Birthweight Differentials among Asian Americans

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ABSTRACT

Objectives. This study examines differentials in mean birthweight and the risk for low birthweight among various Asian-American groups in New York State (n = 499 377).

Methods. Using resident singleton live-birth records from New York State for 1985 and 1986, Asian-American births were compared with Black, American Indian, and White births. Multivariate ordinary least squares and logistic regression models were used to analyze ethnic differences.

Results. Compared with White births, the expected mean difference in birthweight was −115 g for Chinese, −235 g for Japanese, −164 g for Filipinos, −120 g for Blacks, and 74 g for American Indians. The risk for low birthweight was 45% higher for Filipinos and 49% higher for Blacks as compared with Whites.

Conclusions. Results of this study suggest substantial heterogeneity in mean birthweight and risk for low birthweight among ethnic groups in general and the major Asian-American groups in particular. Interestingly, after controlling for ethnic differences in sociodemographic risk factors, Filipinos appear to resemble Blacks much more closely than they do their Japanese and Chinese counterparts with respect to risk for low birthweight. (*Am J Public Health.* 1994;84:1444–1449)

Introduction

The significance of birthweight as one of the most important determinants of infant mortality and morbidity is well documented in social and biomedical research.[1] For infants of low birthweight (i.e., less than 2500 g), the risk of dying in the first year of life is about 21 times that for infants weighing 2500 g or more. For infants of very low birthweight (i.e., less than 1500 g), the risk is considerably greater: about 90 times that for infants weighing 2500 g or more.[2] According to the most recent vital statistics data, the rate of low birthweight (percentage of newborn babies weighing less than 2500 g) in the United States was 7.1% in 1991. However, this rate varied substantially among the various racial and ethnic groups. For White infants it was 5.8%, for Black infants it was 13.6%; and for American Indians and Asian-American groups such as Japanese, Filipinos, and Hawaiians, it was 6.2%, 5.9%, 7.3%, and 6.7%, respectively, all somewhat higher than that observed for White infants. The rate was lowest for Chinese infants (5.1%).[3]

Given these statistics and the particularly strong impact of birthweight on infant mortality and morbidity, it is not surprising that numerous studies have attempted to analyze risk factors associated with low birthweight. However, there is a paucity of studies that have examined racial/ethnic differentials in birthweight among US populations other than Whites, Blacks, and Hispanics.[4] Especially lacking are birth outcome studies on specific Asian-American subgroups, some of which are among the fastest growing minority groups in the United States.[5,6]

Despite the presence of marked heterogeneity among Asian Americans, studies investigating ethnic differentials in socioeconomic characteristics and birth outcomes have often treated Asian Americans as a single entity.[7–9] However, previous research using linked birth and infant death records has demonstrated important variations among Asian Americans in infant mortality rates by age at death[10–15] and cause of death.[16] Similarly, profound differences among these people have been noted with respect to low birthweight and associated risk factors.[4,11] Results of this paper further illustrate the substantial heterogeneity that exists within the Asian-American population with respect to sociodemographic characteristics and birth outcomes.

The purpose of this study is to examine ethnic differentials in mean birthweight and risk for low birthweight, with special emphasis on three major Asian-American groups: Chinese, Japanese, and Filipino Americans. We evaluate birth outcomes among these three groups relative to those for White, Black, and American Indian infants. The specific questions we investigate are (1) whether these racial/ethnic groups differ significantly with respect to mean birthweight and risk of low birthweight, and (2) whether these differentials, if they exist, persist after controlling for selected sociodemographic and biological risk factors.

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Data and Methods

Data

The data used in this study are derived from the National Linked Birth/Infant Death Data Sets for 1985 and 1986 birth cohorts.[2,17] From these two national files were extracted all the resident singleton live births that occurred in New York State during those 2 years.

For the purpose of this analysis, White, Black, American Indian, Chinese, Japanese, and Filipino live births in New York State in 1985 and 1986 were considered. The births occurring to other ethnic groups, including other Asian Americans, were excluded because of insufficient numbers of live births for analysis. The study sample for New York State thus consisted of 499 397 singleton live births, with Chinese, Japanese, and Filipino births in the sample accounting for about 1.5% of all births in the state. It is important to note that all live births were classified according to maternal race/ethnicity.

The rationale for selecting New York State was threefold. First, it is impractical and costly to conduct a multivariate analysis at the national level using all 3.7 to 4.1 million births that occur during a specific calendar year in the United States. Second, although a large proportion (about 40%) of Asian-American births occur in California, that state could not be included in the analysis because information on maternal education—an important covariate of birth outcome and the only measure of socioeconomic status available from vital statistics data—is not recorded on its birth certificates. Third, the population of New York State is ethnically quite diverse, yielding sufficiently large numbers of live births for each of the ethnic groups considered here.

TABLE 1—Selected Maternal and Infant Characteristics Used in the Analysis of Differentials in Mean Birthweight and Risk for Low Birthweight, by Race/Ethnicity: New York State, 1985 to 1986

	Race/Ethnicity					
	White	Black	American Indian	Chinese	Japanese	Filipino
Birthweight						
Mean, g	3396.1	3143.3	3413.7	3283.9	3221.5	3244.3
SD	557.8	624.4	610.9	454.9	456.6	487.8
% low birthweight	5.0	11.5	5.4	3.9	4.0	5.7
Maternal age, y						
<20	7.9	17.4	20.5	0.9	1.0	1.1
20–34	82.9	74.5	74.9	85.8	78.6	77.1
35+	9.2	8.1	4.6	13.3	20.4	21.8
Maternal education, y						
<12	16.5	32.1	36.7	18.1	3.7	4.7
12	41.1	41.6	40.0	51.6	23.5	18.3
13+	42.4	26.3	23.3	30.3	72.8	77.0
Mean	12.9	11.9	11.6	12.4	14.4	14.9
Marital status						
Unmarried	19.5	63.6	49.9	4.4	4.0	10.3
Married	80.5	36.4	50.1	95.6	96.0	89.7
Nativity status						
Native born	81.6	66.4	84.0	5.6	7.0	2.5
Foreign born	18.4	33.6	16.0	94.4	93.0	97.5
County of residence						
Metropolitan	73.1	97.2	60.1	97.4	95.9	96.8
Nonmetropolitan	26.9	2.8	39.9	2.6	4.1	3.2
Total birth order						
1	34.7	33.3	30.0	47.7	39.5	51.6
2–3	49.3	43.7	45.2	44.5	54.4	40.2
4+	16.0	23.0	24.8	7.8	6.1	8.2
Prenatal care began						
1st trimester	78.0	51.9	63.7	65.0	84.7	71.8
2nd–3rd trimester	18.9	37.0	34.8	32.5	14.1	24.2
No care	3.1	11.1	1.5	2.5	1.2	4.0
Mean no. prenatal visits	10.4	7.7	9.5	8.7	11.0	9.1
Gestational age, wk						
<37	9.1	15.8	12.8	6.5	6.6	8.8
37+	90.9	84.2	87.2	93.5	93.4	91.2
Live births, n	382 506	10 830	927	5757	531	1356

Source: National Center for Health Statistics, *Linked Birth/Infant Death Data Sets*, 1985 and 1986 birth cohorts.[2,17]

Variables

The dependent variables in this study were mean birthweight and risk of low birthweight. In estimating the risk of low birthweight, all the live births weighing less than 2500 g were defined to be of low birthweight.[18] Differences in these two dependent variables were modeled as functions of both sociodemographic and biological risk factors. More specifically, the risk factors (covariates) considered to influence birthweight included maternal background factors (e.g., age, race/ethnicity, educational attainment, nativity, marital status, county of residence, and prenatal care) and infant characteristics (e.g., birth order, sex, and gestational age).[19] Maternal education and prenatal care were measured as continuous variables, while all other covariates, including race/ethnicity, were measured as categorical variables.

Methods

Ordinary least squares regression was used to analyze ethnic differences in mean birthweight while multiple logistic regression was used to analyze ethnic differences in the risk of low birthweight, controlling for the effects of other covariates. The parameters in the ordinary least squares model, which represented the effects of covariates including ethnicity, were estimated using the REG procedure; those in the logistic model were estimated by the maximum likelihood method using the LOGISTIC procedure of SAS, Version 6.[20]

Racial/ethnic differentials in mean birthweight and risk of low birthweight were examined by fitting a series of hierarchical regression models, keeping in mind the causal sequencing of the risk factors in their associations with birthweight. In the first stage, regression models were fitted to determine crude (unadjusted) differentials in mean birth-

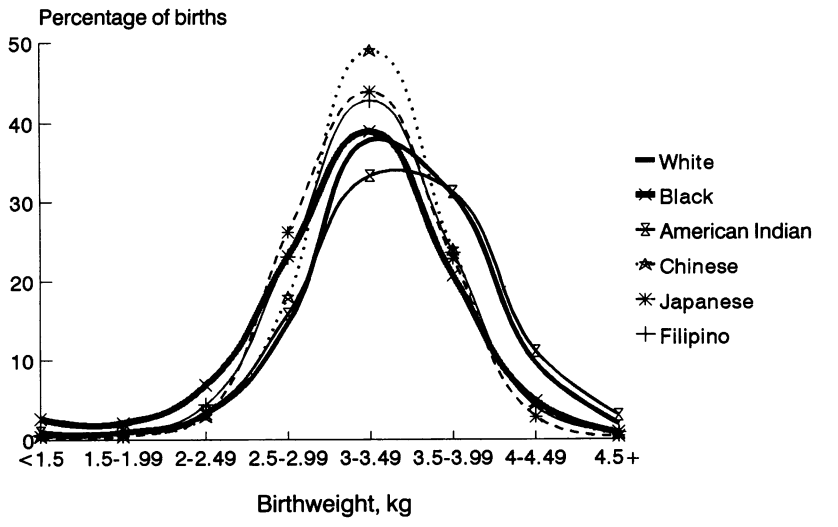

FIGURE 1—Birthweight distribution by maternal race/ethnicity: New York State, 1985 to 1986.

weight and risk of low birthweight between Whites and each of the other ethnic groups. In the second stage, ethnic differentials were investigated by entering race/ethnicity, maternal age, education, marital status, nativity, place of residence, birth order, infant sex, and prenatal care into the model. The final model examined ethnic differentials, incorporating all the covariates including gestational age.

Results

Table 1 shows descriptive data on birth outcomes and selected maternal and infant characteristics by race/ethnicity. As seen in this table, Chinese, Japanese, and Filipino infants weighed significantly less at birth (about 120 to 180 g less) than White infants. Black infants had the lowest mean birthweight, approximately 250 g less than their White counterparts. American Indians had on average about the same birthweight as Whites. However, Chinese, Japanese, and Filipino Americans had a much more compact birthweight distribution, showing substantial clustering around the mean birthweight, whereas White, Black, and American Indian babies showed considerable dispersion below and above the mean (see Figure 1). This also implies that variation in birthweight among Asian Americans was substantially lower than that among Whites, Blacks, and American Indians, which is also evident by looking at the differences in standard deviations of race/ethnic-specific birthweight shown in Table 1.

According to the figures in Table 1, Chinese had the lowest rate of low birthweight, about 22% lower than the White rate and 32% lower than the Filipino rate. Rates of low birthweight for Japanese, Filipinos, and American Indians were not significantly different from that for Whites. However, Blacks had the highest rate—about 2.3 times that for Whites and nearly three times that for Chinese.

The groups with the highest rates of low birthweight appear to have the least favorable distributions on several of the risk factors (see Table 1). For example, the percentage of births to mothers aged 19 or less, the incidence of nonmarital childbearing (as measured by the proportion of births occurring to unmarried mothers), and the proportion of fourth- and higher-order pregnancies were substantially higher among Blacks, American Indians, and Whites than among Asian groups. Similarly, the proportion of preterm births was higher among Blacks, American Indians, and Whites than among Chinese, Japanese, and Filipinos. Additionally, not only did Black and American Indian mothers have, on average, fewer years of schooling than their Asian counterparts, but they were also significantly less likely to have attained a college education, and a somewhat lower proportion of them sought prenatal care during the first trimester of pregnancy.

Ethnic Differentials in Mean Birthweight

Results of multiple linear regressions examining the effects of race/ethnicity and other covariates on mean birthweight are presented in Table 2. When only race/ethnicity was considered, all groups except American Indians differed significantly from Whites in mean birthweight (model 1). When maternal age, education, marital status, nativity, county of residence, birth order, infant sex, and prenatal visits were introduced as controls in model 2, the Black/White differential in mean birthweight decreased by 108 g and the Chinese/White differential decreased by 8 g, while the Japanese/White, Filipino/White, and American Indian/White differentials increased by 67, 24, and 55 g, respectively. In other words, the standardized differences in mean birthweight between Whites and Japanese, Filipinos, and American Indians were larger and those between Whites and Blacks were significantly smaller than the corresponding crude observed differences in model 1.

The other covariates in model 2 were related to birthweight in the manner expected. Maternal age of 35 years and older; first-order, female, and out-of-wedlock births; mother's metropolitan residence, US-born status, and lower educational attainment; and fewer prenatal visits were all associated with significantly lower mean birthweights. Model 3 shows the ethnic differentials in mean birthweight after controlling for the additional effect of gestational age. Relative mean differences in birthweight among ethnic groups changed only slightly, revealing essentially similar patterns as those observed in model 2. Compared with White births, the expected mean difference in birthweight was −115 g for Chinese, −235 g for Japanese, −164 g for Filipinos, −120 g for Blacks, and 74 g for American Indians.

Ethnic Differentials in Risks for Low Birthweight

Since the analysis of ethnic differentials in mean birthweight may be affected by ethnic differences at the lower and upper extremes of the birthweight distribution, a separate analysis of low birthweight is warranted to identify risk factors associated with ethnic differentials in birth outcome. The results of this analysis are presented in Table 3. Clearly, the results of Table 2 are reinforced by the ethnic differentials in the risk for low

birthweight estimated by logistic regression in models 1 through 3 of Table 3. Model 1 in Table 3 presents the crude effect of race/ethnicity on the risk for low birthweight. The category showing an odds ratio of 1.00 represents the reference group used for comparison. Compared with White infants, Black infants had a 148% higher risk for low birthweight whereas Chinese had a 22% lower risk. However, the differences in low-birthweight rates between Whites and Japanese, Filipinos, and American Indians were not statistically significant. Not surprisingly, the results in model 1 of Table 3 are consistent with those reported earlier while discussing the ethnic differentials in low birthweight rates in Table 1.

To further explain ethnic differentials in risks for low birthweight, we added to model 1 sociodemographic risk factors, as mentioned above. Results of this stage are shown in model 2. Controlling for the confounding effects of these covariates reduced ethnic difference in risks for low birthweight for Black infants from 148% to 59% but increased significantly the difference for Filipino infants from 15% to 54%. However, differences in risks for low birthweight between Whites and Japanese, Chinese, and American Indians were not statistically significant.

The remaining results in model 2 of Table 3 are consistent with expectations concerning the relationships of the covariates considered and the risks for low birthweight. Births to unmarried mothers as well as to mothers aged 35 and over, out-of-wedlock births, first- and fourth- or higher-order pregnancies, and births to US-born mothers were all associated with a significantly higher risk for low birthweight. Furthermore, that risk declined significantly with increasing levels of education and prenatal care, even after controlling for the effects of other covariates.

Next added to model 2 was gestational age, the findings of which are shown in model 3 of Table 3. Compared with the other risk factors, gestational age had the strongest net impact on the risk for low birthweight. Although its inclusion in the model somewhat narrowed the ethnic differentials in low birthweight, Filipino and Black infants continued to show significantly higher risks for low birthweight than Whites—45% and 49%, respectively.

TABLE 2—Ordinary Least Squares Regressions Showing Crude and Adjusted Racial/Ethnic Differentials in Mean Birthweight: New York State, 1985 to 1986

	Model 1[a]		Model 2[b]		Model 3[c]	
Covariate	β	SE (β)	β	SE (β)	β	SE (β)
Maternal race/ethnicity						
White[d]						
Black	−246.56*	2.05	−138.69*	2.26	−120.08*	2.14
American Indian	11.54	18.97	67.71*	18.45	74.43*	17.50
Chinese	−116.40*	7.76	−107.91*	7.71	−115.21*	7.32
Japanese	−177.47*	25.49	−244.46*	24.82	−234.85*	23.55
Filipino	−152.84*	15.88	−176.70*	15.55	−164.37*	14.75
Maternal age, y						
20–34[d]						
≤19			5.93	3.07	16.71*	2.91
≥35			−9.10*	2.88	−0.23	2.74
Marital status						
Unmarried[d]						
Married			102.26*	2.17	85.17*	2.06
Total birth order						
2–3[d]						
1			−58.58*	1.84	−58.93*	1.75
4+			15.25*	2.31	21.64*	2.19
County of residence						
Nonmetropolitan[d]						
Metropolitan			−30.67*	2.07	−38.35*	1.96
Nativity status						
Foreign born[d]						
Native born			−46.44*	2.12	−33.17*	2.01
Infant sex						
Female[d]						
Male			127.41*	1.61	131.70*	1.52
Maternal education			10.95*	0.38	9.18*	0.36
Prenatal visits			20.86*	0.21	15.61*	0.20
Gestational age, wk						
≥37[d]						
<37					−596.05*	2.62
Constant	3402.06*	0.94	2974.41*	5.39	3105.27*	5.14
R^2		0.03		0.08		0.18
df		464 550		464 540		464 539

Note. β = unstandardized regression coefficient.
Source. National Center for Health Statistics, *Linked Birth/Infant Death Data Sets,* 1985 and 1986 birth cohorts.[2,17]
[a]The only covariate included is race/ethnicity.
[b]The covariates included are race/ethnicity, maternal age, marital status, education, nativity, county of residence, birth order, infant sex, and number of prenatal vists.
[c]The covariates included are race/ethnicity, maternal age, marital status, education, nativity, county of residence, birth order, infant sex, number of prenatal visits, and gestational age.
[d]Reference category.
*$P < .01$.

Discussion

This study has examined ethnic differentials in birthweight using resident singleton live-birth records from New York State for 1985 and 1986. The two specific questions addressed were (1) whether the Asian-American groups such as Chinese, Japanese, and Filipinos differed from Whites, Blacks, and American Indians with regard to mean birthweight and risk for low birthweight; and (2) whether the ethnic differences remained after controlling for selected sociodemographic and biological risk factors known to influence birth outcome. The analysis initially revealed important ethnic differences, with Chinese, Japanese, and Filipinos showing significantly lower mean birthweights than White infants. Controlling for such sociodemographic factors as maternal age, education, marital status, nativity, birth order, and prenatal care had a narrowing effect on the relative birthweight differ-

TABLE 3—Logistic Regressions Showing Crude and Adjusted Racial/Ethnic Differentials in Risks for Low Birthweight: New York State, 1985 to 1986

	Model 1[a]		Model 2[b]		Model 3[c]	
Covariate	OR	95% CI	OR	95% CI	OR	95% CI
Maternal race/ethnicity						
White	1.00		1.00		1.00	
Black	2.48	2.43, 2.54	1.59	1.54, 1.64	1.49	1.44, 1.54
American Indian	1.09	0.82, 1.45	0.82	0.44, 1.54	0.76	0.55, 1.05
Chinese	0.78	0.69, 0.89	0.87	0.75, 1.01	0.93	0.80, 1.08
Japanese	0.79	0.51, 1.22	1.35	0.86, 2.13	1.28	0.80, 2.05
Filipino	1.15	0.91, 1.45	1.54	1.21 1.96	1.45	1.12, 1.87
Maternal age, y						
20–34			1.00		1.00	
≤19			0.87	0.83, 0.90	0.78	0.74, 0.81
≥35			1.28	1.23, 1.34	1.23	1.17, 1.29
Marital status						
Unmarried			1.00		1.00	
Married			0.70	0.68, 0.72	0.76	0.74, 0.79
Total birth order						
2–3			1.00		1.00	
1			1.18	1.14, 1.21	1.21	1.17, 1.25
4+			1.13	1.10, 1.17	1.09	1.05, 1.13
County of residence						
Nonmetropolitan			1.00		1.00	
Metropolitan			0.98	0.94, 1.01	1.09	1.05, 1.13
Nativity status						
Foreign born			1.00		1.00	
Native born			1.42	1.38, 1.47	1.32	1.27, 1.36
Infant sex						
Female			1.00		1.00	
Male			0.83	0.81, 0.85	0.77	0.75, 0.79
Maternal education			0.96	0.96, 0.97	0.97	0.96, 0.97
Prenatal visits			0.89	0.89, 0.89	0.92	0.92, 0.92
Gestational age, wk						
≥37					1.00	
<37					12.44	12.09, 12.78
Model chi-square		5351.91*		13 766.12*		44 237.91*
df		5		15		16
n		499 377		465 310		465 310

Note. OR = odds ratio; CI = confidence interval.
Source. National Center for Health Statistics, *Linked Birth/Infant Death Data Sets,* 1985 and 1986 birth cohorts.[2,17]
[a]The only covariate included is race/ethnicity.
[b]The covariates included are race/ethnicity, maternal age, marital status, education, nativity, county of residence, birth order, infant sex, and number of prenatal visits.
[c]The covariates included are race/ethnicity, maternal age, marital status, education, nativity, county of residence, birth order, infant sex, number of prenatal visits, and gestational age.
*$P < .01$.

ences between Whites and Blacks and Chinese but had a widening impact on the mean birthweight differences between Whites and Japanese, Filipino, and American Indians.

Similarly, observed ethnic differences in rates of low birthweight indicated a significantly lower risk for low birthweight for Chinese and a higher risk for Blacks compared with Whites. Adjustment for the risk factors mentioned above reduced but did not completely eliminate ethnic differences in low birthweight.

Results of this study also point toward the substantial heterogeneity that characterizes the three Asian-American groups with respect to their sociodemographic composition and birth outcome. Of the three groups, Chinese mothers appear to have the most favorable birth outcome although they have lower educational attainment than Japanese and Filipino mothers. Comparison of their standardized low-birthweight rates (after adjusting for risk factors) reveals that Japanese and Filipino mothers were significantly more likely (38% and 56%, respectively) to have a low-birthweight baby than Chinese mothers. In fact, based on ethnic differences in standardized low-birthweight rates, Filipinos appear to resemble Blacks much more closely than they do their Japanese and Chinese counterparts with respect to the risk for low birthweight.

As regards the generalizability of this study, the Asian-American population in New York State may not be entirely representative of the Asian-American population in the United States as a whole. As seen from Table 1, Chinese, Japanese, and Filipino mothers in our sample consist almost entirely of immigrants, with significantly larger proportions of them having been born abroad than is the case at the national level.[11,16] As a result, these mothers differ somewhat from their national counterparts in their sociodemographic composition and therefore in their birth outcomes; for example, Chinese, Japanese, and Filipino mothers in New York State had fewer prenatal visits and were relatively less likely to seek early prenatal care. Furthermore, compared with their national counterparts, Japanese and Filipino mothers in New York State were characterized by higher maternal education and lower rates of teenage, fourth- and higher-order, and out-of-wedlock births.[11,16] Additionally, Chinese mothers in our study sample (which includes New York City) were relatively more likely to be newer immigrants and to be less educated, poor, and employed in secondary labor markets than is the case nationally.

In conclusion, the results of this study indicate important ethnic differences in mean birthweight and risk of low birthweight. But while sociodemographic risk factors considered here account for some of these observed differences, much of the variance in birth outcomes among ethnic groups in general and among Asian Americans in particular remains unexplained. To explain more fully the ethnic differences in mean birthweight and risk of low birthweight will require consideration of additional risk factors not included in the present analysis owing to lack of data. Examples of these risk factors include such socioeconomic variables as income and occupation; behavioral or life-style factors such as maternal cigarette smoking, alcohol consumption,

and other forms of substance abuse; nutritional factors such as maternal and paternal size, gestational weight gain, diet, and breast-feeding; psychosocial[21] and cultural factors such as stress, social and familial support, and cultural attitudes toward maternity; and medical care factors that are more directly related to birth outcomes.[19] Maternal occupation and especially income may contribute substantially to ethnic variations in birth outcomes independent of education, the most commonly used measure of socioeconomic status in the analysis of health outcomes.[22] Maternal physical stature as measured by height and prepregnancy weight is shown to have a profound net effect on birthweight[9,18] and is expected to account for part of the reported birthweight deficit for Asian-American groups considered in this study. However, significant ethnic differentials in both mean birthweight and risk of low birthweight have been shown to persist even after controlling for ethnic differences in maternal body size and other covariates.[9,23] □

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