

# Fetal and Infant Mortality

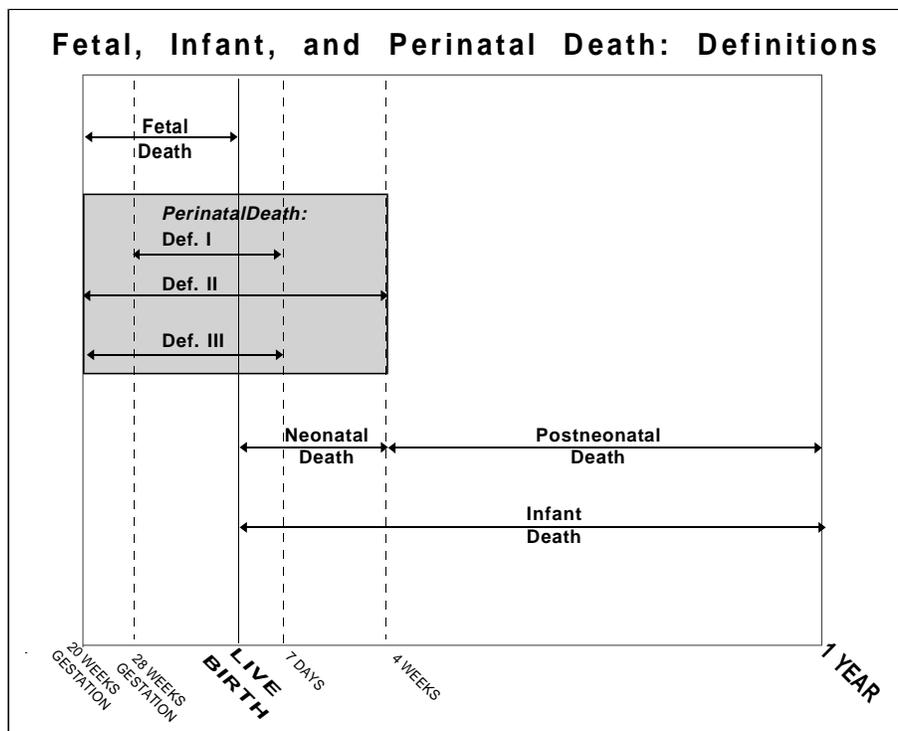
## INTRODUCTION

This report presents fetal and infant mortality data spanning the period of 20 weeks gestation through one year after birth. Although fetal and infant mortality data are useful in statistically describing deaths within a given time frame, their fundamental purpose is to assist in discovering and evaluating preventive strategies to improve infant health. As an aid to understanding and monitoring health trends, this report divides fetal and infant deaths into five categories, which overlap and are not necessarily mutually exclusive: (1) fetal deaths, (2) perinatal deaths, (3) infant deaths, (4) neonatal deaths, and (5) postneonatal deaths, as defined by the National Center for Health Statistics (see diagram and definitions below).

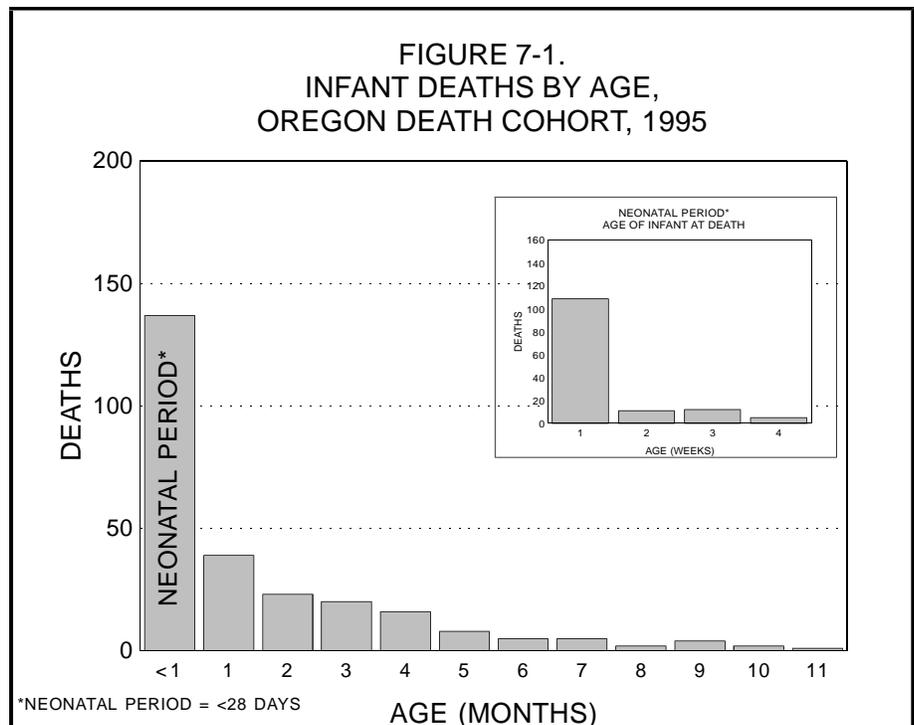
This report analyzes the above categories using these three databases: (1) fetal death cohort (2) death cohort and (3) birth cohort (see definitions below). National publications covering the subject may use one or any combination of these databases. As a result, death rates often vary slightly depending on which cohort was used as the source of the statistical data. Throughout this report, some tables display rates and ratios based on small numbers of events; therefore, use great caution in inferring causal relationships based solely on the data contained in these tables.

## DEFINITIONS AND METHODOLOGY

Before analyzing fetal and infant death data, it is necessary to define their different components.



- **Fetal deaths** are those that occur after 20 weeks gestation in which the developing fetus dies either *in utero* or upon delivery. They are classified as “early” (20-27 weeks gestation) or “late” (28 weeks gestation or more), and Oregon Public Health and Safety Laws require that they be reported.
- **Infant deaths** are those that occur before a child's first birthday (i.e., measured from birth up through 364 days). Infant deaths include both neonatal and postneonatal deaths.
- **Neonatal deaths** occur during the first month of life, specifically from birth through the first 27 days. Neonatal deaths may be “early” (under 7 days) or “late” (7-27 days).
- **Postneonatal deaths** occur from day 28 through day 364 after an infant's birth. Even though the first calendar month may include 28, 29, 30, or 31 days, infant deaths after day 28 are counted as occurring in the second month of life.
- **Perinatal deaths-definition I** includes fetal deaths at 28 weeks gestation or more, and infant deaths of less than 7 days.
- **Perinatal deaths-definition II** includes fetal deaths at 20 weeks gestation or more and infant deaths of less than 28 days.
- A **fetal death cohort** includes all fetal deaths of at least 20 weeks gestation that occurred in any given calendar year.
- A **death cohort** includes all infant deaths that occurred in any given calendar year, regardless of birth year.
- A **birth cohort** includes all infants who die within one year of their birth.



### USE OF THE 1995 DEATH COHORT

This report uses data from the death cohort for 1995 as the basis for analyzing infant deaths without maternal or birth characteristics, a standard demographic and health-status monitoring technique that yields the most timely and current information. Consistent longitudinal or historical data can be obtained more easily at national and local levels with a death cohort than a birth cohort because its use does not involve matching corresponding birth records.

Infant characteristics at the time of death are derived from death certificates. The characteristics of interest are: age at death, county of residence at death, and underlying cause of death. Total age-specific and cause-specific mortality rates are computed by dividing the number of infant deaths in a calendar year by the number of births in the same calendar year.

### INFANT DEATH: BASIC FACTS

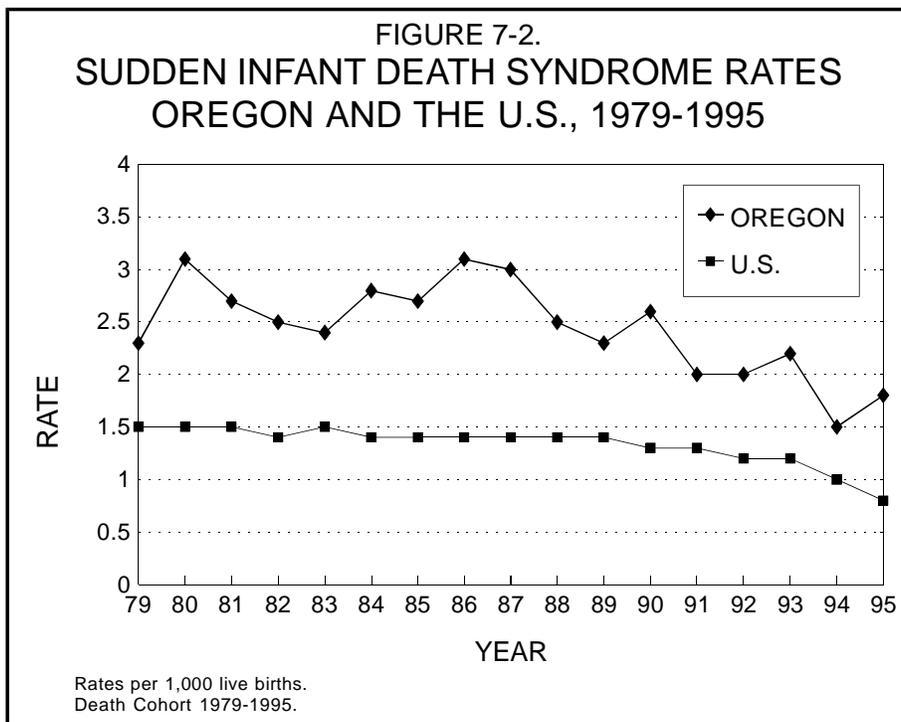
Here are the basic statistics on infant deaths in Oregon during 1995:

- 262 infants under age one died.
- The infant death rate (6.1 per 1,000 births) decreased 14 percent from the previous year.
- Oregon's infant death rate is 20 percent lower than the U.S. 1995 rate (7.6). [Table 5-1].
- Most infants who died during 1995 were neonates (infants under 28 days old). [Figure 7-1]. Four out of five of those neonatal deaths occurred within the first week of life. Polk county's neonatal death rate was statistically significantly lower than the state rate (1.5 vs. 6.1). [Table 7-1].

---

***During 1995;  
262 infants under  
age one died.***

---



### Sudden Infant Death Syndrome

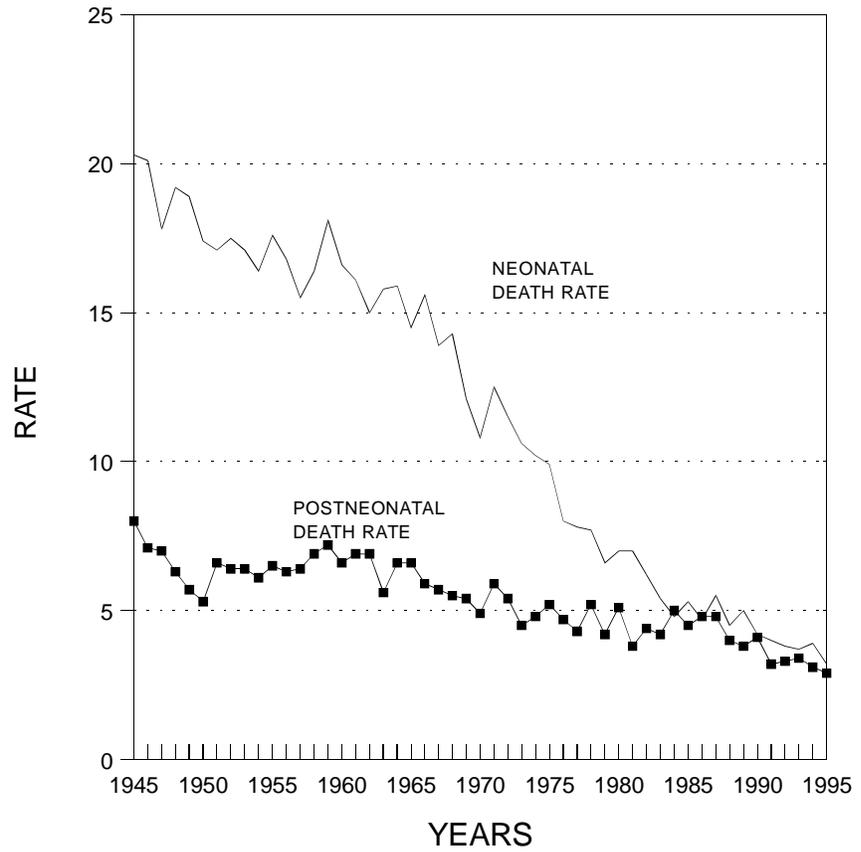
Sudden Infant Death Syndrome (SIDS) is the sudden and unexpected death of an apparently healthy infant. Historically it has been the leading cause of death for Oregon infants, most of which occur during the postneonatal period. [Table 7-2].

The number of SIDS deaths rose to 76 in 1995 from 63 deaths in 1994. In 1995, SIDS accounted for 29 percent of the state's total infant deaths and 55 percent of all postneonatal deaths. The 1995 Oregon SIDS death rate was 1.8 deaths per 1,000 live births, an increase from the 1994 rate of 1.5. [Figure 7-2]. However, the SIDS rate for 1994 was the lowest Oregon has recorded since the Health Division began tracking SIDS deaths in 1979.

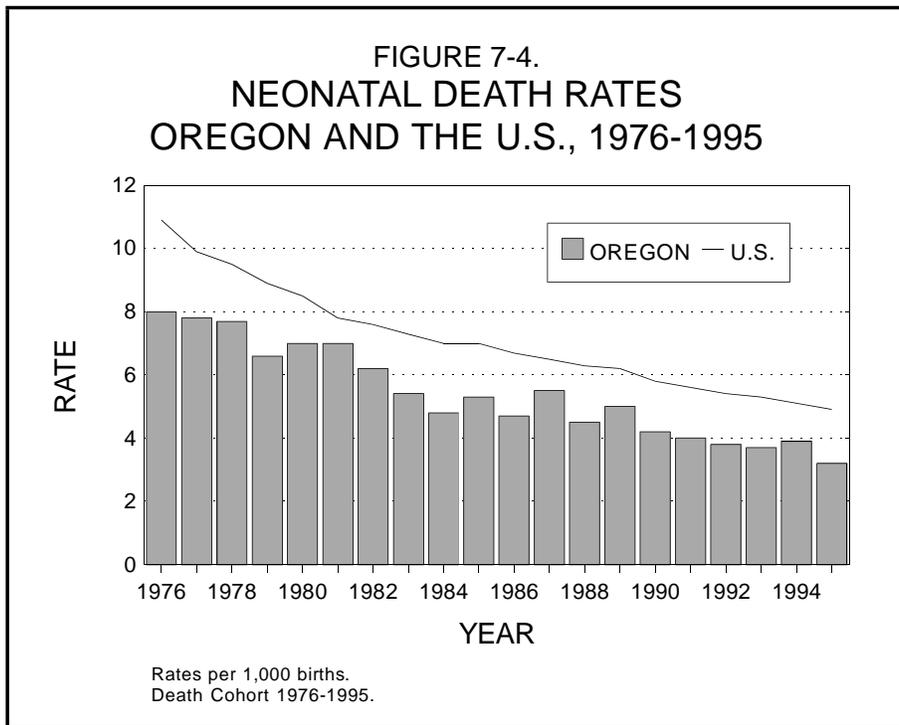
Nonetheless, the 1995 rate of SIDS deaths in Oregon is double the U.S. rate (1.8 versus 0.9) per 1,000 live births. Nationally, SIDS was responsible for 3,397 deaths in 1995 making it the third leading cause of infant mortality in the U.S. <sup>2</sup> [Figure 7-2].

**SIDS deaths rose to 76 in 1995 from 63 in 1994.**

FIGURE 7-3.  
NEONATAL AND POSTNEONATAL DEATH RATES,  
OREGON RESIDENTS, 1945-1995



Rates per 1,000 births.  
Death Cohort 1945-1995.



Several theories have been put forward based on SIDS research conducted in the late 1980s and early 1990s to explain SIDS, but as yet none have been universally accepted. Many risk factors for SIDS have been identified—e.g., low birthweight, teenage motherhood, maternal smoking, and infant sleeping position. In 1994, the American Academy of Pediatrics sponsored the national “Back to Sleep” campaign which promoted a non-prone sleeping position for infants, encouraged breast-feeding and discouraged infant exposure to tobacco smoke and overheating.<sup>2</sup>

### NEONATAL DEATH

Neonatal and postneonatal death rates have been declining since 1945, but the neonatal death rate has declined more dramatically. In 1995, the neonatal death rate was only slightly higher than the postneonatal death rate (3.2 versus 2.9). [Figure 7-3].

In 1995, 137 infants died during the neonatal period, a decrease from the 164 deaths that occurred in 1994. Oregon's neonatal death rate has consistently been below that of the U.S. [Figure 7-4]. In 1995, the state's rate was 3.2 per 1,000 live births, lower than the 1993 record low of 3.7 and nearly 35 percent lower than the national rate of 4.9. [Tables 5-2 and 5-4]. As in previous years congenital anomalies were responsible for more neonatal deaths (31%) than any other cause. [Table 7-2]. During the period 1989-1995 the neonatal death rate for Respiratory Distress Syndrome (RDS) decreased from 77.6 to 9.4 per 100,000 live births. (See sidebar). The number of neonatal deaths due to RDS decreased during the same period from 32 to 4. [Table 7-2].

NEONATAL DEATHS DUE TO RESPIRATORY DISTRESS SYNDROME			
YEAR	NUMBER	PERCENT	RATE *
1989	32	15.6	77.6
1990	12	6.7	28.0
1991	9	5.2	21.2
1992	7	4.1	16.7
1993	7	4.5	16.8
1994	10	6.1	23.9
1995	4	4.6	9.4

\* Per 100,000 live births.

### POSTNEONATAL DEATH

In 1995, 125 infants died during the postneonatal period, representing 48 percent of all infant deaths. The postneonatal death rate (2.9 per 1,000 live births) was lower than the previous record low of 3.2 recorded in 1991. [Table 5-4].

Oregon's postneonatal death rate has typically been higher than the U.S. rate; in 1995, the state rate was 7.4 percent higher than that of the U.S. (2.7 per 1,000 live births).<sup>1</sup> In Oregon none of the counties had rates statistically significantly different from the state rate. [Table 7-1].

### FETAL DEATH

In 1995, there were 237 Oregon resident fetal deaths, representing little change from the preceding year (5.5 vs. 5.4 per 1,000 live births). (See sidebar). Fetal deaths were first reported to the Health Division in 1928, when the ratio was 29.0 for every 1,000 live births. Since then the ratio has declined, and remained near 6.0 for over a decade. [Figure 7-5].

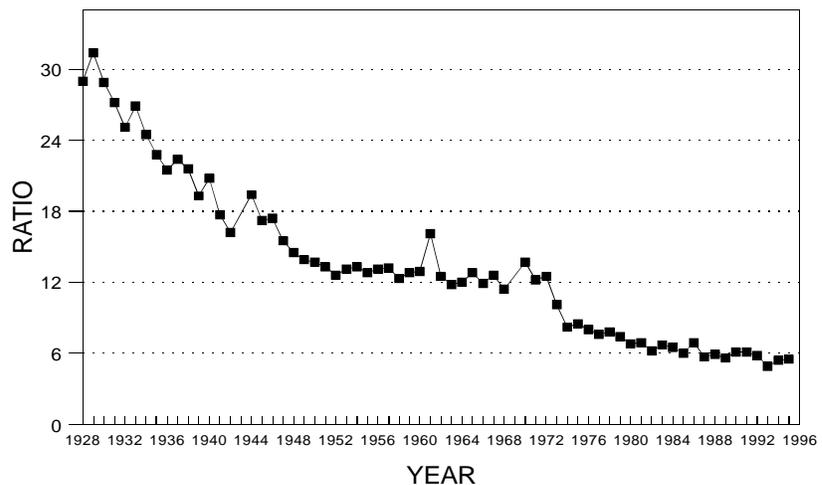
Oregon's fetal death ratio has been typically lower than the U.S. ratio. In fact, in 1991, the most recent comparison available, Oregon's ratio was 16 percent lower than that of the U.S. (6.1 vs 7.3). [Table 5-1].

### Cause of Death

Causes of fetal death are shown in Table 7-4. The most frequently reported cause of fetal death in 1995 (n=90) was the residual category "other and ill defined." The second leading cause, "complications of the placenta, cord and membranes," totaled 83 deaths. Congenital anomalies (25 deaths) and maternal complications of pregnancy (13 deaths) were third and fourth. There was little change in the distribution of deaths by cause compared to 1994.

FETAL DEATH RATIOS PER 1,000 LIVE BIRTHS BY MOTHER'S AGE					
AGE	YEAR				
	1995	1994	1993	1992	1991
TOTAL	5.5	5.4	4.9	5.8	6.1
15-44	5.5	5.3	4.9	5.8	6.1
15-19	6.4	6.7	4.1	5.1	3.9
20-24	5.4	4.5	4.0	6.4	5.8
25-29	4.8	4.4	5.0	4.7	5.5
30-34	4.8	4.5	4.1	5.6	7
35-39	7.1	9.2	8.1	7.7	7.3
40-44	13.0	11.6	15.0	40.0	22.9

FIGURE 7-5.  
FETAL DEATH RATIO,  
OREGON RESIDENTS, 1928-1995



## USE OF THE 1995 BIRTH COHORT

### Methodology

Infant and perinatal death statistics can also be determined by use of a birth cohort, with all rates and ratios based on the number of births and/or fetal deaths that occurred in 1994. Because birth cohorts contain infants who die within their first year of life, some may die during the following calendar year. For example, of the 277 deaths of infants born in 1994, 239 died in calendar year 1994 and 38 died in calendar year 1995; only the 38 infants who died during 1995 are represented in the 1995 death cohort.

The Center for Health Statistics has produced tables containing infant and perinatal death data from the birth, fetal death and matched infant death files. These birth cohort tables display data for infant and perinatal deaths according to several maternal risk factors and low birthweight. Additionally, this report presents neonatal and postneonatal deaths that were matched to their corresponding birth. Thus, a birth occurring at the end of December 1994 may have a matched postneonatal death that occurred up to one year later, near the end of December 1995.

Use of a birth cohort from a matched birth and death file allows analysis of characteristics of an infant's mother during pregnancy and delivery. These are the characteristics of interest: mother's marital status, age, ethnicity, race, education, start of prenatal care, tobacco use and alcohol use. The characteristics of the infant that are derived from the birth certificate and fetal death certificate include birthweight, gestational age, and county of residence at time of birth.

### Small Numbers

Because of the small numbers of events in some of the risk-factor categories, this report uses three-year groupings of the risk characteristics to improve statistical reliability. Single-year tables displaying risk factors are also included for comparison with statistics of prior years, but the analysis of risk factors and maternal characteristics are done using only the three-year tables.

### Perinatal Deaths

Beginning with data for 1979 the National Center for Health Statistics (NCHS) started publishing statistics for three perinatal measures: Perinatal definition I, Perinatal definition II, and Perinatal definition III.<sup>3</sup> Beginning with the birth cohort data for 1991, the Oregon Center for Health Statistics added statistics to the annual report to include the NCHS perinatal definitions. Based on feedback from Oregon physicians, Perinatal definition III was found not to be useful and was consequently dropped from these tables. The majority of this report's written analysis focuses on neonatal deaths because the relationships among the independent variables are similar to those of Perinatal definition I and postneonatal deaths. (Please refer to pages 7-1 and 7-2 for definitions.) Perinatal death statistics are included within tables 7-13 through 7-16 to assist in international comparisons of data.

## NEONATAL DEATHS 1992-1994

The mothers of infants who died during the neonatal period may have had various risk factors that affected the outcome of their pregnancies. These include marital status, age of mother, maternal ethnicity and race, education of mother, start of prenatal care, tobacco use and alcohol use. [Table 7-16].

### Birthweight

The birthweight of an infant has long been a predictor of subsequent survival. An increase in birthweight is correlated with a decrease in the risk of neonatal death. [Table 7-12]. Nearly all the infants weighing less than 500 grams died. The death rate for infants weighing less than 500 grams was 955.8 per 1,000 live births, decreasing to 1.2 per 1,000 live births for infants weighing more than 2,500 grams. [Figure 7-6].

Many of the same behavioral, social and medical conditions associated with higher rates of infant deaths are also associated with lower birthweights, and some are highly associated with one another. This report does not try to account for or hold all these variables constant in relation to each other. Instead, it presents a simple descriptive analysis. Most variables have confounding or mitigating effects on each other.

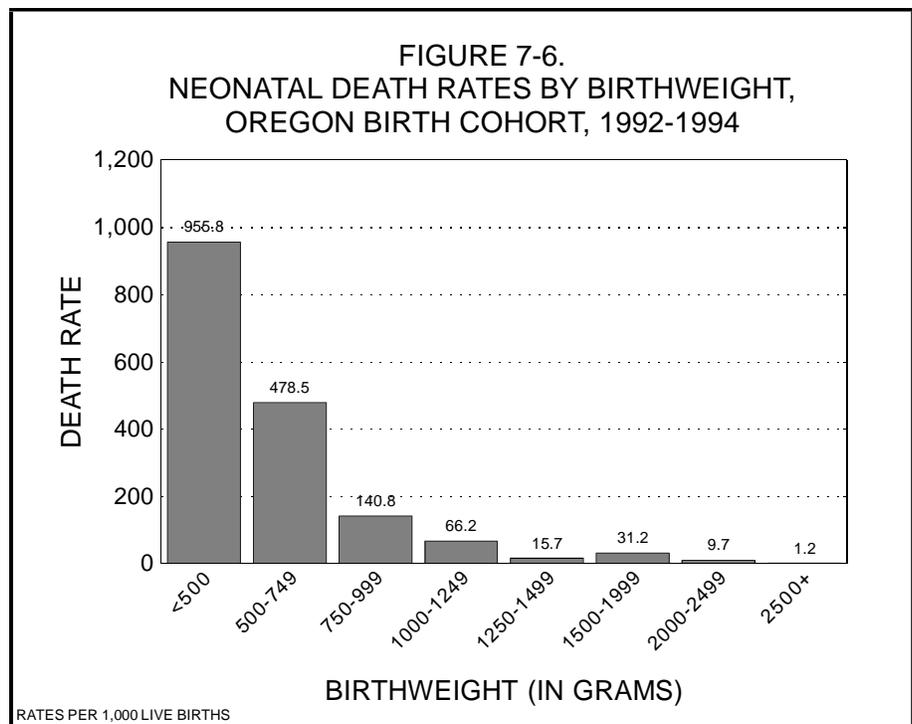
### Maternal Characteristics

Even though most women reported being married at the time of birth, the neonatal death rate was higher for the children of unmarried women (5.1 versus 3.3) and the difference was statistically significant. [Table 7-18]. There were no statistically significant differences noted among the neonatal death rates by mother's age or educational attainment, though the infants of women who

---

***Birthweight  
has long been a  
predictor of  
survival.***

---



completed only grade school had a higher neonatal death rate than the infants of women who completed high school (5.3 versus 3.5). [Table 7-18]. The neonatal death rate for infants of African American mothers was statistically significantly higher than the combined rate for all other infants. (8.7 vs. 3.7). [Table 7-18].

### **Prenatal Care**

The infants of women who received no prenatal care had a higher neonatal death rate than the infants of women who received any prenatal care and the difference was statistically significant. (29.6 versus 3.6). Among women who received prenatal care, those infants whose mothers began care in the first or second trimester displayed higher rates (3.6) than those whose mothers had care beginning in the third trimester (2.0), but the difference was not statistically significant. [Table 7-18].

### **Tobacco/Alcohol Use**

Among women who had an infant die during the neonatal period, 25.2 percent reported using tobacco during their pregnancy. The infants of women who smoked during pregnancy had a higher neonatal death rate than the infants of women who did not use tobacco (4.8 versus 3.4), a statistically significant difference. Approximately three percent (2.7%) of the mothers whose infants died during the neonatal period reported using alcohol during their pregnancy. The infants of women who reported using alcohol during pregnancy had a higher neonatal death rate than the infants of women who reported no alcohol use during pregnancy (3.7 versus 3.0), but the difference was not statistically significant. [Table 7-18].

There may be under-reporting of alcohol use and tobacco use, thereby lowering the neonatal death rates for this category by eliminating high-risk mothers from the analysis.

## **POSTNEONATAL DEATHS 1992-1994**

The demographic characteristics of mothers whose infants died in the postneonatal period are similar to those of mothers whose infants died in the neonatal period. Higher postneonatal death rates were found among the children of mothers who were unwed, under age 20, received no prenatal care, or used tobacco or alcohol during pregnancy. The children of African Americans also had higher rates of postneonatal mortality. These higher rates were all statistically significant. The mother's level of education did not make a statistically significant difference in postneonatal mortality rates. [Table 7-18].

### **REFERENCES**

- 1 Anderson RN, Kochanek KD, Murphy SL. Report of final Mortality Statistics, 1995. Monthly Vital Statistics Report; vol 45 no 11, supp. 2. Hyattsville, Maryland: National Center for Health Statistics. 1997.
- 2 Centers For Disease Control and Prevention. CDC Surveillance Summaries, Oct. 11, 1996. MMWR; 45 (no 40).
- 3 Hoyert, D.L. "Perinatal Mortality in the United States:1985-91." U.S. Department of Health and Human Services, Public Health Services, Centers for Disease Control and Prevention, National Center for Health Statistics. Vital Health Stat 20 (26) August 1995.