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Racial Variation in Spontaneous Fetal Deaths at 20 Weeks or Older in Upstate New York, 1980–86

SYNOPSIS

THE DISTRIBUTION OF spontaneous fetal deaths (at age 20 weeks or more) by maternal race has received considerably less study than other adverse pregnancy outcomes. The purpose of this study was twofold—(a) to describe spontaneous fetal deaths among white, black, and American Indian women and (b) to determine if there was any variation by International Classification of Diseases, Ninth Revision (ICD-9) cause of death, gestational age at death, or maternal age at loss among these groups of mothers.

Using the fetal death certificate registry maintained by the New York State Department of Health, 8,592 spontaneous fetal deaths at age 20 weeks or more were identified among upstate (exclusive of New York City) mothers between 1980 and 1986. By race it was 7,300 for white women, 1,257 for black women, and 27 for American Indian women. Spontaneous fetal death rates varied by maternal race as listed on vital records—black, 13.5 per 1,000 total births, white, 8.3, and American Indian, 8.1. The three leading causes of death (ICD-9 779, 762, and 761) did not vary by maternal race.

Gestational age at death, imputed from last menstrual period, did vary by maternal race. Fetal deaths to white and black mothers were observed to occur most often between 24 weeks of pregnancy (39 percent) and 32 weeks (43 percent), while American Indian fetal deaths generally occurred later (more than 33 weeks) in pregnancy (41 percent). Most spontaneous fetal deaths occurred to mothers ages 20–29 regardless of race. Black teenage mothers, however, experienced the largest proportion of losses (23 percent) compared with white (10 percent) and American Indian (11 percent) teenage mothers.

There is limited study of fetal mortality in the United States despite a plethora of studies focusing on other adverse pregnancy outcomes, including infant mortality. Several authors have reported racial disparities in infant mortality rates for U.S. populations. In general, infant mortality rates for blacks are twice those reported for whites (1,2). This twofold difference has been attributed in part to higher rates of low birth weight (3) and gravid conditions precipitating delivery (4).

The two components of infant mortality—neonatal and postneonatal deaths—have been studied in relation to race as well. Postneonatal mortality rates and, to a lesser extent, neonatal mortality rates are often higher among

blacks than whites (5,6). The marked reduction in neonatal mortality rates during the past few decades has resulted in fetal deaths accounting for a greater proportion of overall perinatal mortality (7). Meaningful information on the health status of women during parturition can be derived from assessment of perinatal mortality.

There is less systematic study of fetal mortality rates in comparison with infant mortality rates. Race and ethnicity have not been studied extensively in relation to fetal death. The need for systematic study of spontaneous fetal mortality is evident for at least three reasons: (a) a relatively large proportion of gravid women experience fetal losses, (b) recognition that fetal mortality rates are often higher than neonatal or postneonatal mortality rates, and (c) the suggestion that population-based surveillance of fetal mortality may be a tool for monitoring threats to favorable pregnancy outcomes (8).

Population-based study of fetal mortality rates often requires analysis of fetal death registries. The methodologic limitations associated with the use of these registries are well recognized. Of key concern is the underregistration of fetal deaths, especially fetal deaths at less than 28 weeks gestation (9-12). Characteristics of fetuses associated with underreporting include young gestations, small sizes, anomalies, and maceration (11). Fetal deaths requiring overnight hospitalization of mothers were the only fetal deaths receiving vital registration in a cohort of 6,254 pregnancies at the Kaiser Permanente Medical Care Program (13).

Underreporting of fetal deaths is not random and, in part, stems from varying State requirements for reporting (14). Somewhat conflicting terminology is used in the International Classification of Disease (ICD) index for spontaneous abortion (634) and intrauterine deaths (656.4) that could affect underreporting if earlier gestations are excluded from definitions of fetal deaths (15). The code 656.4 refers to deaths after 22 weeks of completed gestation; spontaneous abortion presumably includes deaths occurring at or earlier than 22 weeks.

Despite these methodologic limitations, racial variations (white versus nonwhite) in fetal mortality rates have been examined but only for selected areas or communities. Higher rates have been reported for blacks (or nonwhites) than whites (16-19). The magnitude of the difference is approximately twofold, or comparable to that observed for infant mortality.

American Indians exhibit unique patterns for reproductive outcomes. American Indian women have higher fertility rates than other racial groups (20), especially at younger

ages (21). Neonatal mortality rates for American Indians and Alaskan Natives are lower than those for whites or all races in the United States. According to a recent publication of the Indian Health Service, the neonatal mortality rates for American Indians and Alaskan Natives was 0.8 times the all-races rate in the United States and 0.9 times the U.S. white rate (22).

Caution is needed in interpreting these findings, given the recognition that Indian race is underreported on infant death certificates and, thereby, results in conservative estimates of mortality rates. It is unclear how American Indian birth patterns may relate to patterns of fetal loss. We are unaware of published studies that have examined fetal mortality rates among American Indians.

The purpose of this study is to assess racial variations in fetal mortality rates for upstate New York (exclusive of New York City). We extended our analysis to that beyond a black-white comparison by including American Indian fetal deaths. For study purposes, we limited our analysis to fetal deaths at 20 weeks or longer gestation to reduce the likelihood of reporting differences by races.

Methods

The New York State fetal death registry was used to identify all spontaneous fetal deaths occurring to upstate (exclusive of New York City) resident women between 1980 and 1986. Only fetal deaths occurring after 20

weeks or more gestation and for whom maternal race was known were included in the analysis. Approximately 2 percent of fetal death certificates were excluded because of missing race data, and 4 percent of "other race" deaths were excluded because of the marked heterogeneity within this category. Thus, the study population comprised 8,592 fetal deaths during the specified time period.

New York State public health law has required reporting of all fetal deaths since 1967. Only fetal deaths of gestations 20 weeks or longer mandated reporting prior to 1967. In 1907, the first fetal deaths were reported for New York State (23). Induced abortions are reported separately in the State and are not included in the following analyses.

A fetal death was defined according to State law as "...the death prior to the complete expulsion or extraction from its mother of a product of conception; the death is indicated by the fact that after such separation, the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscle" (23). Maternal race and age, gestational age, and cause of death were abstracted from fetal death certificates. Gestational age was imputed from

The fetal death registry is valid to the extent that fetal deaths are reported and that the information on certificates is complete and accurate.

the last menstrual period, and cause of death entries were categorized into standard codes of the ICD-9 (15).

Descriptive analysis of maternal race by age, cause of death, and gestational age was conducted by the Bureau of Biometrics, New York State Department of Health, using the Statistical Analysis System (SAS) (24). Fetal mortality rates were calculated using the following formula:

$$\text{fetal mortality rate} = \frac{\text{number of fetal deaths at 20 weeks or longer gestation}}{\text{number of total births (live births + fetal deaths of 20 weeks or more)}} \times 1,000$$

Fetal mortality rates are presented with corresponding 95 percent confidence intervals (CIs), assuming that the number of deaths has a Poisson distribution (25). CIs are provided for rates to assess the precision of rates when the number of events is small. Given the population-based approach of the study, no tests of statistical significance were performed for the analyses.

Results

The total number of fetal deaths registered for upstate New York during the period 1980–86 was 7,308 for white women, 1,257 for black women, and 27 for American Indian women.

A description of fetal deaths at age 20 weeks or older and corresponding fetal mortality rates are reported in table 1. Variation in fetal mortality rates is observed by maternal race. Black mothers were observed to experience the highest rate (13.5 per 1,000 total births of 20 weeks or more gestation) while white mothers experienced 8.3 per 1,000 and American Indians 8.1 per 1,000. (Rates for American Indian mothers are based on a small number of observed events.)

Additional variations in fetal mortality rates are revealed when the analysis is further stratified by age (table 2). In general, black women demonstrated higher fetal mortality rates compared with white or American Indian women in nearly all age strata. One noted exception, however, was a higher rate (19.6) for American Indian women ages 30–44

years. Although American Indian women experienced higher fetal mortality rates with increasing age, no deaths were reported for Indian women at the extremes of age, that is, ages 10–14 or older than 45. Fetal mortality rates among black women were highest at the extremes of age, and were substantially higher than those for other women.

The distribution of fetal deaths by race and gestational age is presented in the figure. Fetal deaths among white and black mothers reflected a curvilinear relation with gestational age. The greatest percentage of fetal deaths had reported gestations between 24–32 weeks for white (39 percent) and black (43 percent) mothers. The lowest percentage of fetal losses for these two groups of mothers were for advanced gestations (more than 33 weeks), that is, 29 percent for whites and 23 percent for blacks. Conversely, the percentage of fetal deaths among American Indian mothers increased with gestation; 41 percent of fetal deaths among American Indian women were reported to have gestations of 33 weeks or more, compared with 26 percent for the youngest gestations (less than 24 weeks).

Cause of death as reported on fetal death certificates is summarized in table 3. Three leading causes of death (ICD-9) were consistently observed across racial groups. Other and ill-defined conditions originating in the perinatal period (ICD-9 779) accounted for the largest proportion of fetal deaths, in whites (37 percent), blacks (37 percent), and American Indian (30 percent). Complications of placenta, cord, and membranes (ICD-9 762) accounted for approximately one-quarter of the fetal deaths in all three racial groups. Maternal complications of pregnancy (ICD-9 761) was the third leading cause of death cited and accounted for 18 percent of white deaths, 22 percent of black deaths, and 15 percent of American Indian deaths. These three leading causes of death accounted for more than 80 percent of fetal deaths. The remaining fetal deaths were assigned to a variety of other causes.

Discussion

Our findings suggest that fetal mortality rates vary by maternal race. Black women were noted to experience higher rates than either white or American Indian women.

Table 1. Distribution of fetal deaths at ages 20 weeks and older and fetal mortality rates by maternal race, upstate New York¹ 1980–86

Outcomes	White		Black		American Indian		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Fetal deaths	7,308	85.1	1,257	14.6	27	0.3	8,592	100.0
Births.....	870,447	90.2	91,537	9.5	3,315	0.3	965,299	100.0
Births plus fetal deaths	877,755	90.1	92,794	9.5	3,342	0.3	973,891	100.0
Fetal mortality rate ²	8.3		13.5		8.1		8.8	
95 percent confidence interval.....	(8.3, 8.3)		(12.9, 14.1)		(5.1, 11.1)		(8.8, 8.8)	

¹Exclusive of New York City.

²Per 1,000 births (live births plus fetal deaths at 20 weeks or older).

Table 2. Distribution of fetal mortality rates at age 20 weeks or older¹ by maternal race and age, upstate New York,² 1980–86

Age of mother (years)	White		Black		American Indian	
	Number	Rate	Number	Rate	Number	Rate
10–14.....	7	11.5	12	15.6	-	0.0
15–19.....	713	10.2	281	13.3	3	4.3
20–29.....	4,133	7.5	671	12.7	13	6.3
30–44.....	2,431	9.4	285	15.8	11	19.6
45 and older.....	7	24.0	3	96.8	-	0.0
Totals.....	7,291	8.3	1,252	13.5	27	8.1

¹Rates per 1,000 total births (live births plus fetal deaths at 20 weeks or older).

²Exclusive of New York City.

NOTE: Analysis excludes 22 fetal deaths missing data on maternal age.

The magnitude of this difference was not quite twofold as reported by previous authors (18). Age-specific fetal mortality rates also appeared to vary by maternal race. Women ages 45 or older were reported to have the highest rates among whites and blacks, whereas women ages 30–44 years had the highest rates in American Indians. At the lower end of maternal age, black teenage mothers had a higher fetal mortality rate than white teenage mothers. It is not known whether this finding reflects etiology or some other sociodemographic aspect of fertility across racial groups. Added attention needs to be given to the grouping of fetal deaths over time that may mask changes in this event.

Gestational age, as reported on fetal death certificates, was observed to vary in relation to maternal race. Most fetal deaths to white or black women occurred mid gestation (24–32 completed weeks); a lower percentage of deaths occurred at advanced gestational ages (more than 33 weeks). Conversely, American Indian women were most likely to experience fetal deaths later in pregnancy (more than 33 weeks). For gestational age, a curvilinear pattern was observed for white and black mothers, while a positive relation was observed for American Indian mothers. Although

interesting, this finding should be cautiously interpreted given that it is based on 27 reported fetal deaths to American Indian mothers and should be viewed as preliminary, pending further investigation. Further research is certainly needed to determine if gravid conditions that disproportionately affect American Indian mothers may result in late fetal deaths. Alternatively, perinatal conditions that affect American Indian women may result in a greater percentage of untoward outcomes (for example, frequency of pregnancy complications but more severe sequelae).

No racial variation was observed with respect to (ICD-9) cause of death as reported on fetal death certificates. Three leading causes of death (in descending order) were observed for each of the three racial groups: other and ill-defined conditions originating in the perinatal period (779); complications of placenta, cord, and membranes (762); and maternal complications of pregnancy (761). It is interesting to note the absence of reporting differences with respect to cause of death across racial groups. This finding supports the absence of clinical differences in assigning cause of death based on mother's race.

The findings need to be cautiously interpreted because of the inherent methodologic limitations of this study. First, the purpose of this descriptive study was to describe variations in fetal mortality rates by race of mothers. As designed, the study was intended to explore whether racial differences in infant mortality are also evident in fetal mortality. We were interested in expanding race to include white, black, and Native American mothers who were residents of upstate New York.

Given that this study relied solely on the New York State fetal death registry for case ascertainment, underreporting of fetal deaths is of utmost concern. The fetal death registry is valid to the extent that fetal deaths are reported and that the information on certificates is complete and accurate. Our analysis of variations in gestational age by race may be limited by underreporting of fetal deaths at younger ages, that is, less than 20 weeks gestation. Unlike other State registries, all fetal deaths regardless of gestation or birth weight must be reported in New York. This should encourage reporting of all

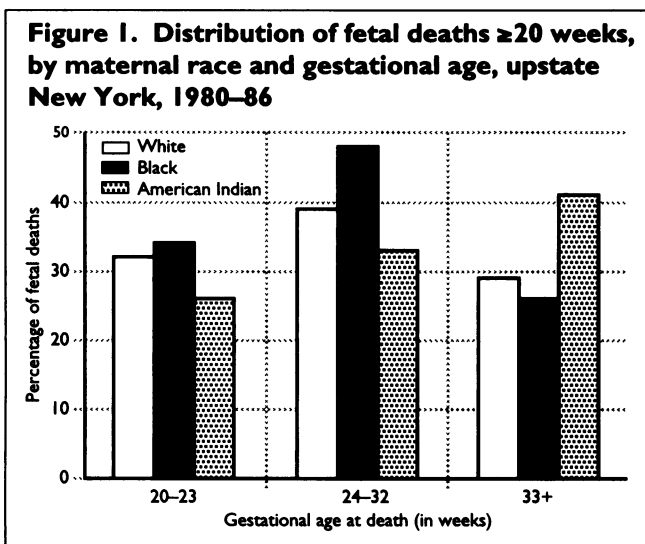


Table 3. Percentage distribution of fetal deaths at age 20 weeks or older by race and cause of death, upstate New York,¹ 1980–86

Cause of fetal death (ICD09 code)	White		Black		American Indian		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Maternal conditions (760).....	179	2.4	49	3.9	3	11.1	231	2.7
Maternal complications of pregnancy (761).....	1,344	18.4	272	21.6	4	14.8	1,620	19.0
Complications of placenta, cord, membranes (762).....	1,849	25.3	277	22.0	7	25.9	2,133	24.8
Slow fetal growth and fetal maturation (764).....	86	1.2	7	0.6	93	1.1
Disorders relating to short gestation and unspecified low birth weight (765).....	285	3.9	84	6.7	2	7.4	371	4.3
Intrauterine hypoxia and birth asphyxia (768).....	300	4.1	33	2.6	2	7.4	335	3.9
Other respiratory conditions of fetus (770).....	44	0.6	9	0.7	1	3.7	54	0.6
Other and ill-defined conditions originating in perinatal period (779).....	2,678	36.6	469	37.3	8	29.6	3,155	36.7
Other.....	543	7.4	57	4.5	600	7.0
Totals.....	7,308	100.0	1,257	100.0	27	100.0	8,592	100.0

¹Exclusive of New York City.

NOTE: ICD-9 = International Classification of Diseases, Ninth Revision.

fetal losses and, thereby, reduce the probability of underreporting for earlier losses. The absence of a cutoff criteria for mandated reporting of fetal deaths in New York State should reduce underreporting around the cutoff, especially since other studies observed underreporting in gestation age closest to the cutoff used for reporting deaths (11,26,27).

In previous research, spontaneous fetal loss in relation to a white-nonwhite comparison has been assessed; ours included a third racial group. Given that we restricted our analysis to fetal losses at 20 weeks or more gestation, a time when most women would have sought intrapartum care, there is no prior reason to assume that race-specific fetal mortality rates were systematically affected by reporting differences. If one group of women receives less medical care (less likely to be reported) than the remaining groups, the rates reported in this study would be conservatively underestimated. Thus, it remains that considerable underreporting of early spontaneous fetal deaths may be evident as suggested by previous authors (28,29). State efforts aimed at enhancing fetal death reporting, including specification of systematic reporting criteria, have been developed (30) and should continue to be encouraged. A recently published commentary highlighted the need to improve fetal death reporting in the United States (31).

A second possible explanation for the differences in rates by race may stem from differences in the completeness of vital registration of live births at the extremes of gestation and birth weight. Again, we are unaware of any studies that document racial differences in assigning deliveries as fetal losses versus live births.

Another limitation of the State fetal death registry is the lack of complete autopsy examination on all fetal deaths. Lammer and coworkers (16) studied 574 fetal deaths occur-

ring to residents of Massachusetts in 1982 to assess the concordancy between cause(s) of death as reported on fetal death certificates and autopsy reports (61 percent). Like death certificates in general (32–34), fetal death certificates tended to be unreliable for ascertaining cause of death, that is, 55 percent of fetal deaths were discordant for cause of death between data sources. We examined fetal mortality rates in relation to maternal race with less emphasis on cause of death. Eighty percent of deaths clustered about three causes and, therefore, the impact of low concordancy may be limited in our data set.

Lastly, other explanations for the variation in fetal mortality rates need to be considered. Misclassification of race is possible despite our systematic assignment of maternal race based on the criteria used by the National Center for Health Statistics (35). We are unaware of any published studies documenting racial misclassification of fetal deaths. Unfortunately, we had little information on other covariates that are likely to impact on fetal deaths (for example, smoking, reproductive history, caffeine).

We suggest that additional descriptive epidemiologic studies using fetal death registries are needed to determine better the validity and reliability of our findings. Such information would be useful to States, given that considerable effort and cost are required to maintain fetal death registries. Further research is needed if we are to achieve the Healthy People 2000 goal of reducing the fetal death rate to no more than 5 per 1,000 live births plus fetal deaths and to realize the potential for identifying factors associated with early infant demise (36).

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