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## Birth Outcomes of Korean Women in Hawaii

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### Synopsis .....

*Since the end of the Korean War, immigration of Koreans to the United States has increased rapidly. In 1990, 11.6 percent of all Asians in the United States were of Korean ethnicity, and it is projected that Koreans will outnumber all other Asian*

*groups, except Filipinos, in the United States by the year 2030.*

*Despite the growing size of this population, very little is known about their health status. This study, using 1979-89 Hawaii vital record data, investigates the relationship between maternal sociodemographic characteristics, prenatal care utilization factors, and birth outcomes among Koreans as compared with Caucasians. The ethnic term "Caucasian" is used in Hawaii's vital records and is synonymous with non-Hispanic whites.*

*Korean mothers were more likely to be older and have lower educational attainment, and less likely to be adolescent, single, or to have received adequate prenatal care than Caucasian mothers. More than 80 percent of the Korean mothers were foreign born. Significantly higher risks for very preterm delivery (less than 33 weeks) and very low birth weight births were observed for Koreans as compared with Caucasians. Nativity had no effect on birth outcome in this population. The results of this study suggest that prevention of preterm birth is an important focus for improving pregnancy outcomes in this growing ethnic group.*

SINCE the end of the Korean War, Koreans in increasing numbers have migrated to the United States and are now one of the more numerous Asian ethnic groups in this country (1). After the

United States Immigration and Nationality Act of 1965, the number of immigrants from Korea increased rapidly, from approximately 18,500 during 1965-69 to 163,000 during 1980-84 (1).

In 1990, 11.6 percent of all Asians in the United States were of Korean ethnicity, and the total United States Korean population more than doubled, from more than 357,000 in 1980 to almost 799,000 in 1990 (2). An estimated 90 percent or more of the adults are recent immigrants (1). It is projected that Koreans will outnumber all other Asian groups, except Filipinos, in the United States by the year 2030 (1). Almost half of the Koreans in the United States resided in the western part of the United States in 1980, and 88 percent resided in urban areas (1). Many are well educated and were established professionally in Korea before immigrating.

Despite the growing number of Koreans in the United States, very little is known about the perinatal health of this population; a large majority are immigrants. It is important to monitor new and growing populations to document and address any special health care problems that emerge. Previous studies of immigrant populations in Hawaii have shown no differences in birth outcomes between foreign-born and U.S.-born women (3,4). However, these findings were contradictory to the other investigations of pregnancy outcomes of immigrants in the United States (5-11).

This study was undertaken to investigate the relationship between maternal sociodemographic characteristics and use of prenatal care and pregnancy outcomes among Koreans as compared with Caucasians in Hawaii. Koreans constituted 2.2 percent of the 1990 population of Hawaii, up from 1.9 percent in 1980, and 2.2 percent of the births from 1988 to 1990. Hawaii is one of the few States that does not group Koreans into the category of "other Asian" on vital records (12). The term "Caucasian" is used in Hawaii's vital records; it is roughly synonymous with non-Hispanic whites. The State's vital records uses 19 ethnic or racial designations.

## Data and Methods

The source of data used in this study was Hawaii's 1979-89 linked live birth-infant death vital record file. After single live births to resident mothers were selected, 61,151 Caucasian births and 4,345 Korean births were used in the analysis. Vital record data from this period were used to minimize fluctuations associated with small numbers and the influence of unusual, short-term trends. There were no major trends observed in the data during this time. The information used in this study from the vital record file was found to be relatively com-

*'Korean mothers were also more likely to be older (35 years of age or older) and have a lower level of educational attainment than Caucasian mothers. They were less likely to be adolescent, to have received adequate prenatal care, and to have begun prenatal care in the first trimester.'*

plete, and no variable had more than 5 percent missing data.

Ethnicity was determined by the self-reported race of the mother and father on the birth certificate. Maternal and paternal ethnicity were determined to be the same if the reported races on the birth certificate agreed.

Chi-square and *t*-tests were used to test for significant ethnic differences in maternal sociodemographic characteristics and pregnancy outcomes. Logistic regression analysis was used to calculate odds ratios for the independent effects of maternal characteristics on pregnancy outcomes. Separate models were run for low birth weight (less than 2,500 grams [g]), very low birth weight (less than 1,500 g), preterm birth (less than 37 completed weeks), and very preterm birth (less than 33 completed weeks), using the same independent variables in each model.

Gestational age in completed weeks was calculated from the birth certificate as the interval between the date of last normal menses and the date of birth, using recommended procedures for imputing missing day of last normal menses values (13). Small-for-gestational age was determined using the birth weight for gestational age standards proposed by Brenner and coworkers (14). Adequacy of prenatal care utilization was defined as a modification of the index proposed by Kessner and coworkers and Alexander and Cornely (15,16). The trimester prenatal care began and the number of prenatal care visits given the gestational age of the infant at birth are indexed to assess adequacy of care.

High educational attainment was defined as more than 12 years of education for adults and 2 or more years above expected grade level for age for adolescents. Low educational attainment was defined as less than 12 years of education for adults and 2 or more years below expected grade level for age for adolescents younger than age 18. The

Table 1. Sociodemographic characteristics of Korean and Caucasian mothers of single live born infants of Hawaii residents, 1979–89

Maternal characteristic	Korean		Caucasian		Chi-square
	Number	Percent	Number	Percent	P-value
Single marital status . . . . .	365	8.40	8,058	13.18	<.01
Younger than 18 years . . . . .	37	0.85	840	1.38	<.01
35 years or older . . . . .	459	10.56	5,023	8.21	<.01
Low educational attainment . . . . .	493	11.43	4,710	7.72	<.01
High educational attainment . . . . .	1,626	37.68	28,552	46.79	<.01
Primipara . . . . .	2,127	48.98	28,524	46.66	<.01
First trimester prenatal care . . . . .	3,331	76.66	48,473	79.27	<.01
Adequate prenatal care . . . . .	2,841	65.39	42,521	69.53	<.01
Non-U.S.-born . . . . .	3,532	81.29	4,479	7.32	<.01
Military dependent . . . . .	867	19.95	25,324	41.41	<.01
Same maternal and paternal ethnicity . . . . .	1,565	36.02	40,600	66.39	<.01
Number of infants . . . . .	4,345	...	61,151	...	...

Table 2. Birth outcomes of Korean and Caucasian women of single live born infants, Hawaii residents, 1979–89

Birth outcome	Maternal ethnicity				P-value
	Korean		Caucasian		
	Number	Percent	Number	Percent	
Preterm (less than 37 completed weeks) . . . . .	311	7.42	3,897	6.54	.03
Very preterm (less than 33 completed weeks) . . . . .	80	1.91	725	1.22	<.01
Low birth weight (less than 2,500 grams) . . . . .	232	5.34	2,961	4.84	.14
Very low birth weight (less than 1,500 grams) . . . . .	55	1.27	439	0.72	<.01
Small-for-gestational age . . . . .	194	4.71	2,729	4.68	.93
Neonatal mortality . . . . .	30	16.9	274	14.5	.02
Postneonatal mortality . . . . .	7	11.6	128	12.1	.50
Infant mortality . . . . .	37	18.5	402	16.6	.13
Mean birth weight (grams) . . . . .	3,313 ± 553.33		3,407 ± 557.84		<.01
Mean gestation (weeks) . . . . .	39.48 ± 2.64		39.75 ± 2.46		<.01

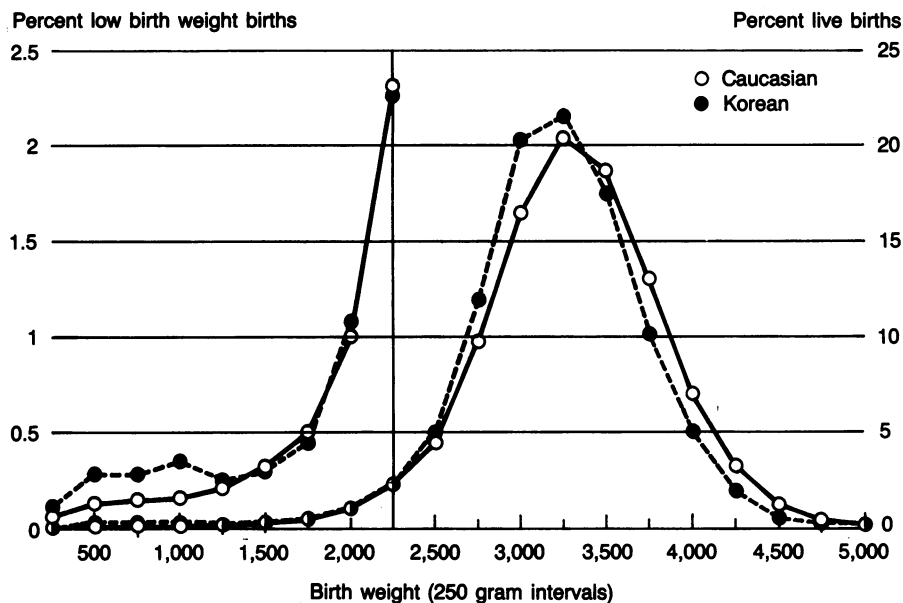
<sup>1</sup> Per 1,000 live births.

Table 3. Logistic regression models of factors associated with birth outcomes of 1979–89 Hawaii resident single live births

Maternal factor	Birth outcome											
	Low birth weight			Very low birth weight			Preterm			Very preterm		
	O.R.	95 per-cent C.I.	P-value	O.R.	95 per-cent C.I.	P-value	O.R.	95 per-cent C.I.	P-value	O.R.	95 per-cent C.I.	P-value
Single marital status . . . . .	1.45	1.30,1.62	<.01	1.47	1.12,1.95	<.01	1.40	1.27,1.54	<.01	1.78	1.46,2.18	<.01
Age younger than 18 years . . . . .	1.10	0.85,1.42	.45	1.07	0.55,2.07	.84	1.24	0.98,1.56	.08	1.25	0.79,1.98	.35
Age 35 or older . . . . .	1.40	1.22,1.60	<.01	1.54	1.09,2.16	.01	1.32	1.17,1.48	<.01	1.33	1.03,1.73	.03
Low educational attainment . . . . .	1.39	1.23,1.58	<.01	1.00	0.70,1.42	.99	1.20	1.07,1.35	<.01	1.06	0.82,1.37	.67
High educational attainment . . . . .	0.82	0.75,0.89	<.01	0.75	0.60,0.93	.01	0.92	0.86,0.99	.03	0.81	0.69,0.95	.01
Primipara . . . . .	1.43	1.32,1.55	<.01	1.56	1.26,1.91	<.01	1.13	1.06,1.21	<.01	1.30	1.12,1.52	<.01
High parity-for-age . . . . .	1.20	0.86,1.67	.28	1.41	0.61,3.25	.42	1.19	0.89,1.57	.24	1.49	0.82,2.70	.19
Adequate prenatal care . . . . .	0.68	0.62,0.73	<.01	0.66	0.54,0.82	<.01	0.73	0.68,0.78	<.01	0.74	0.64,0.87	<.01
Military dependent . . . . .	1.08	1.00,1.18	.06	1.04	0.83,1.31	.71	1.13	1.05,1.22	<.01	1.06	0.90,1.26	.48
Non-U.S.-born . . . . .	0.93	0.81,1.08	.35	0.82	0.57,1.20	.31	1.00	0.89,1.12	.97	0.85	0.64,1.13	.26
Korean ethnicity . . . . .	1.14	0.95,1.36	.16	2.10	1.39,3.19	<.01	1.16	0.99,1.35	.06	1.83	1.33,2.51	<.01

NOTE: O.R. = odds ratio; C.I. = confidence interval. Reference group: Caucasian, married, ages 18–34, average educational attainment, appropriate parity for age, received less than adequate prenatal care, nonmilitary dependent, U.S.-born.

Figure 1. Birth weight distribution of single live born infants of Hawaii residents, by maternal ethnicity, 1979-89



remaining females were categorized as having average educational attainment (17).

Parity was determined by the number of previous live births reported on the birth certificate. High parity-for-age was defined as 1 or more previous births for adolescents, 3 or more previous births for women ages 18-21 years, 4 or more previous births for women ages 22-24, and 5 or more for those 25 and older.

## Results

Maternal sociodemographic characteristics and prenatal care utilization characteristics are presented in table 1 by ethnic group. Significant differences between ethnic groups were found for every characteristic examined. Noteworthy for the Korean group are the very high percentage of Korean mothers who are non-U.S.-born, the relatively low proportion of same ethnicity fathers, and the relatively low proportions of mothers who are military dependents. Korean mothers were also more likely to be older (35 years or older) and have a lower level of educational attainment than Caucasian mothers. They were less likely to be adolescent, to have received adequate prenatal care, and to have begun prenatal care in the first trimester.

Table 2 presents birth outcome data by maternal ethnicity. The infants of Korean women had significantly higher percentages of births at less than 33 weeks and at less than 37 weeks, and births of less

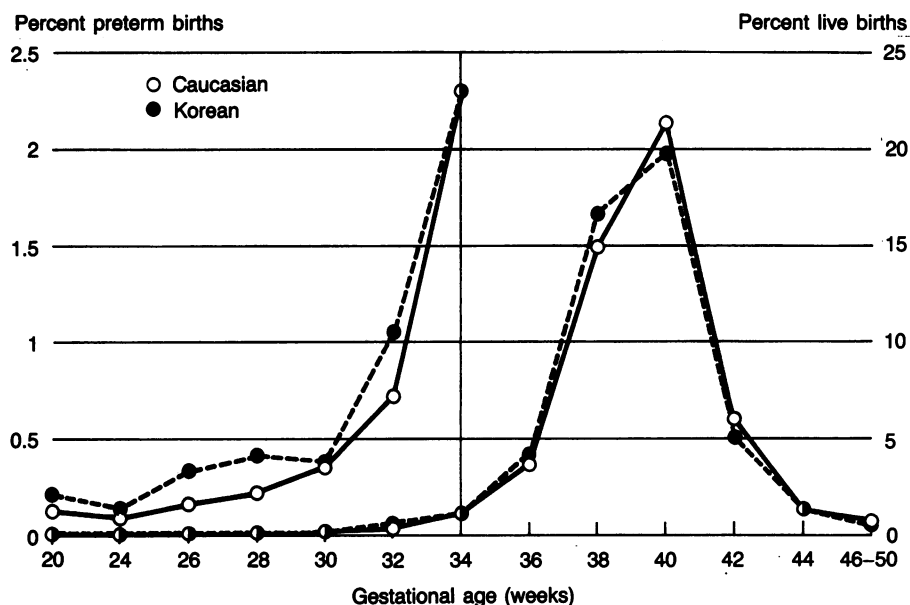
than 1,500 g. There were no significant differences in the proportion of infants who were less than 2,500 g and small-for-gestational age. The mean birth weight for infants of Korean women was almost 100 g lower than for Caucasians, and the mean gestation was approximately 2 days shorter. The neonatal mortality rate for Korean infants was significantly higher than for Caucasian infants. Postneonatal and infant mortality rates did not differ significantly between the two groups. The small number of deaths in the Korean group precluded further analysis of mortality.

A distribution of birth weight by maternal ethnicity is shown in figure 1. Compared with Caucasians, the birth weight distribution for Koreans is shifted towards the lower values and is more compact; that is, the range of birth weights is narrower. The difference between the groups is more pronounced in the very low birth weight range, while there is little discernable difference in the 1,500-2,500 g range.

Figure 2 presents the distribution of gestational age by maternal ethnicity. The distribution for the Korean births is shifted towards shorter gestational ages, as compared with Caucasians. The Korean distribution also exhibits a pronounced early gestational age tail with a notable excess in the less than 33 weeks' range.

The results of logistic regression analyses on low birth weight, very low birth weight, preterm birth, and very preterm birth are presented in table 3.

Figure 2. Gestational age distribution of single live born infants of Hawaii residents, by maternal ethnicity, 1979-89



The same independent maternal characteristics were considered in each analysis and included measures of marital status, age, educational attainment, parity, prenatal care utilization, maternal nativity, military dependency, and ethnicity.

Single marital status, older maternal age, and primiparity were significantly associated with higher risks of all outcomes. High educational attainment and adequate prenatal care were positively associated with all outcomes. Low educational attainment was significantly associated with increased risks for low birth weight and preterm birth only. Being a military dependent was associated with a higher risk of preterm birth only. Young maternal age, high parity-for-age, and non-U.S. nativity were not significantly associated with any of the outcomes. After taking into account these independent factors, Koreans had significantly higher risks of very low birth weight and very preterm birth (odds ratio = 2.10 and 1.83, respectively), but no significant differences were observed for low birth weight or preterm birth.

## Discussion

This study was undertaken to investigate the birth outcomes of an ethnic group whose importance in the United States is increasing but whose health status has been infrequently studied. More than 80 percent of the Korean mothers in this study are foreign-born. Previous investigations of the

relationship of maternal nativity status to pregnancy outcome in the United States have reported favorable outcomes among foreign-born women (5-11). However, in this study, as in a previous study of nativity status of Filipino mothers in Hawaii (3), maternal nativity was not found to be related to more favorable pregnancy outcomes.

Although the Korean infants in this study are close to achieving the year 2000 objectives of a 5 percent low birth weight rate and a 1 percent very low birth weight rate (18), there were still significant differences in some of their birth outcomes as compared with Caucasians. These differences could not be completely explained by the available socioeconomic and prenatal care risk factors examined in this study. However, the lack of a significant ethnic difference in the small-for-gestational age proportion suggests that very preterm delivery, rather than intrauterine growth retardation, is the primary factor in the increased very low birth weight rate.

Early initiation of adequate prenatal care and high educational attainment were both associated with positive birth outcomes. Koreans had a lower proportion of women receiving adequate prenatal care and demonstrated higher proportions of infants of very low birth weight and very preterm births than Caucasians. Prevention of preterm birth is an important focus if pregnancy outcomes in this ethnic group are to be improved. Further investigation into the cultural views of health, illness, and

pregnancy itself in the Korean population is warranted, so that prenatal care providers can develop culturally appropriate health education materials and care.

Births to older women (35 years or older) represent a significant risk factor for Koreans as compared with Caucasians, while unmarried mothers and adolescent pregnancy are less common. Data measuring other risk factors, such as maternal nutrition, stature, smoking, substance use, and weight gain during pregnancy were not available for study. Such factors remain an area for further investigation.

Ethnic variations in pregnancy outcome indicators have continued to draw both research interest and national policy concern. The multi-ethnic population of the United States encompasses considerable diversity in socioeconomic status, health care access and availability, and health status. As information about pregnancy outcome becomes available on an increasing number of U.S. ethnic groups, a more comprehensive and indepth understanding of the factors underlying ethnic disparities in pregnancy outcome can be formulated.

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