	602 178[e]
Chinese	1.43 (1.28, 1.59)	1.45 (1.29, 1.64)	48 607
Japanese	1.09 (0.98, 1.22)	1.09 (0.97, 1.22)	23 390
Filipino	1.12 (1.02, 1.22)	1.04 (0.95, 1.14)	61 854
Other Asian	0.99 (0.91, 1.08)	0.90 (0.82, 0.98)	165 824
Mexican[c]	1.36 (1.33, 1.39)	1.38 (1.35, 1.41)	717 884
Puerto Rican[c,f]	1.10 (1.05, 1.14)	1.10 (1.05, 1.15)	104 857
Cuban[c]	1.28 (1.12, 1.47)	1.24 (1.07, 1.43)	29 611
Central and South American[c]	1.22 (1.06, 1.40)	1.18 (1.02, 1.36)	132 097
Total	1.22 (1.19, 1.25)	1.08 (1.04, 1.13)	386 718
Preterm birth			
White (non-Hispanic)[c]	1.00 (0.96, 1.04)	0.96 (0.92, 1.00)	806 694[d]
Black	1.48 (1.44, 1.53)	1.31 (1.27, 1.35)	594 557[e]
Chinese	1.12 (1.02, 1.24)	1.08 (0.98, 1.20)	48 170
Japanese	1.19 (1.08, 1.31)	1.16 (1.05, 1.28)	23 072
Filipino	1.08 (1.01, 1.16)	0.97 (0.90, 1.05)	61 014
Other Asian	0.90 (0.84, 0.96)	0.86 (0.80, 0.93)	160 874
Mexican[c]	1.20 (1.18, 1.22)	1.17 (1.15, 1.19)	701 750
Puerto Rican[c,f]	1.04 (1.01, 1.08)	1.06 (1.02, 1.10)	107 168
Cuban[c]	1.17 (1.04, 1.30)	1.11 (0.98, 1.25)	29 338
Central and South American[c]	1.01 (0.90, 1.13)	0.99 (0.88, 1.12)	132 098
Total	1.08 (1.05, 1.10)	0.99 (0.95, 1.03)	378 723

Source. Data were derived from the Linked Birth and Infant Death data sets, 1985, 1986, and 1987 birth cohorts. Differentials were based on logistic regression models. The reference group was foreign- or Puerto Rican–born mothers.

[a]Unadjusted for the effects of other covariates.

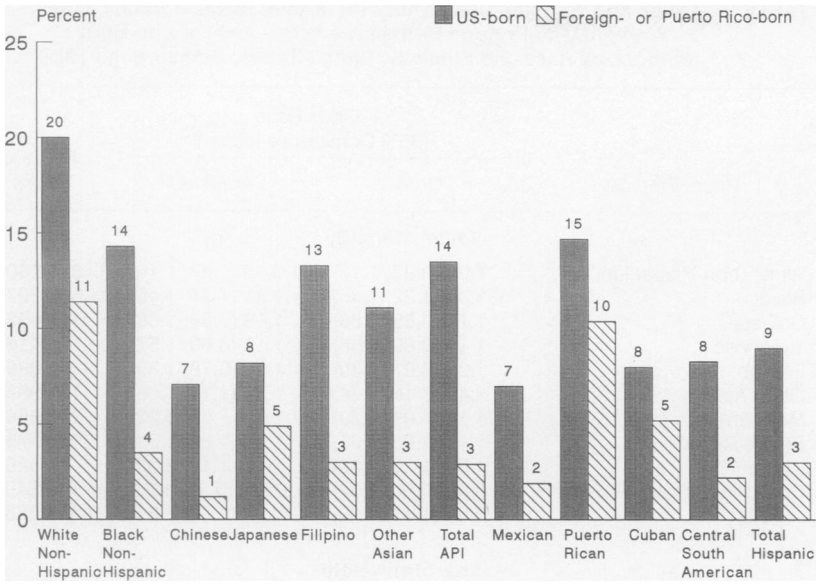
[b]Adjusted for the effects of maternal age, marital status, education, birth order, place of residence, plurality, and prenatal care; the adjustment for preterm birth excluded prenatal care.

[c]Based on data from 23 reporting states and the District of Columbia.

[d]40% sample of live births.

[e]35% sample of live births.

[f]Differentials are shown between Puerto Rican women born in the 50 states and the District of Columbia and those born in Puerto Rico or abroad.



Note. Smoking data exclude California, New York, Indiana, and South Dakota. Hispanic origin was not reported for New Hampshire. API = Asians and Pacific Islanders, including Hawaiians.
Source. Data were derived from the 1992 natality data file, National Center for Health Statistics.

FIGURE 2—Percentage of mothers smoking during pregnancy, by maternal race/ethnicity and nativity: United States, 1992.

Survey data, mothers born in the United States were 2.3 and 3.9 times more likely to use alcohol and marijuana/cocaine during pregnancy, respectively, than their foreign-born counterparts.[16] In addition, US-born non-Hispanic White, Black, Asian, and Hispanic mothers were 1.3 to 1.9 times more likely than their immigrant counterparts to be exposed to environmental tobacco smoke during pregnancy.[16]

Household composition can be used to measure roughly the degree to which familial and social support may be available to mothers during their pregnancy.[27] Based on the 1988 National Maternal and Infant Health Survey data, Black and Asian immigrant mothers were 6% to 9% more likely than their US-born counterparts to live in households with their partners or extended family members,[16] environments generally regarded as more conducive to positive birth outcomes. Contrary to our expectation, Hispanic immigrants were somewhat more likely than US-born Hispanics to live alone during pregnancy (10.0% vs 6.6%).[16] Breast-feeding, the optimal form of infant nutrition, has been linked to a reduced risk of infant mortality.[28] Our analysis of the 1988 National Maternal and Infant Health Survey data showed that foreign-born mothers were substantially more likely to breast-feed than US-born mothers; this was especially true among Black mothers, of whom immigrants were almost three times as likely to breast-feed as their US-born counterparts.[16] Whether or not the pregnancy is wanted can influence birth outcome by encouraging positive maternal health behavior during pregnancy.[29,30] As the 1988 National Maternal and Infant Health Survey data indicate, Asian, Hispanic, and Black immigrant mothers were, respectively, 43.2%, 21.8%, and 19.5% less likely than their US-born counterparts to report that their babies were unwanted or mistimed.[16]

Discussion

The results of this study strongly indicate that foreign-born/immigrant status is associated with a substantially reduced risk of infant mortality and low birthweight for the total population in general and for Blacks, Cubans, Mexicans, and Chinese in particular. No appreciable difference in the risk of preterm birth existed between the US-born and foreign-born women for the total population, although infants born to Japanese, Mexican, and Black immigrant mothers exhibited about 15% to 25% lower risks than their US-born counterparts.

How does one address the observed ethnic-specific nativity differentials in the risk of pregnancy outcomes? The extent to which differences involving prenatal substance use, exposure to environmental tobacco smoke, household structure, breast-feeding, and whether the pregnancy is wanted vary by ethnicity may help account for a substantial portion of these differentials. However, to explain more fully the considerable differentials between the US- and foreign-born Blacks, it may be necessary to look at not only the current life circumstances and socially disadvantaged position of US-born blacks vis-à-vis foreign-born Blacks, but also their unique socio-cultural and political background in terms of a historical perspective. Very few groups, if any, have experienced for so long the kind and degree of discrimination that US-born Blacks have faced.[31] Foreign-born Blacks, on the other hand, have not had similar long-term exposure to socioeconomic and structural discrimination.

To understand further the nativity differentials, especially among such groups as Cubans, Mexicans, Chinese, and other Asians, it may be pertinent to also consider the varied circumstances within which members of different ethnic immigrant groups entered the United States. These circumstances, which broadly define the immigration process, entail origin-country conditions, period of immigration, push and pull factors prompting the migration, criterion under which the individual immigrated (skill, refugee, or family reunification), place of destination within the United States, and US immigration laws or restrictions in effect at the time of immigration.[1,32]

A word of caution is in order. While data on infant mortality and low birthweight from linked records are considered to be very reliable, the accuracy of birth certificate data on gestational age has sometimes been questioned.[33-35] Gestational age data in this study, based primarily on last menstrual period, were missing for about 4% of the births.[13-15] Moreover, approximately 14% of the birth records were imputed for gestational age when the month of the last menstrual period was known but the day was not. The percentage of missing and imputed records tended to be higher for Blacks, Mexicans, and other Asians than for other groups. Immigrants generally had a higher percentage of missing records but a somewhat lower percentage of imputed records.[36] Imputed and missing records may have introduced into our analysis two

potentially different biases: while the effect of imputation may have been to slightly increase the proportion of preterm births,[37] the effect of missing records was likely to introduce a downward bias in the estimates of preterm birth.[33,34] These biases could mean a somewhat larger differential in preterm births between the US- and foreign-born mothers in our ethnic-specific analyses than may have actually been the case.

Finally, although we have emphasized only the substantial but varying effects of nativity status on pregnancy outcomes by ethnicity, it is important to also mention that several other critical factors, such as maternal age, education, marital status, and prenatal care, affected pregnancy outcomes differentially for immigrants and those born in the United States. As the findings of the study suggest, nativity status, in conjunction with ethnicity, may serve as an important axis of differentiation and stratification in analyses of pregnancy outcomes among the current American population. Nativity differences should be considered in designing and carrying out ethnic-specific interventions to prevent adverse pregnancy outcomes. □

Acknowledgments

An earlier version of this paper was presented at the 122nd Annual Meeting of the American Public Health Association, November 1994, Washington, DC.

We are grateful to Joyce Martin of the National Center for Health Statistics and three anonymous reviewers for their helpful comments.

References

1. Jasso G, Rosenzweig M. *The New Chosen People: Immigrants in the United States.* New York, NY: Russell Sage Foundation; 1990.
2. *Statistical Abstract of the United States: 1993.* Washington, DC: US Bureau of the Census; 1993.
3. *Asians and Pacific Islanders in the United States.* Washington, DC: US Bureau of the Census; 1993.
4. Kleinman JC, Fingerhut LA, Prager K. Differences in infant mortality by race, nativity status, and other maternal characteristics. *Am J Dis Child.* 1991;145:194–199.
5. Becerra J, Hogue C, Atrash H, Perez N. Infant mortality among Hispanics: a portrait of heterogeneity. *JAMA.* 1991;265:217–221.
6. Guendelman S, Gould J, Hudes M, et al. Generational differences in perinatal health among the Mexican American population: findings from the HHANES 1982–1984. *Am J Public Health.* 1990;80(suppl):61–65.
7. Ventura S, Taffel S. Childbearing characteristics of US-born and foreign-born Hispanic mothers. *Public Health Rep.* 1985;100: 647–652.
8. Collins JW, Shay DK. Prevalence of low birth weight among Hispanic infants with United States-born and foreign-born mothers: the effect of urban poverty. *Am J Epidemiol.* 1994;139:184–192.
9. Cabral H, Fried L, Levenson S, et al. Foreign-born and US-born Black women: differences in health behaviors and birth outcomes. *Am J Public Health.* 1990;80:70–72.
10. Valanis B, Rush D. A partial explanation of superior birth weights among foreign-born women. *Soc Biol.* 1979;26:198–210.
11. Valanis B. Relative contributions of maternal social and biological characteristics to birth weight and gestation among mothers of different childhood socioeconomic status. *Soc Biol.* 1979;26:211–225.
12. Singh GK, Yu SM. Pregnancy outcomes among Asian Americans. *Asian Am Pacific Islander J Health.* 1993;1:63–78.
13. *Linked Birth/Infant Death Data Set: 1985 Birth Cohort, Public Use Data Tape Documentation.* Hyattsville, Md: Public Health Service; 1990.
14. *Linked Birth/Infant Death Data Set: 1986 Birth Cohort, Public Use Data Tape Documentation.* Hyattsville, Md: Public Health Service; 1991.
15. *Linked Birth/Infant Death Data Set: 1987 Birth Cohort, Public Use Data Tape Documentation.* Hyattsville, Md: Public Health Service; 1992.
16. *1988 National Maternal and Infant Health Survey: Public Use Data Tape Documentation.* Hyattsville, Md: Public Health Service; 1991.
17. Sanderson M, Placek PJ, Keppel KG. The 1988 National Maternal and Infant Health Survey: design, content, and data availability. *Birth.* 1991;18:26–32.
18. *1992 Detail Natality File, Public Use Data Tape Documentation.* Hyattsville, Md: Public Health Service; 1994.
19. Ventura SJ, Martin JA, Taffel SM, Mathews TJ, Clarke SC. Advance report of final natality statistics, 1992. *Month Vital Stat Rep.* 1994;43(5)(suppl).
20. Institute of Medicine. *Preventing Low Birthweight.* Washington, DC: National Academy Press; 1985.
21. Eberstein IW. Demographic research on infant mortality. *Sociol Forum.* 1989;4:409–422.
22. Cramer JC. Social factors and infant mortality: identifying high risk groups and proximate causes. *Demography.* 1987;24: 299–322.
23. Nersesian WS. Infant mortality in socially vulnerable populations. *Annu Rev Public Health.* 1988;9:361–377.
24. Singh GK, Kposowa AJ. A comparative analysis of infant mortality in major Ohio cities: significance of socio-biological factors. *Appl Behav Sci Rev.* 1994;2:77–94.
25. *SAS/STAT User's Guide: The LOGISTIC Procedure, Version 6.* 4th ed. Cary, NC: SAS Institute Inc; 1989;2.
26. Brooks-Gun J. Stress and support during pregnancy: what do they tell us about low birthweight? In: Berendes H, Kessel S, Yaffe S, eds. *Advances in the Prevention of Low Birth Weight: An International Symposium.* Washington, DC: National Center for Education in Maternal and Child Health; 1991:39–57.
27. Moss N, Carver K. Explaining racial and ethnic differences in birth outcomes: the effect of household structure and resources. Presented at the annual meeting of the Population Association of America, May 1992, Denver, Colo.
28. Mosley WH, Chen LC. An analytical framework for the study of child survival in developing countries? In: Mosley WH, Chen LC, eds. *Population and Development Review—Child Survival: Strategies for Research.* New York, NY: Population Council; 1984;10(suppl):15–45.
29. Weller RH, Eberstein IW, Bailey M. Pregnancy wantedness and maternal behavior during pregnancy. *Demography.* 1987;24: 407–412.
30. Marsiglio W, Mott F. Does wanting to become pregnant with a first child affect subsequent maternal behaviors and infant birth weight? *J Marriage Fam.* 1988;50:1023–1036.
31. James SA. Racial and ethnic differences in infant mortality and low birth weight: a psychosocial critique. *Ann Epidemiol.* 1993; 3:130–136.
32. Lamberty G, Coll CG. Conclusion: expanding on what is known about the health and development of Puerto Rican mothers and children. In: Lamberty G, Coll CG, eds. *Puerto Rican Women and Children: Issues in Health, Growth, and Development.* New York, NY: Plenum Press; 1994:255–276.
33. Berkowitz GS, Papiernik E. Epidemiology of preterm birth. *Epidemiol Rev.* 1993;15: 415–443.
34. David RJ. The quality and completeness of birth weight and gestational age data in computerized birth files. *Am J Public Health.* 1980;70:964–973.
35. Adams MM. The continuing challenge of preterm delivery. *JAMA.* 1995;273:739–740.
36. *1987 Detail Natality File, Public Use Data Tape Documentation.* Hyattsville, Md: Public Health Service; 1989.
37. Taffel S, Johnson D, Heuser R. A method of imputing length of gestation on birth certificates. *Vital Health Stat.* 1982;2(93). DHHS publication PHS 82-1367.