

Racial Differences between Linked Birth and Infant Death Records in Washington State

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Abstract: The race of infants who died in Washington State 1968–1977 was ascertained by two different methods: 1) race on the death record, and 2) race on the corresponding linked birth record. The second method resulted in substantial increases in the numbers of infant deaths for the nonwhite races:

Indian 39 per cent (n = 114/293), Filipino 56 per cent (n = 19/34), Japanese 121 per cent (n = 23/19), and Chinese 117 per cent (n = 14/12). For Indians, the discrepancy between birth and death records was greatest when the age at death was less than seven days (p < 0.01). (*Am J Public Health* 1980; 70:974–976.)

Between 1968 and 1977 in the United States, both the percentage and the absolute declines in infant mortality rate (IMR) were greater for American Indians, and for each of the Asian races, than for Whites.¹ For Blacks the percentage decline in IMR was approximately the same as for Whites; however, the absolute decline was much greater. Causes for these decreases are speculative, but a portion of the decline in nonwhite IMRs may have been related to better social conditions and improved health care.^{2,3} These improvements were mediated in part by large federal programs to improve pregnancy care for Indians (the Indian Health Improvement Act of 1976), and for Blacks and other inner city populations (the Maternal and Infant Care Project). Washington State participated in these federal programs, and reports indicate that Washington's nonwhite IMRs followed national trends.⁴

During the process of linking Washington State's birth certificate and death certificate files, we found systematic discrepancies for race between the linked birth and infant death certificates. These discrepancies could have a major effect on the interpretation of both the rapid decline in nonwhite IMRs and the magnitude of current differences between White and nonwhite IMRs. Thus, we analyzed race-specific infant mortality in Washington State according to the race determined at birth as well as the convention of race recorded at death.

Methods

Deaths of infants born between 1968 and 1977 to Wash-

ington State residents were ascertained from a linked file of birth and death records. Linkages were made for 8,390 infant deaths. Matching was accomplished manually according to these criteria: name, birth date, sex, and mother's and father's names. Linkages could not be made for 728 infant deaths. The most common reason for a non-match was the death of an infant who was born outside Washington state to a resident of another state. The number (and proportion) of non-linked infant deaths, according to race at death, was: White 656 (.08), Black 24 (.05), Indian 30 (.09), Chinese 2 (.14), Japanese 1 (.05), "other nonwhite" 15 (.17), and Filipino 0 (.00). Our analysis was restricted to the linked records.

Race was determined from the birth and death certificates according to standards developed by the National Center for Health Statistics (NCHS).^{5,6} Birth attendants (or hospital personnel) complete the birth certificate, and funeral directors generally complete the death certificate. For mixtures of White and nonwhite races, the nonwhite race is assigned. For mixtures of two nonwhite races, the race of the father is assigned, except for the Hawaiian race, which always takes precedence. The birth certificate has entries for both the maternal and paternal races; thus, the NCHS criteria for the race of the child at birth can be adhered to explicitly. On the other hand, the infant's race at death is assigned according to a single entry on the death certificate, and the races of the parents are not entered onto the death certificate. Before 1978, the racial codes for vital records in Washington State differed slightly from the racial codes of the NCHS.⁷ Consequently, birth and death certificates that had been coded "other nonwhite" were recoded to conform to NCHS standards.

Cross-tabulations of infant deaths were prepared for: 1) race at death by race at birth, and 2) race of mother by race of father. Racial discordance between the birth and death certificates was also examined according to the age of the infant at death (six days or less, seven to 28 days, and greater than 28 days), five year interval (1968–1972 and 1973–1977), and the stated cause of death. Additional cross-tabulations were prepared for those purposes. Trends in proportions were analyzed with the chi-square test for trend.

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Editor's Note: See also related editorial, p. 944, and articles, pp. 964 and 977, this issue.

Results

Of the 8,390 linked records, 355 infant death certificates (4.2 per cent) showed a different race from the race recorded for the infant at birth (Table 1). In each of the nonwhite racial categories that are described by the NCHS,⁷ the number of infant deaths increased when coded by race at birth, rather than race at death. The relative increases in infant deaths according to race were 3.5 per cent Black, 39 per cent Indian, 117 per cent Chinese, 121 per cent Japanese, 200 per cent Hawaiian, 15 per cent other nonwhite races, and 56 per cent Filipino. (The number of White infant deaths decreased by 2.9 per cent.) The largest number of discrepancies occurred for infants that were coded as Indian at birth, but White at death (126); second were infants coded Black at birth, but White at death (40). When discordant races appeared on an infant's birth and death certificates, the overwhelming tendency was toward the White race at death. Of 336 infants with a known race at birth and a different race at death, 246 were coded White at death.

Infant deaths that were associated with parents of different reported races had a significantly higher rate of discordance between birth and death certificates (204/346) than infant deaths that were associated with parents whose races were reported to be the same (72/7,057). Certain maternal-paternal racial pairings were associated with particularly high proportions of infant death and birth certificates that were discordant for race (Table 2). For example, 75 per cent of infants born to a White father and a Filipino mother were coded Filipino at birth and another race at death. Infants born to Indian fathers and White mothers (coded Indian at birth) were not coded Indian at death in 71 per cent of cases. However, even with two Indian parents, 10 per cent of infant deaths were coded to a different race at death.

Between the first five years (1968-1972) and the second five years (1973-1977) of the study, the per cent of infants coded Indian at birth and another race at death rose from 32 per cent to 34 per cent. For Blacks, the percentages increased from 7.7 per cent to 12.4 per cent. When all the remaining nonwhite races were taken as a group, these per-

centages increased from 48 per cent to 56 per cent. For non-white races, the increases in proportions were not statistically significant ($p > 0.1$).

We studied three ages at death (six days or less, seven to 28 days, and 29 to 365 days). With increased age at death, Indians had a significant trend ($\chi^2_{(1)} = 8.08$; $p < 0.01$) for a decreased proportion (77/191, 7/28, 50/188) of racial discrepancy between birth and death records. No significant trend occurred for Blacks (28/283, 8/41, 10/148; $\chi^2_{(1)} = 0.68$; $p > .25$), or for other nonwhite races as group (74/148, 8/17, 23/37; $\chi^2_{(1)} = 1.45$, $p > 0.1$).

The cause of death was not associated with differences in the proportions of linked birth and death records that were discordant for race.

Discussion

Our results demonstrate a major source of bias that acts to decrease IMRs for nonwhite races in Washington State. We suspect that this is not an isolated finding. In a California study of linked birth and death records between 1965 and 1967, 148 infants were coded Indian on the birth record, whereas only 61 were coded Indian on the death record. Discrepancies were also striking for the Asian races: 240 infants were coded Japanese at birth, but only 151 were coded Japanese at death.⁸ Similarly, in another study of linked records from New York State (exclusive of New York City) between 1973 and 1977, 39 infants were coded Indian at birth vs 25 infants coded Indian at death.* This highlights the need to recognize and quantitate this bias on a national level. To reduce the problem, increased emphasis should be placed on local vital records field programs that traditionally have had a low priority.

Interpretation of IMRs is particularly difficult for Indians, who comprise the third largest racial group in Washington State. Between 1968 and 1977, conventional calculations underestimated the number of infant deaths among Indians by 39 per cent. For the ten-year period of this study, the IMR for Indians was 24.2 per 1,000 live births as calculated with current NCHS standards.⁷ However, the IMR

TABLE 1—Race Coded at Death by Race Coded at Birth for Infants Born in Washington State between 1968 and 1977

Race at Birth	Race at Death									TOTALS	
	1	2	3	4	5	6	7	8	0		
White (1)	7239	24	16	1	0	0	1	1	2	6	7290
Black (2)	40	426	2	0	0	0	2	1	0	1	472
Indian (3)	126	4	273	0	0	0	2	2	0	0	407
Chinese (4)	7	0	0	11	0	0	6	2	0	0	26
Japanese (5)	19	1	0	0	17	1	4	0	0	0	42
Hawaiian (6)	8	1	0	0	0	3	0	0	0	0	12
Other Nonwhite (7)	27	0	0	0	2	0	39	0	0	0	68
Filipino (8)	19	0	2	0	0	0	5	27	0	0	53
Chamorrow	0	0	0	0	0	4	0	1	0	0	1
Guamian (0)											
Unknown (9)	19	0	0	0	0	0	0	0	0	0	19
TOTALS	7504	456	293	12	19	4	59	34	2	7	8390

TABLE 2—Cross-tabulation of Infant Deaths (Washington State 1968–1977) According to the Race of the Father and Mother*

Race of Father	Race of Mother									
	1	2	3	4	5	6	7	8	0	9
White (1)	0.0 (23)	.40 (4)	.71 (43)	.80 (4)	.89 (16)	1.0 (1)	.49 (19)	.75 (12)	+	+
Black (2)	.38 (17)	.06 (13)	.17 (1)	0.0 (0)	+	1.0 (1)	.18 (2)	.33 (1)	+	+
Indian (3)	.71 (53)	0.0 (0)	.10 (16)	1.0 (1)	+	+	.50 (1)	0.0 (0)	+	+
Chinese (4)	1.0 (3)	+	+	.33 (5)	+	+	+	1.0 (3)	+	+
Japanese (5)	.67 (6)	+	1.0 (1)	+	.08 (1)	1.0 (1)	+	+	+	+
Hawaiian (6)	1.0 (3)	1.0 (1)	+	+	.67 (2)	+	+	0.0 (0)	+	+
Other Nonwhite (7)	.71 (5)	+	+	+	+	+	.25 (5)	+	+	+
Filipino (8)	.50 (3)	+	0.0 (0)	0.0 (0)	+	+	0.0 (0)	.41 (9)	+	+
Chamorro Guamian (0)	+	+	+	+	+	+	+	1.0 (1)	+	+
Unknown (9)	.04 (28)	.05 (8)	.20 (20)	+	1.0 (1)	+	0.0 (0)	.40 (2)	+	1.0 (19)

*No infant deaths occurred in these cells.
 *In each cell is enumerated the respective proportion (number) of infant deaths with discordant races between the birth and death records.

was 33.6 when calculated with race as reported on linked birth certificates.

Since 1962, the early neonatal mortality rate (death within the first six days of life) for United States Indians has been reported as less than that in the general United States' population; whereas after 28 days of life, their postneonatal mortality rate has been reported as greater than in the general population.⁹ We were impressed that the greatest incidence of discordance between birth and death records occurred for infants who died in the first six days of life. Thus, the acknowledged increase in Indian infant mortality rates with age may be related, in part, to age-related rates of discordance between death and birth records.

TABLE 3—Proportion of Discordant Birth and Death Records in Washington State, According to Race at Birth and Five-year Interval

Race	1968–1972	1973–1977	$\chi^2_{(1)}(p)$
White	21/4287 (.005)	30/3003 (.01)	6.59 ($<.03$)
Black	21/271 (.077)	25/201 (.12)	2.88 ($<.1$)
Indian	73/226 (.32)	61/181 (.34)	0.09 ($>.75$)
All Other Nonwhite*	49/103 (.48)	56/99 (.57)	1.64 ($>.1$)

*Excludes 19 infants whose race at birth was unknown.

*Logrillo VM: Personal communication. November 20, 1979.

Certain national health care projects are directed specifically at high-risk racial groups. IMRs are one measure of the effectiveness of these projects. To provide the most reliable and accurate data possible, race-specific IMRs should be calculated with race as stated on the birth certificate from linked birth and death records.

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