Preterm Birth

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PUBLIC HEALTH IMPORTANCE

Preterm delivery, the termination of pregnancy before completion of 37 weeks of gestation, is one of the predominant proximate causes of low birth weight and, together with low birth weight, is the third leading cause of infant mortality in the United States (*1*). According to CDC's National Center for Health Statistics (NCHS), 440,082 preterm births (10.8% of all live births with a known period of gestation) occurred in the United States in 1991 (*1*).

In addition to its causal relationship to increased rates of neonatal mortality, preterm delivery also is associated with increased neonatal morbidity. Other neonatal consequences of preterm delivery include necrotizing enterocolitis, hyaline membrane disease, severe respiratory distress syndrome, and intraventricular hemorrhage (*2–4*). Perinatal sepsis risks are also significantly higher among preterm infants than among term infants (*5,6*). For additional information about related topics and surveillance activities, see the Behavioral Risk Factors Before and During Pregnancy, Prenatal Care, Pregnancy-Related Nutrition, Low Birth Weight and Intrauterine Growth Retardation, Infant Mortality, and Neonatal and Postneonatal Mortality chapters.

HISTORY OF DATA COLLECTION

Through the National Vital Statistics System, managed by NCHS, CDC collects and publishes data on births in the United States (*7*). Preterm delivery primarily is determined by assessing length-of-gestation data collected on birth certificates, which each state provides to NCHS. Since 1933, NCHS has obtained information on births from the registration offices of all states, New York City, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam (*7*). Additional national surveillance data on the estimated prevalence of preterm delivery in the United States have been provided by the National Natality Followback Surveys—conducted in 1963, 1964–1966, 1967–1969, 1972, and 1980—and the 1988 National Maternal and Infant Health Survey (NMIHS) (*8,9*). All of these surveys provide data for estimating the length of pregnancy, although the agreement between the birth certificate and the survey data on the prevalence of preterm vs. term delivery has been variable (*10,11*).

Over the past four decades, refinements in the birth certificate have helped to improve estimations of the length of pregnancy. In 1949, the Standard Certificate of Live Birth was revised to request the length of pregnancy in weeks, and in the 1956 revision, the certificate was refined to ask for "completed weeks of gestation" (*12*). In a 1972 publication (*12*), NCHS refined the World Health Organization's definition of prematurity by distinguishing a difference between preterm births and low-birth-weight births as follows: "Infants who are premature because of curtailed gestation (gestational age of <37 completed weeks) are designated 'preterm.'. . . Infants who are premature by virtue of birth weight (2,500 grams or less at birth) are designated 'low birth weight' infants."

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CDC SURVEILLANCE ACTIVITIES

The registration of births is a local and state function, but uniform registration practices and use of the records for national statistics have been established over the years through cooperative agreements between the states and NCHS (*13*). The civil laws of every state provide for a continuous and permanent birth registration system. In general, the local registrar of a town, city, county, or other geographic location collects the records of births occurring in the area; inspects, queries, and corrects these records, if necessary; maintains a local copy, register, or index; and transmits the records to the state health department. There the vital statistics office inspects the records for promptness of filing and for completeness and consistency of information; queries the data, if necessary; numbers, indexes, and processes the statistical information for state and local use; and binds the records for permanent reference and safekeeping. Microfilm copies of the individual records or machine-readable data are transmitted to NCHS for use in compiling the final annual national vital statistics volume (*13*).

The surveillance of preterm births depends on 100% registration of births from all states and the District of Columbia. The data are provided to NCHS through the Vital Statistics Cooperative Program. The length of gestation is measured from the first day of the mother's last normal menstrual period (LMP) to the date of birth. The LMP is used as the initial date because it can be more accurately determined than the date of conception, which usually occurs 2 weeks after the LMP. When the length of gestation as computed from the LMP is inconsistent with the reported birth weight or is incompletely reported, the **clinical estimate of gestation**—an item added to the 1989 revision of the birth certificate—is used (*1*).

The period of gestation is often reported in terms of weeks or months of pregnancy. When months are reported, they are converted to gestation intervals in weeks as follows (*14*):

- ≤3 months to "not stated."
- 4 months to 17 weeks.
- 5 months to 22 weeks.
- 6 months to 26 weeks.
- 7 months to 30 weeks.
- 8 months to 35 weeks.
- 9 months to 40 weeks.
- 10 months to 44 weeks.

Births occurring before 37 weeks of gestation are considered **preterm** for purposes of classification. At 37–41 weeks of gestation, births are considered **term**, and at ≥42 weeks, they are considered **postterm**. These distinctions are according to the *International Classification of Diseases, Ninth Revision* definitions (*15*).

Before 1981, NCHS only computed the period of gestation when a valid month, day, and year of LMP were reported on the birth certificate. However, length of gestation could not be determined from a substantial number of live birth certificates each year because the day of LMP was missing. From 1968–1978, 12.0%–16.4% of records reported to NCHS by states had day only missing from the LMP date (*16*). Therefore, in 1981, NCHS began imputing weeks of gestation for records missing the day of LMP when a valid month and year were provided. Each such record is assigned the gestational period in weeks of the preceding record that has a complete LMP date with the same computed months of gestation and the same 500 g birth-weight interval. The effect of the imputation procedure is to increase slightly the proportion of preterm births and to lower the proportion of births at 39, 40, 41, and 42 weeks of gestation (*15,16*).

Because of postconception bleeding or menstrual irregularities, the presumed date of LMP may be in error. In these instances, the computed gestational period may be longer or shorter than the true gestational period, but the extent of such errors is unknown (*15,16*).

GENERAL FINDINGS

The preterm delivery rate has been increasing gradually from 9.4% of live births in 1981 to

10.8% in 1991. Of the 438,905 preterm births with stated weights reported by NCHS in 1991, 180,218 (41.1%) of the infants were also classified as low birth weight because they weighed <2,500 g. Risk factors for preterm delivery include low socioeconomic status, low prepregnancy weight, inadequate weight gain during the pregnancy, previous preterm delivery, a history of infertility problems, vaginal spotting or light bleeding during pregnancy, antepartum hemorrhage and abnormal placental implantation, alcohol consumption before the third trimester of pregnancy, negative attitude about the pregnancy, smoking, multiple gestation, cervical factors, myometrial factors, problems with the fetal membranes, and decreased uteroplacental blood flow (*17–21*).

For more than a decade, black women have experienced twice the risk of preterm delivery as white women. In 1991, 18.9% of black infants compared with 9.1% of white infants were born before completing 37 weeks of gestation (*1*). The reasons for this disparity are largely unexplained (*22–25*). To further understand why black women are disproportionately represented among all women who experience a preterm birth, Lieberman and colleagues evaluated economic, demographic, and behavioral predictors of preterm delivery among a hospital-based cohort of black women in Massachusetts (*24*). The presence of any one of the following conditions significantly increased black women's risk of a preterm birth: being <20 years of age, being single, receiving welfare, and not having graduated from high school. These socioeconomic differences accounted for a major portion (77%) of the discrepancy in risks of preterm delivery between blacks and whites, but they did not explain the total gap or suggest proximate interventions to reduce this racial disparity (*24*).

INTERPRETATION ISSUES

Preterm delivery rates are somewhat imprecise because of the difficulty in ascertaining gestational age with certainty. Thus, the actual incidence of preterm delivery is difficult to estimate. In a recent review, Savitz et al. report the incidence of preterm births as varying from 4.4% to 21.5%, depending on the population studied and the criterion used to define prematurity (*26*). Whereas multiple gestation has been associated with preterm delivery, many studies focus on singleton preterm births, which results in a slight underestimation of the true number of preterm births. The wide range in risks is partially accounted for by a tendency to equate prematurity with low birth weight.

A few analyses have been conducted at the state level to assess the quality of birth certificate data specifically for the accuracy of reported gestational ages. In a 1980 study of North Carolina vital records, David found that targeting the 10 hospitals reporting the most inaccuracies and incomplete records might decrease the missing data by almost 50% (*27*). This intervention would improve the state's ability to accurately estimate rates of neonatal mortality, intrauterine growth retardation, and other adverse perinatal outcomes. More recently, several investigators compared data from Tennessee birth certificates with data from delivery hospital medical records as part of a case control study (*28*). They found that gestational age concordance ranged from 41.6% to 84.8% depending on whether exact agreement or agreement within 2 weeks was sought. Moreover, when the Kessner Index of prenatal care was applied to this population, the investigators found that birth certificate data overestimated the adequacy of prenatal care when compared with the medical records data. These findings could have implications during evaluations of the adequacy of health-care delivery systems for pregnant women in a state.

EXAMPLES OF USING DATA

Several investigators have observed a disproportionately increased risk of preterm delivery for black women at the shortest gestations (*25,29,30*). Others have noted that preterm delivery is associated with the highest mortality rates among infants weighing <1,500 g (*31*). Few states have conducted the surveillance of birth certificate data to address local issues relevant to preterm delivery. Most analyses have been at the national level. Nevertheless, monitoring these rates locally while implementing

intervention strategies could allow for the early recognition of improvements in the health status of women and their infants.

FUTURE ISSUES

Several of the year 2000 objectives for improving maternal and infant health will depend on decreasing the rate of preterm births. Thus, using vital records data to examine preterm delivery rates is an important approach to developing appropriate prevention strategies. Reducing the infant mortality rate to no more than 7 per 1,000 live births, the incidence of low birth weight to no more than 5% of live births, and the incidence of very low birth weight to no more than 1% of live births will require a marked reduction in the prevalence of preterm delivery (*32*). Moreover, separating the prevalence of preterm delivery from the prevalence of intrauterine growth retardation is an important distinction to make when planning effective interventions.

To further understand what risk factors may predispose women to experience preterm births, we must investigate the heterogeneity of preterm delivery. Preterm delivery is an adverse reproductive outcome initiated primarily by one of three situations: idiopathic preterm labor, preterm premature rupture of membranes, or intentional medical/surgical intervention. Hence, treating three different processes as if they were a single entity may not be appropriate.

Despite the diversity in the initial circumstances that can lead to preterm birth, epidemiologic studies of preterm delivery rarely differentiate among the etiologic pathways. When studies that do examine the etiology of preterm delivery are examined, marked differences are found from study to study in the frequency of each etiologic pathway. However, geographic locations of the studies, periods of data collection, and racial and socioeconomic distributions of the populations also differ from study to study (*26*).

To begin understanding which risk factors are most amenable for intervention, basic information is needed on the descriptive epidemiology of preterm delivery. With minimal data quantifying the frequency of either idiopathic preterm labor or preterm premature rupture of membranes, it is difficult to estimate the effectiveness of strategies aimed at either condition. If a particular exposure is a risk factor for only one etiologic pathway for preterm delivery, it may not be identified in studies that aggregate preterm birth as a single, homogenous, adverse reproductive outcome (*27*). Given the differences in the risks of preterm birth between black and white women, examining preterm delivery by its heterogeneous components may shed light on the reasons for this racial disparity.

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