Chapter 4 - Pregnancy Outcomes

The focus of chapter 4 is adverse outcomes of pregnancy. Although most pregnancies have healthy outcomes, some pregnancies do not. Adverse pregnancy outcomes can be devastating. An experience that is normally associated with wonder and fulfillment becomes a source of grief and difficulty. Poor outcomes that may result from a pregnancy include miscarriage, fetal death, obstetric complications, maternal mortality, preterm (under 38 weeks' gestation) and low birth weight newborns, and infant mortality. Analysis of data and risk factors contributing to these various adverse pregnancy outcomes is the first step in the development of strategies to reduce these events. Chapter 4 discusses risks for some unfortunate pregnancy outcomes.

Miscarriages

Approximately 15% of *recognized* pregnancies end in first-trimester spontaneous abortion (miscarriage). However, data from several published studies indicate that 30-40% of *all* pregnancies end in miscarriage.[1,2,3] Abnormalities in embryonic growth and development cause most recognized pregnancy losses. Overall, 30-50% of spontaneous abortions are the result of sporadic chromosomal anomalies.[4]

Although infections appear to be associated with some first trimester and early second trimester pregnancy losses, a causal relationship has not been established.[5] Certain drugs and chemical agents, such as anesthetic gases, chloroquine, oral hypoglycemic agents, arsenic, heavy metals, ethanol, caffeine, and cigarette smoking, have been associated with miscarriage. A causal relationship between exposure and spontaneous abortion has not been established for many of these agents.[5]

Early pregnancy loss is usually a sporadic event, with the subsequent pregnancy usually resulting in a live birth. However, research estimates that 0.4% of women have recurrent spontaneous abortions (three consecutive miscarriages). Causes of recurrent miscarriages include the following:[6,7,8,9,10,11]

- Genetic factors, chromosome abnormalities, and maternal age;
- Malformations of the maternal reproductive tract (bicornate uterus, a septate uterus, or a single uterine horn);
- Luteal phase (of the menstrual cycle) insufficiency caused by insufficient progesterone (pregnancy hormone) levels;
- Immunologic factors;
- Certain maternal autoimmune disorders (lupus anticoagulant, antiphospholipid antibody syndromes);
- Psychological factors; or
- Smoking and alcohol use.

Prevention of recurrent spontaneous abortion is aimed at diagnosis and treatment of one or more of the above causes. Women who have a single miscarriage should be reassured regarding the randomness of the event.

Fetal Deaths

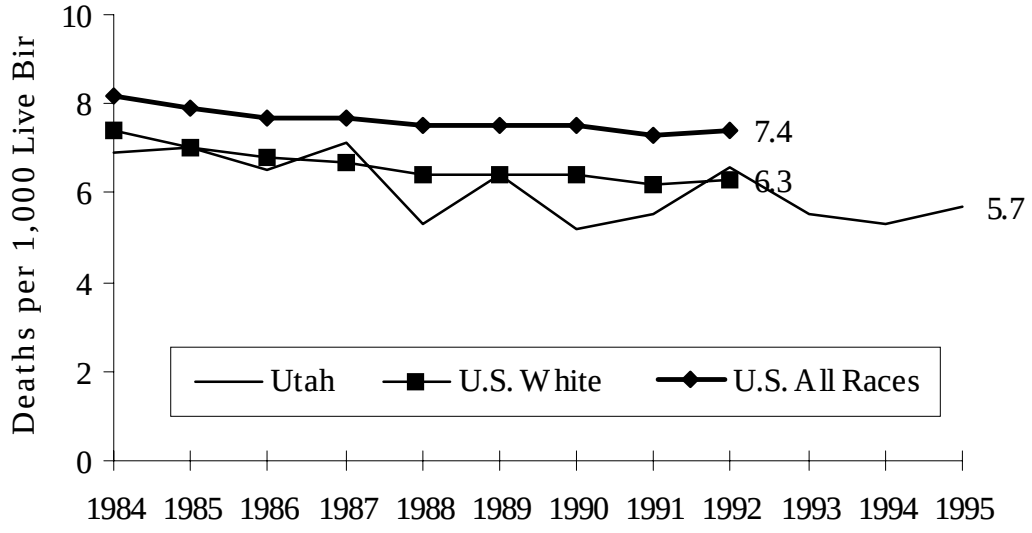
The Healthy People 2000 Objectives include the recommendation to reduce the fetal death ratio to no more than 5 per 1,000 live births. The definition of fetal death by the Utah Department of Health, Bureau of Vital Records is "a product of human conception: (a) of 20 weeks' gestation or more, calculated from the date the last normal menstrual period began to the date of delivery; and (b) that was not born alive."

The fetal death ratio for Utah residents for 1995 was 5.7/1,000 live births. Approximately 89% of Utah's population is White, non-Hispanic. A comparison between the U.S. White population and the Utah population reflects a slightly higher ratio of 6.6/1,000 live births in Utah than the U.S. White ratio of 6.3/1,000 in 1992 (Figure 4.1). An analysis of 1995 Utah fetal deaths (n=227) using Utah Department of Health Bureau of Vital Records fetal death certificate data found:

- Forty-four percent of fetal deaths occurred at or before 24 weeks' gestation;
- The most common gestational age for fetal deaths was at 20 weeks' gestation (12% of all);
- Thirty-one percent of fetal deaths occurred at or beyond 35 weeks' gestation.

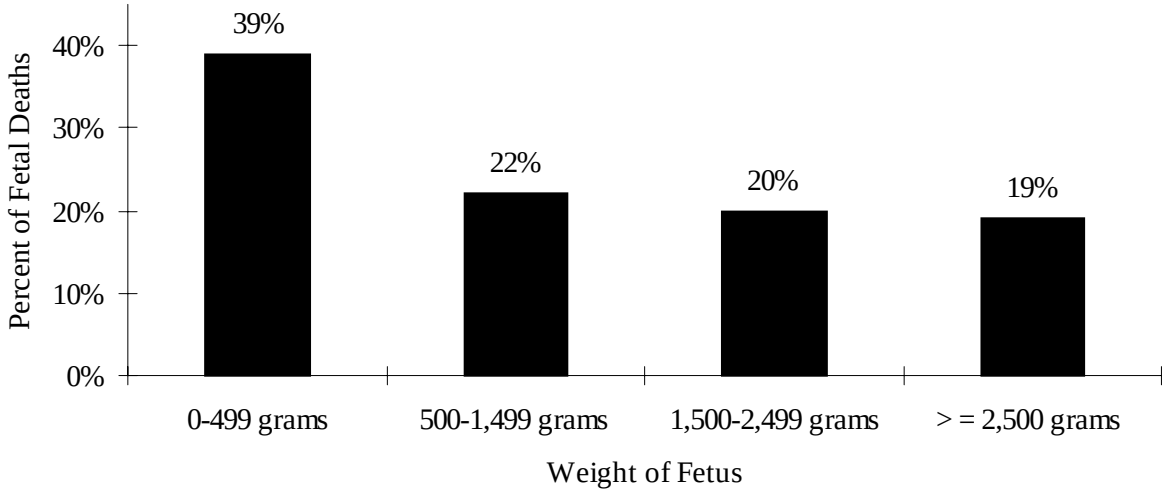
The greatest percent of fetal deaths in Utah during 1995 weighed less than 500 grams, however 19% of fetal deaths occurred in normal birth weight fetuses (Figure 4.2). Further research is needed to identify factors that contributed to these normal birth weight fetal deaths.

Figure 4.1 Fetal Death Ratios: Utah and United States, 1984-1995



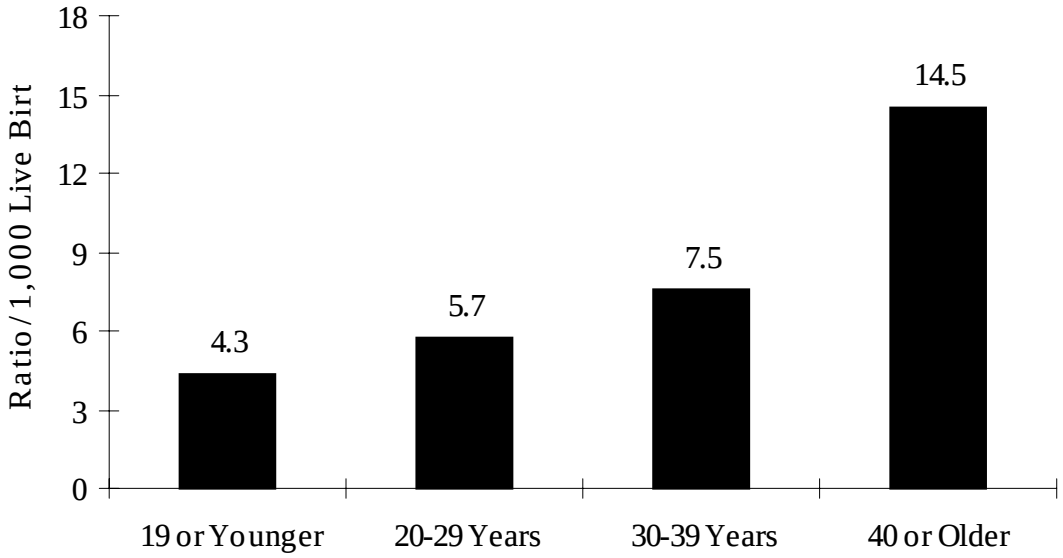
Sources: Utah: Bureau of Vital Records, Utah Department of Health and National Center for Health Statistics, U.S. Department of Health and Human Services

Figure 4.2 Frequency of Fetal Death Incidence by Weight: Utah, 1995



Source: Bureau of Vital Records, Utah Department of Health

Fetal death ratios increased with advancing age of Utah women in 1995 (Figure 4.3). Further research is needed to determine what may have contributed to this dramatic increase. Analysis of fetal death ratios by mother's parity (number of previous live births) reveals that during 1995, Utah women with no previous live births had the lowest (5.2/1,000) fetal death ratios. The ratios increased slightly with increased parity. Women with one to four previous live births had a ratio of 6.7/1,000, and women with five or more previous live births had a ratio of 6.6 fetal deaths/1,000 live births.

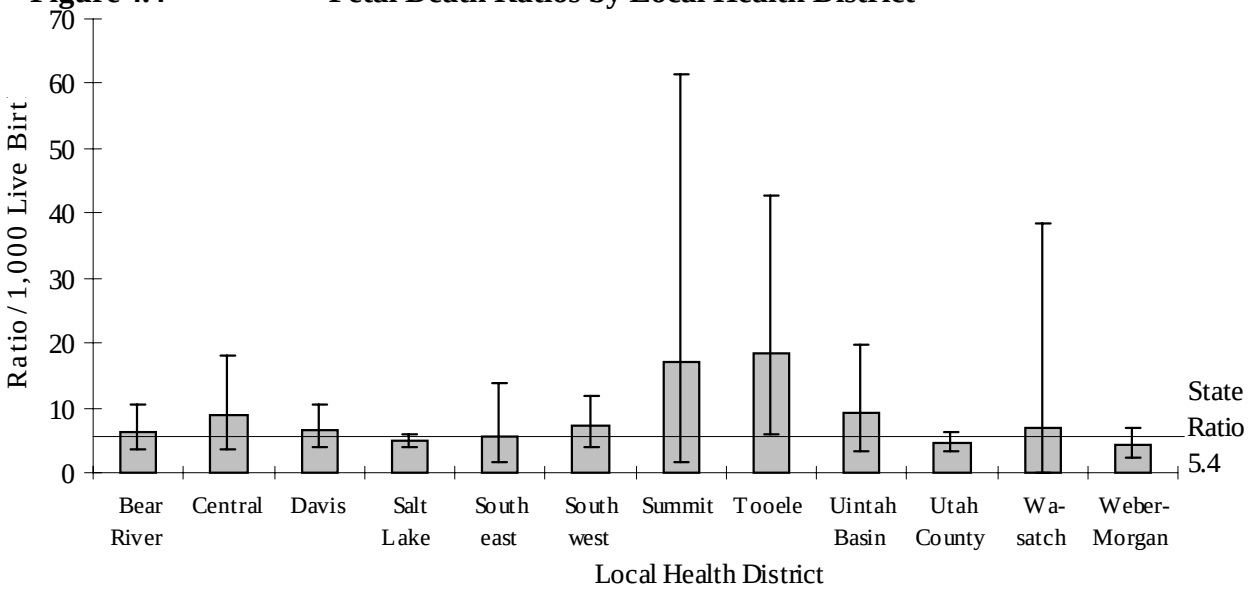


Source: Bureau of Vital Records, Utah Department of Health

Figure 4.3 Fetal Death Ratios by Mother's Age: Utah, 1995

Utah's fetal death ratio is close to the Healthy People 2000 Objective of 5/1,000 live births. However, there are areas of the state where the ratio is significantly higher than the state ratio of 5.4/1,000 live births for the years 1993-95 (Figure 4.4). In order to show the limits of analysis of ratios in local health districts that have small populations, confidence intervals have been included. The bar on top of each graph can be interpreted as the range in which we are 95% confident that the true rate lies. A narrow confidence interval (a small range) indicates that the result is based on a larger number of cases than one with a wide confidence interval (a large range).

Figure 4.4 Fetal Death Ratios by Local Health District



Note: Bars superimposed on each health district ratio represented a 95% confidence interval.
Source: Bureau of Vital Records, Utah Department of Health

According to National Center for Health Statistics data, risk factors for fetal death include: race (fetal mortality rate for Blacks is two times the rate for Whites), lack of adequate prenatal care, marital status (substantially higher for unmarried than for married mothers) and age (youngest and oldest mothers experience the greatest risks).[12]

Major causes of fetal deaths identified in the literature include maternal conditions, preterm labor, asphyxia, abruptio placentae, infection, and birth defects.[13,14,15] Variation in the distribution of causes exists between different study populations. The leading cause of fetal death in Utah between 1992-1995, was "fetus affected by complications of placenta, cord or membranes" (Table 4.1). Interventions to reduce known causes of fetal death might include improved prenatal diagnosis and treatment of maternal conditions such as hypertension and maternal-fetal infections and improvements in access to and the quality of prenatal care.

Table 4.1 Causes of Fetal Deaths: Utah, 1993-1995 Three-Year Average

Causes of Fetal Deaths	3-Year Average Number of Deaths
Complications of placenta, cord or membranes	79
Cause of death not specified	33
Intrauterine hypoxia or birth asphyxia	32
Maternal condition or complication of pregnancy or labor and delivery	26
Congenital anomalies	22
Disorder related to short gestation or low birth weight	8
Other or ill defined conditions	11

Utah, 1993-1995 Three Year Average

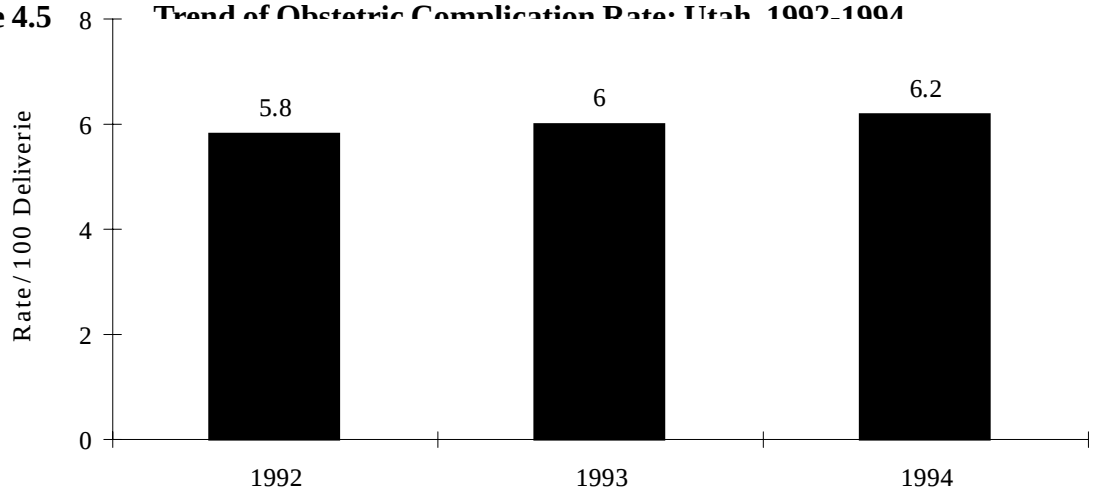
Source: Bureau of Vital Records, Utah Department of Health

Obstetric Complications

Obstetric complications may contribute to maternal, fetal, and neonatal morbidity and mortality. Complications of pregnancy also lead to a loss of productivity, generate substantial health care costs, and cause emotional distress for families.

According to 1994 Utah Hospital Discharge data, average total charges for deliveries occurring in Utah hospitals were $2,442 for an uncomplicated delivery and $3,947 for a complicated delivery. There was a slightly increasing trend of the obstetric complication rate in Utah during the years 1992-1994 (Figure 4.5).

Figure 4.5 Trend of Obstetric Complication Rate: Utah, 1992-1994

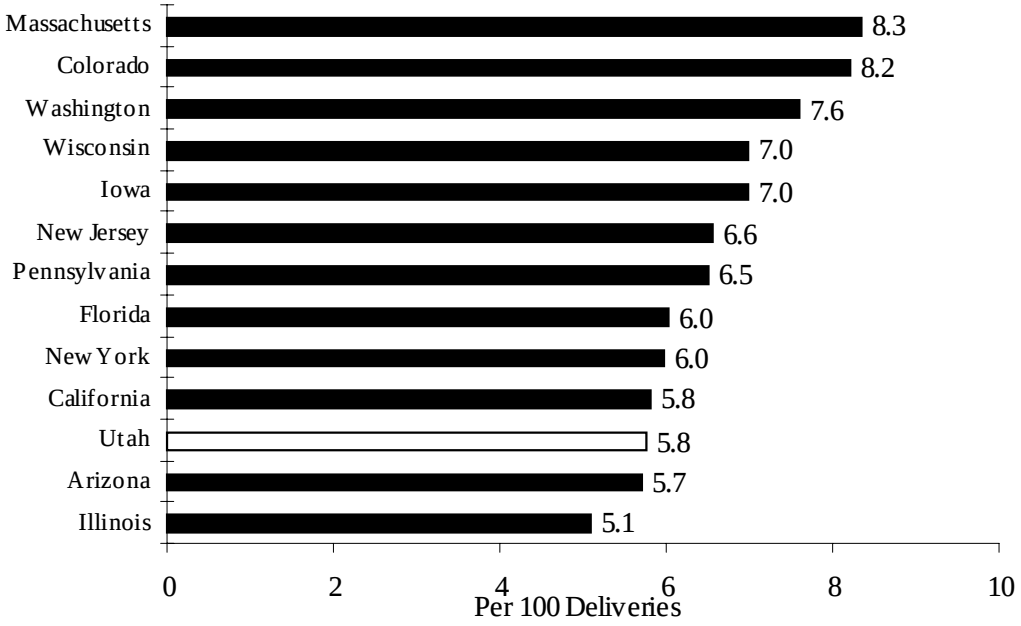


Note: Obstetric complications were defined by the Healthcare Cost and Utilization Project (HCUP-3), Agency for Health Care Policy and Research (AHCPR) study.
Source: Utah Hospital Discharge Public Query Internet Database, Office of Health Data Analysis, Utah Department of Health

A recent study by the Agency for Health Care Policy and Research (AHCPR) compiled obstetric complication rates from 13 states. The rate of complications of obstetric care was defined as the number of patients out of every 100 deliveries with a diagnosis or procedure code indicating fourth degree lacerations, hemorrhage or transfusions, pulmonary, cardiac, central nervous system, or anesthesia complications, obstetric shock, renal failure, puerperal infection, air embolism, disruption of cesarean or perineal wound, breast abscess, or other obstetric complications.[A]

Illinois had the lowest obstetric complication rate among the 13 selected states in a 1992 study (Figure 4.6). Of western states participating in that study, the rates for Utah, Arizona, and California were comparable, ranging from 5.70 to 5.82 per 100 deliveries, while Colorado and Washington rates were substantially higher.[16]

Figure 4.6 Obstetric Complication Rates: Utah and Selected States*, 1992



*Note: Obstetric complications were defined by the Healthcare Cost and Utilization Project (HCUP-3), Agency for Health Care Policy and Research (AHCPR) study.
Source: AHCPR HCUP-3 Quality Indicators Project, Utah Hospital Discharge Database, Office of Health Data Analysis, Utah Department of Health

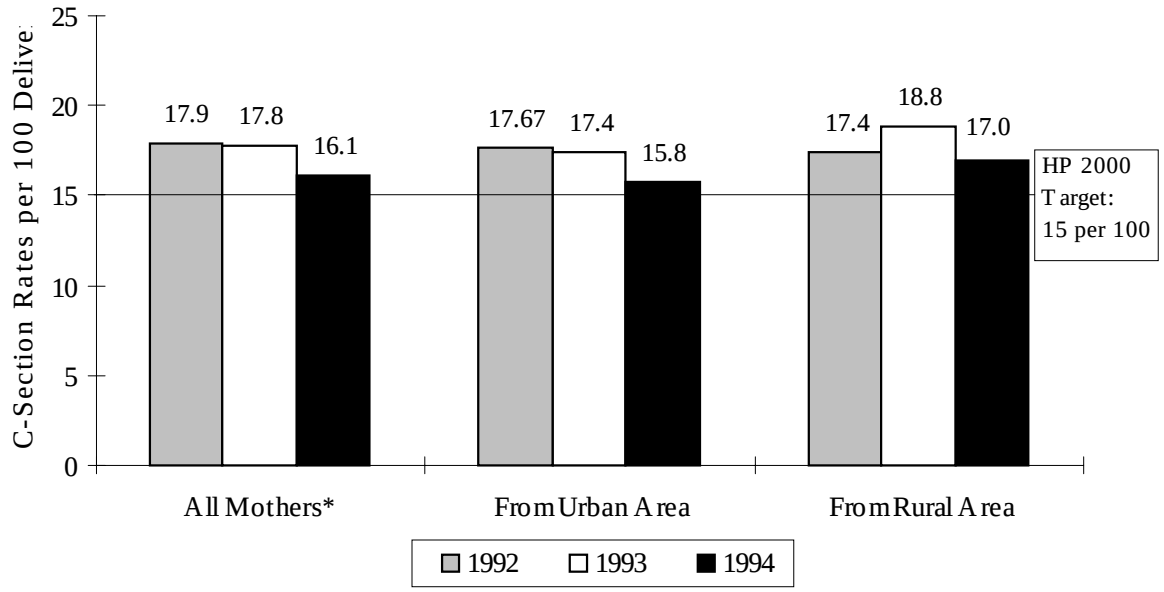
Cesarean Section

Over the past 25 years, cesarean section rates in the U.S. increased nearly five-fold from 5 cesarean sections per 100 deliveries in 1968 to 24 in 1992.[17] Cesarean section is the most common proce-

[A] This definition differs from that used for the Healthy People 2000 objective for obstetric complications.

dure for hospitalized women both in the U.S. and Utah.

Approximately 16 of every 100 deliveries in Utah are cesarean births. Cesarean rates in Utah have declined from 17.9 in 1992 to 16.1 in 1994 (Figure 4.7).[18] Although Utah's cesarean rate is lower than the national rate, the current rate is still higher than the Healthy People 2000 target of 15% of all deliveries. Also, there are variations in rates among geographic areas and payer types. Utah women from rural areas had significantly higher cesarean rates than those from urban areas in both 1993 and 1994. There was a decline in cesarean rates among urban women's deliveries from 1992 to 1994; however, a similar decline was not observed among rural women's deliveries. Further analysis is required to understand factors related to higher cesarean rates among rural women's deliveries.



*Included mothers who are residents of other states in addition to Utah residents.
Source: Utah Hospital Discharge Public Query Internet Database, Office of Health Data Analysis, Utah Department of Health.

Cesarean rates varied significantly according to health care payer type (Figure 4.8).[18] Mothers with Medicaid and other types of public health insurance had the highest age-adjusted cesarean rates in 1992 (20.8 and 20.4 per 100 deliveries, respectively). In 1994, an age-adjusted cesarean rate for Medicaid patients declined to 17.8 per 100 deliveries, which was still higher than those for most other insurance carriers.[18] One possible explanation for these increased rates may be that women qualifying for these programs are at higher risk for obstetric complications, necessitating cesarean sections to assure better outcomes. Self-paid hospital deliveries were significantly less likely to result in a cesarean than all other deliveries over the three years. A decline in cesarean rates has been observed among all other payer categories except Blue Cross/Blue Shield's fee-for-service and non-Medicaid government insurance.[18] Further research is necessary to examine the reasons for the variation in cesarean rates by payers.

Figure 4.8 Cesarean Section Rates by Primary Payer Category: Utah, 1992-1994

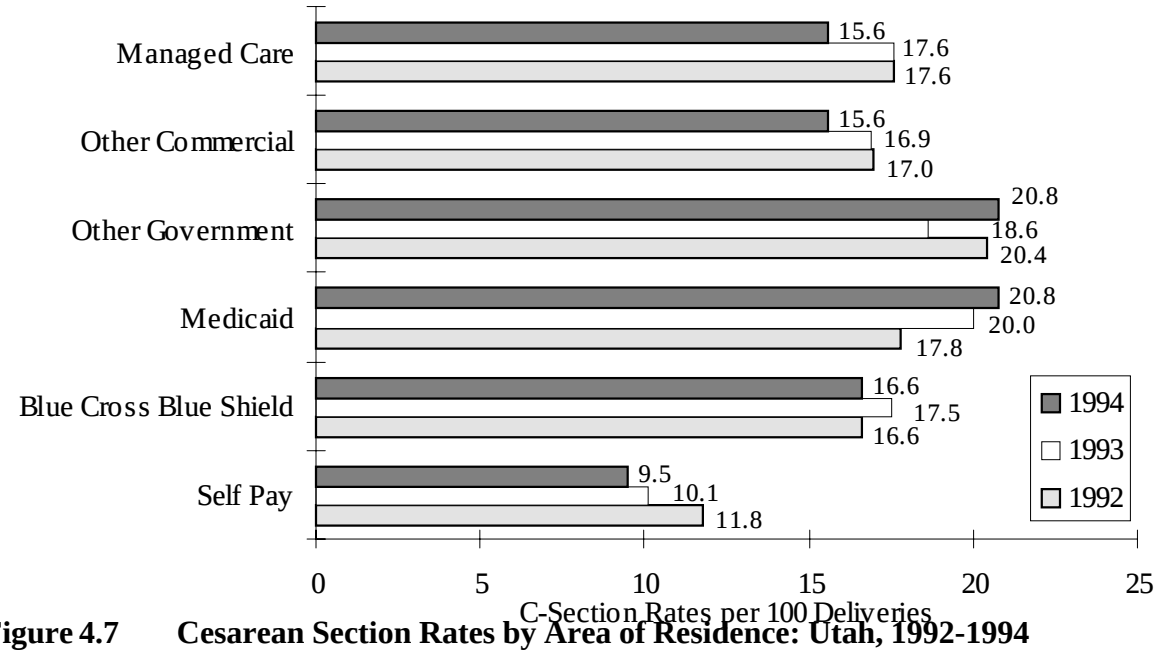


Figure 4.7 Cesarean Section Rates by Area of Residence: Utah, 1992-1994

Note: All rates were adjusted to the age composition of delivery mothers (age 10 to 54) in 1992 hospital discharge data.
Source: Utah Hospital Discharge Public Query Internet Database, Office of Health Data Analysis, Utah Department of Health.

Maternal Mortality

Maternal death is a devastating event due to the relatively young age at death and lost potential of its victims. Children of families experiencing maternal death are left without the crucial support and guidance of their mothers. Thorough identification and review of maternal deaths are critical in order to define strategies for prevention. Following is a comparison of maternal death reviews for the U.S. population and Utah.

U.S. Maternal Mortality

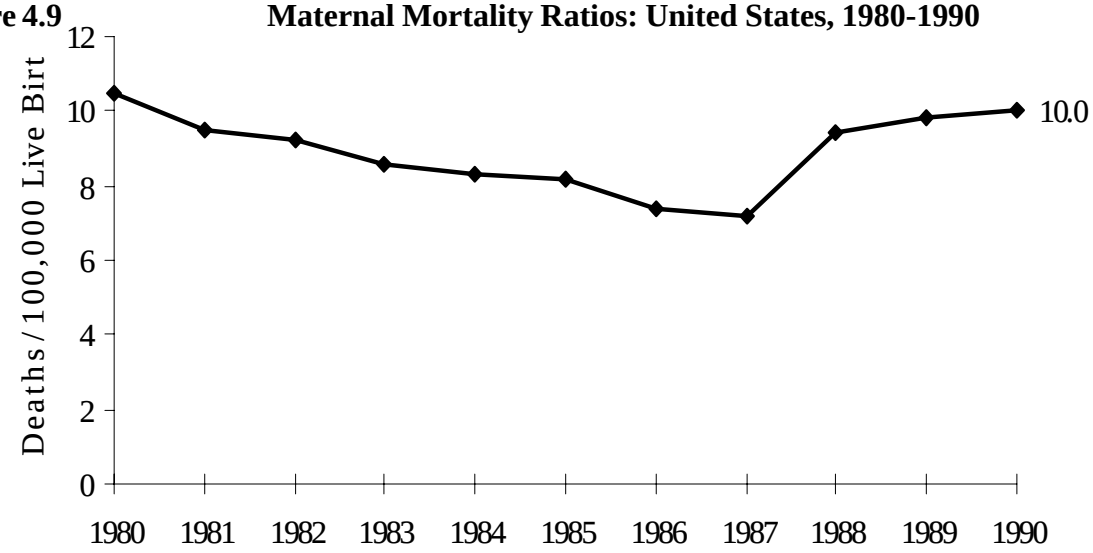
The Centers for Disease Control and Prevention (CDC) 1991 maternal mortality review guidelines define a maternal death as any death occurring during pregnancy, or within one year following termination of pregnancy, resulting from complications of the pregnancy itself, by a chain of events initiated by the pregnancy or by the aggravation of an unrelated condition by the physiologic or pharmacologic effects of the pregnancy.[19]

The CDC's Division of Reproductive Health reviewed all identified maternal deaths in the U.S. for the period from 1979 through 1986. During these years the maternal mortality ratio was 9.1 deaths/ 100,000 live births. The ratios increased with age and were highest among women of Black and other

minority races for all age groups. The risk of maternal death increased with decreasing levels of education for all age groups. The leading cause of death following the delivery of a live birth was pulmonary embolism.[19]

The CDC recently published findings from their ongoing review of maternal deaths for the period from 1987-1990.[19,20] During this period, the ratio increased from 7.2 in 1987 to 10.0 in 1990 (Figure 4.9). It is hypothesized that increased efforts in identifying maternal deaths have contributed to the increasing ratio.

Figure 4.9 Maternal Mortality Ratios: United States, 1980-1990



Source: Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, U.S. Centers for Disease Control and Prevention

Utah Maternal Mortality

A retrospective review of maternal deaths in Utah between the years of 1982-1994 was recently completed by the Utah Department of Health and the Department of Obstetrics and Gynecology at the University of Utah Medical Center. The CDC's definition for maternal mortality was used in order to make comparisons between Utah and U.S. data.

During the 13 years included in this review, 62 maternal deaths were identified. During this same interval 484,789 live births were registered in the state of Utah, resulting in an overall maternal mortality ratio of 12.8 per 100,000 live births, somewhat higher than the overall U.S. population ratios published by the CDC. Utah's higher ratios noted in this study may be due to more complete ascertainment of pregnancy-related deaths than was possible in the national study. Table 4.2 reports the maternal mortality ratio (maternal deaths per 100,000 live births) in Utah during the study period (1982-1994).[21]

Table 4.2 Maternal Mortality Ratios by Grouped Years: Utah, 1982-1994

	1982-1984	1985-1987	1988-1990	1991-1992	1993-1994
Maternal Mortality Ratio (per 100,000 Live Births)	13.4	11.9	10.2	16.4	13.3

Note: Last two groups are 2-year instead of 3-year ratios because the study period prevented equal category divisions.
Source: Perinatal Mortality Review Database, Reproductive Health Program, Utah Department of Health

The women's ages ranged from 15-39, with a mean maternal age of 27.7 years. There was a significant positive correlation[A] between the number of deaths and the maternal mortality ratio for progressive maternal age, illustrating advancing maternal age as a risk factor for maternal death (Table 4.3). On average, women dying of pregnancy-related complications had been pregnant 3.1 times, including the pregnancy resulting in the death (Table 4.3).[21] The risk of maternal mortality increased with progressive parity (number of previous live births), though the chi-square test revealed that correlation was statistically non-significant.

Table 4.3 Maternal Death Ratios by Age and Previous Live Births: Utah, 1982-1994

Factors	Deaths	Maternal Mortality Ratio
Age		
15-19 years	4	8.5
20-29 years	33	10.8
30-34 years	16	17.4
35-39 years	9	27.1
Previous Live Births		
0 births	13	8.2
1 - 4	30	10.2
$\geq$ 5 births	4	15.9

Source: Perinatal Mortality Review Database, Reproductive Health Program, Utah Department of Health

Of the 62 women who died, 85.5% were married. Racial classification of maternal deaths studied yielded 91.9% as White, 6.5% as Asian-Pacific Islander, and 1.6% as Native American. Hispanic ethnicity was involved in 4.8% of the deaths reviewed, with maternal death ratios being similar for Hispanic and non-Hispanic women (12.1/100,000 versus 11.9/100,000, respectively).[21] The average education was 12.4 years for women in this review, with higher maternal mortality ratios among

[A] The significance of the effect of correlates of maternal mortality (e.g. maternal age and parity) was determined using Chi-square statistics.

women with less than high school education (17.3/100,000) than those with high school diplomas (10.5/100,000) or one or more years of college (11.1/100,000). All deaths included in the review were to Utah residents; maternal death ratios were higher among rural residents (19.1/100,000) than among urban residents (12.4/100,000).[21]

The classic triad of causes of maternal death (hemorrhage, infection and pre-eclampsia/eclampsia) remains an important contributor (16/62 or 25.2%). However, trauma, pulmonary embolism and maternal cardiac disease accounted for 46% (29/62) of maternal deaths in Utah.[21] Improvements in prevention, earlier diagnosis and aggressive treatment of these conditions will be needed to achieve the Healthy People 2000 objective, a 50% reduction in the maternal mortality ratio by the year 2000.

Preterm Births

A preterm birth is any delivery, regardless of birth weight, that occurs before 37 completed weeks from the first day of the last menstrual period.[A] According to national and international data, preterm births account for the majority of perinatal deaths in newborns without congenital malformations.[22,23]

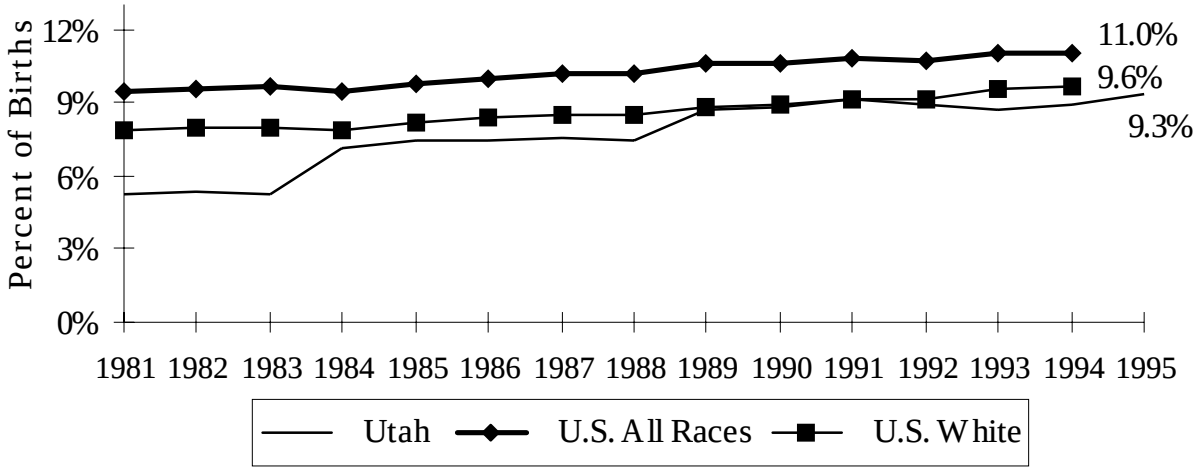
In 1995, Utah's percentage of preterm births was 9.3% of the total live births that year. In 1994, the U.S. White population percentage of preterm births was 9.6% of the total live births that year, just slightly higher than the Utah percentage (Figure 4.10). The cause of most preterm deliveries is unknown. Technologies to diagnose and treat premature labor have been largely unsuccessful to date.

According to recently published research, pregnant women diagnosed with a common vaginal condition, bacterial vaginosis (BV), during the second trimester were 40% more likely to give birth to a premature, low birth weight infant than were women who did not have the vaginal infection.[24] A large multi-center clinical trial is currently underway to determine whether screening and treatment of these frequently asymptomatic infections significantly alter the risk of preterm delivery.

The percentage of preterm births occurring at very early gestational ages has remained relatively stable while the percentage of later gestational age preterm births has increased rather dramatically over the past decade (Figure 4.11). This may, in part, be due to technologies developed during the mid-1980s which allowed the option of delivery to intervene earlier for better outcomes versus continuation of a high-risk pregnancy with the increased risk of intrauterine fetal death. Of preterm births in Utah, the highest percentage occur between 28-35 weeks' gestation (4.8% in 1995), followed by births occurring at 36 weeks' gestation (3.9% in 1995) and the lowest percentage occur between 20-27 weeks' gestation (0.4% in 1995).[21]

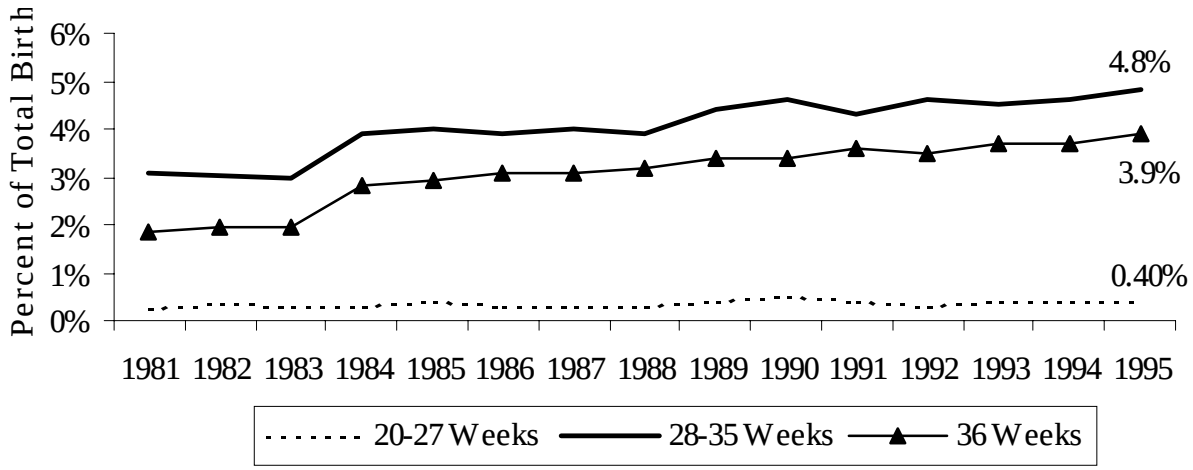
[A] American Academy of Pediatrics, 1967 and World Health Organization, 1969.

Figure 4.10 Live Births 36 Weeks' Gestation or Less Utah and United States, 1981-1995*



* U.S. data were not available for 1995.
Sources: Utah: Bureau of Vital Records, Utah Department of Health
U.S.: National Center for Health Statistics, Monthly Vital Statistics Report, Vol., 44, No. 3(s). Sept. 21, 1995, U.S. Department of Health and Human Services

Figure 4.11 Preterm Births by Gestational Age: Utah, 1981-1995



Source: Bureau of Vital Records, Utah Department of Health

Factors that contribute to preterm birth include:[25]

- low socioeconomic status;
- minority race (Black women have an incidence of preterm births double that of White women);
- age (younger than 20, older than 35 for first delivery);
- low prepregnancy weight and inadequate weight gain during pregnancy;
- history of previous preterm birth;
- malformations of the uterus;
- incompetent cervix;
- smoking (risk increases with more cigarettes/day);
- medical risks (hyperthyroidism, heart disease, gall bladder disease, hepatitis and anemia);
- abdominal surgery during last 2 trimesters;
- multiple gestation (approximately 27% of assisted reproductive technology births end in preterm delivery);
- fetal anomalies;
- obstetric complications (polyhydramnios, placenta previa or abruptions);
- cocaine use;
- bacteriuria and systemic or uterine infection (may have no symptoms); or
- short interpregnancy intervals.[25]

Table 4.4 depicts how risk factors compared to gestational age at time of delivery affected preterm births (PTB) in Utah between the years 1992-1995. These data indicate an increasing percentage of PTBs among women: with multiple gestations (or fetuses), under 20 years or over 35 years of age, with inadequate weight gain during the pregnancy, with a short interpregnancy space, who are unmarried, or who use tobacco or alcohol during the pregnancy.[21]

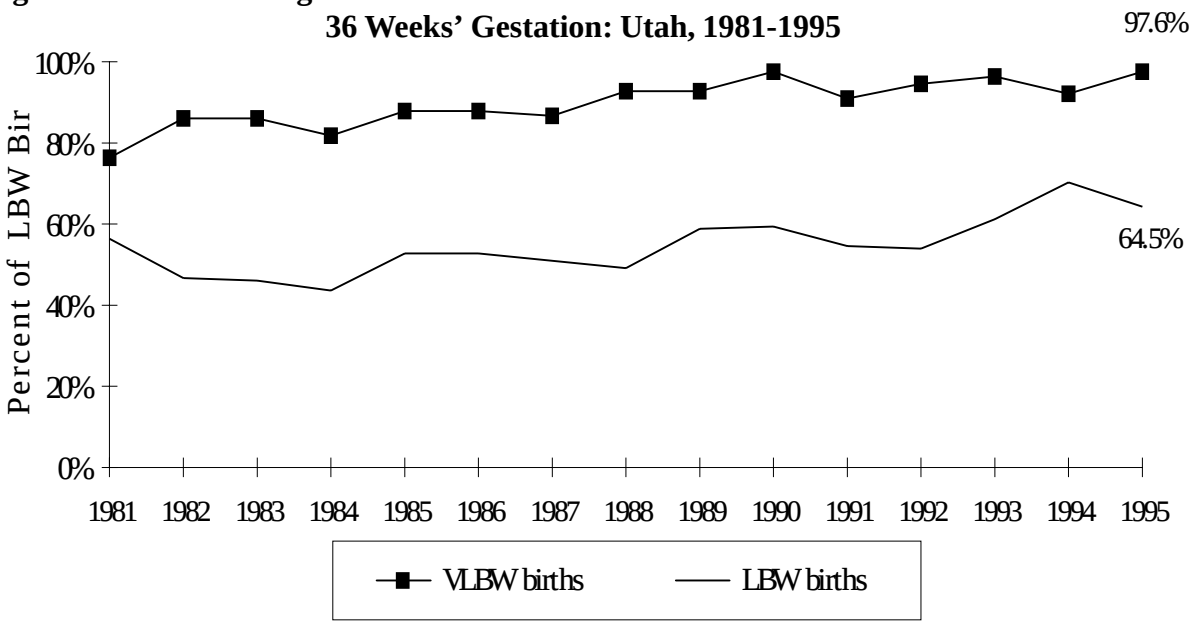
A high proportion of low birth weight births are attributed to preterm delivery (Figure 4.12). It is not surprising that the greatest percentage of very low birth weight (VLBW) (under 1,500 grams) births are born preterm. However, these data indicate that the proportion of moderately low birth weight (MLBW) (1,500-2,500 grams) births born preterm increased by 14% between 1981 and 1995 (from 56% to 64%). This rise may be due to iatrogenic (treatment related) prematurity caused by elective deliveries of MLBW infants to prevent intrauterine fetal demise. However, these data indicate it is important to focus on the cause of preterm births in order to reduce LBW births. According to Creasy, "preterm delivery is now the single most important problem to overcome in improving the outcome of the pregnancy with a nonanomalous fetus."[25] A recent comparison of birth statistics in the U.S. and Norway indicates that efforts to curb infant mortality should be directed toward the preventable causes of preterm delivery.[22] Analysis of infant deaths due to preterm delivery are currently underway by the Utah Department of Health Perinatal Mortality Review Program.

Table 4.4 Expectant Mother's Risk Factors by Newborn's Gestational Age at Birth: Utah, 1992-1995

Risk Factor	35 Weeks or Less	36-37 Weeks	38 Weeks or More
Plurality			
Single	5.4%	9.5%	85.1%
Multiple	36.3%	36.0%	27.7%
Education			
Less than high school	8.3%	11.4%	80.3%
High school graduate	6.4%	10.5%	83.1%
Some college	5.5%	9.7%	84.8%
College graduate	5.1%	9.1%	85.8%
Age			
Under 20 years	8.3%	10.8%	80.9%
20-35	5.8%	10.0%	84.2%
Over 35 years	6.4%	10.7%	82.9%
Weight Gain			
0-10 pounds	10.3%	11.8%	77.9%
11-20	8.5%	12.0%	79.5%
21-30	5.1%	10.0%	84.9%
31-50	4.0%	9.4%	86.6%
Over 50 pounds	5.2%	10.9%	83.9%
Inter-Pregnancy Interval			
0-12 months	24.0%	25.0%	51.0%
13-18	6.4%	11.6%	82.0%
19-24	5.5%	10.5%	84.0%
25-36	4.9%	9.6%	85.5%
Over 36 months	5.8%	9.6%	84.6%
Race/Ethnicity			
White	6.0%	10.0%	84.0%
Black	9.4%	13.0%	77.6%
Native American	7.9%	11.5%	80.6%
Asian/Pacific Islander	6.0%	11.5%	82.5%
Other Races	9.3%	13.4%	77.3%
Hispanic (any race)	9.3%	13.4%	77.3%
Marital Status			
Married	5.7%	9.9%	84.4%
Single	8.5%	11.0%	80.5%
Tobacco Use			
Usedduring pregnancy	7.9%	12.3%	79.8%
No use during pregnancy	5.9%	9.9%	84.2%
Alcohol Use			
Used during pregnancy	7.4%	9.9%	82.7%
No use during pregnancy	6.1%	10.1%	83.8%

Source: Bureau of Vital Records, Utah Department of Health

Figure 4.12 Percentage of VLBW and LBW Births Born at or Before 36 Weeks' Gestation: Utah, 1981-1995



Source: Bureau of Vital Records, Utah Department of Health

Low Birth Weight

The Healthy People 2000 Objectives include the recommendation to reduce the incidence of low birth weight (LBW) births (less than 2,500 grams) to no more than 5% of live births and very low birth weight births, to no more than 1% of live births. Low birth weight contributes to infant morbidity and mortality. In order to change these outcomes it is critical to develop strategies to prevent low birth weight births. Risk factors for LBW include:[26,27]

- age (younger than 18, older than 35 years);
- low socioeconomic status;
- low level of education;
- smoking;
- high altitude;
- multiple gestation;
- stress;
- poor nutritional status and anemia;
- low weight for height and inadequate weight gain during pregnancy; or
- medical risks in pregnancy (e.g. hypertension, toxemia).[26,27]
- minority race;
- unmarried status;
- previous LBW infant;
- alcohol and substance abuse;
- absent or inadequate prenatal care;
- short interpregnancy interval;

Various risk factors, including infant's birth weight, affected pregnancy outcomes in Utah during 1992-1995 (Table 4.5). These data indicate that a higher percentage of LBW newborns were born to women with:

- lower education;
- unmarried status;
- reported use of tobacco and alcohol; or
- multiple gestation pregnancies.[21]

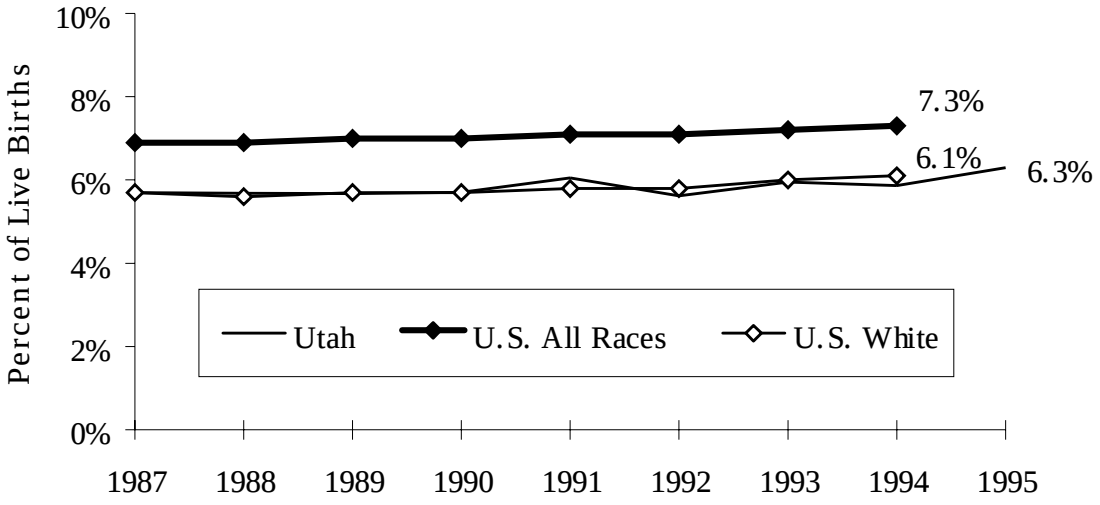
Table 4.5 Newborns' Birth Weights by Mother's Risk Factors: Utah, 1992-1995

Mother's Risk Factor	Number of Infants	Low BirthWeight (LBW) Newborn Under 2,500 grams	Normal Birth Weight (NBW) Newborn >=2,500 grams
Plurality			
Singleton	152,946	5.1%	94.9%
Twins	3,454	50.5%	49.5%
Triplets	133	95.5%	4.5%
Education			
Less than high school	22,881	9.4%	90.6%
High school graduate	50,979	6.5%	93.5%
Some college	51,621	5.3%	94.7%
College graduate	31,092	4.7%	95.3%
Marital Status			
Married	132,273	5.6%	94.4%
Single	24,296	9.5%	90.5%
Tobacco Use			
Used during pregnancy	15,147	12.7%	87.3%
No use during pregnancy	141,145	5.5%	94.5%
Alcohol Use			
Used during pregnancy	2,726	11.7%	88.3%
No use during pregnancy	153,348	6.1%	93.9%

Source: Bureau of Vital Records, Utah Department of Health

The incidence of LBW births is increasing in Utah and the U.S. as a whole (Figure 4.13). Approximately 89% of Utah's population is non-Hispanic White. A comparison between the U.S. White population and Utah reflects a similar trend in LBW births. The increased percentage of LBW births for U.S. all races population reflects the fact that LBW is more than twice as high among Blacks as among Whites.[28]

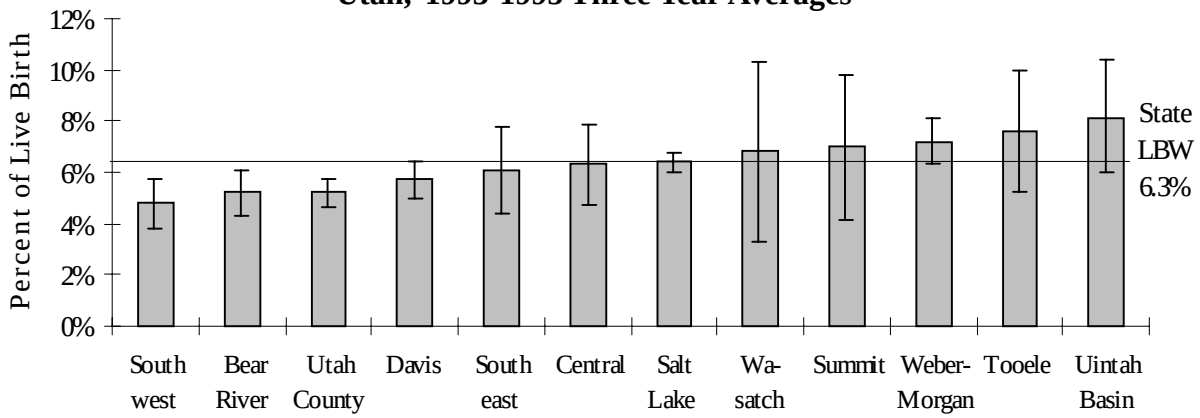
Figure 4.13 Low Birth Weight Newborns: Utah and United States, 1987-1995



Sources: Utah: Bureau of Vital Records, Utah Department of Health
U.S. : National Center for Health Statistics, U.S. Department of Health and Human Services

Among Utah's local health districts during the years 1993-1995, the LBW birth ratios were higher in the Wasatch, Summit, Weber-Morgan, Tooele and Uintah Basin health districts than the state ratio (Figure 4.14).[21] In order to show the stability of ratios in local health districts that have small populations, a confidence interval has been included. The bar on top of each graph can be interpreted as the range in which we are 95% confident that the true rate lies. A narrow confidence interval (a small range) may indicate that the result is based on a larger number of cases than one with a wide confidence interval (a large range).

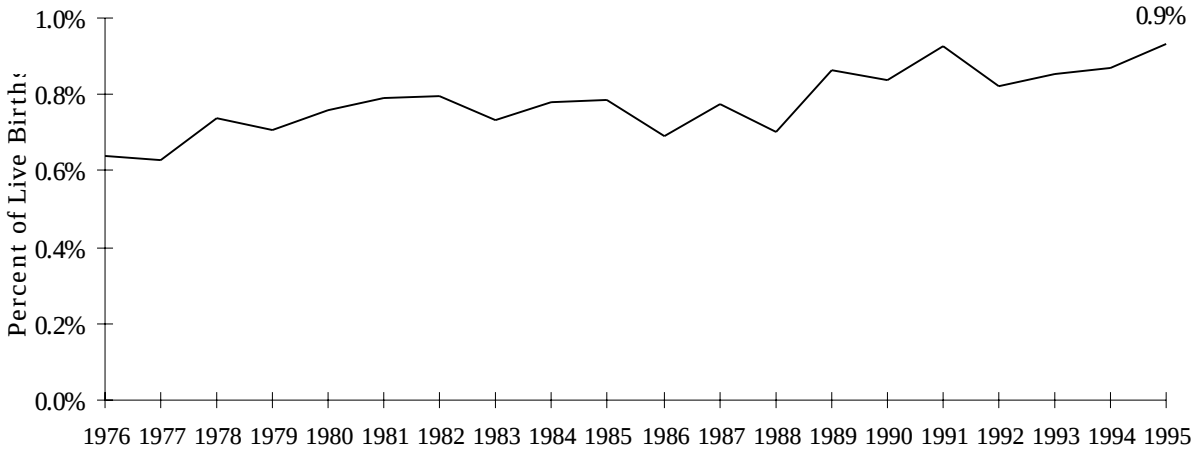
Figure 4.14 Prevalence of LBW Births by Local Health District and State Total Utah, 1993-1995 Three Year Averages



Source: Bureau of Vital Records, Utah Department of Health
Bars superimposed on each health district ratio represented a 95% confidence interval.

There is a slightly increasing trend in the percentage of VLBW births in Utah (Figure 4.15). The incidence of VLBW births in Utah in 1995 was 0.93% of live births. The incidence of VLBW births in the U.S. White population for 1993 (the most recent year that data are available) was 1% and for all races was 1.3%. This trend may reflect improvements in perinatal care that prevent fetal deaths but result in an increased number of VLBW births. The fetal death rate has declined over the same period of time (see pages 4.2-4.5).

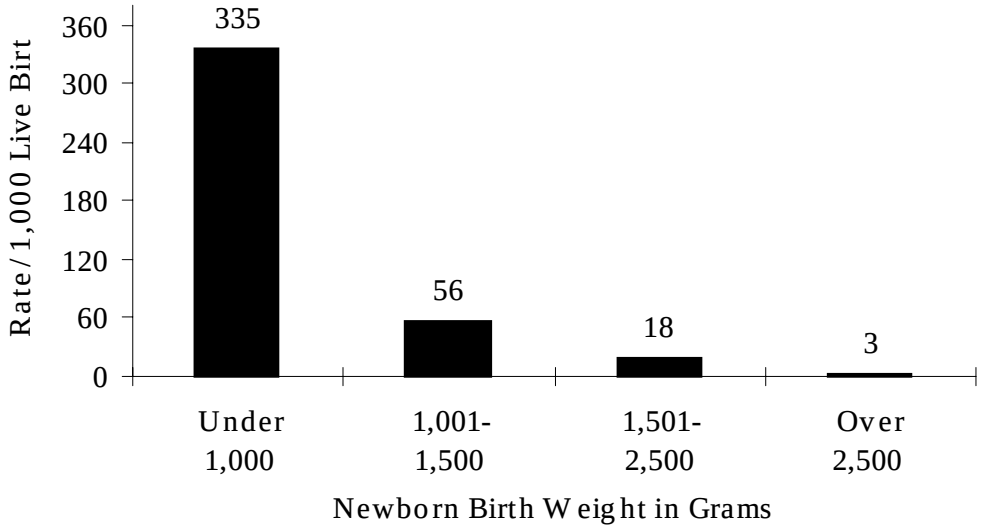
Figure 4.15 Incidence of Very Low Birth Weight Births: Utah, 1976-1995



Source: Bureau of Vital Records, Utah Department of Health

The contribution of LBW to infant mortality and morbidity is dramatic. Infants born weighing under 2,500 grams account for two-thirds of neonatal deaths; half of these infants weigh 1,500 grams or less.[29] Between 1992-1995, Utah infants born weighing under 1,000 grams were more likely to die than infants weighing more than 2,500 grams (Figure 4.16).[21] These data clearly indicate that strategies aimed at reducing the number of LBW and VLBW births would lead to a decrease in infant mortality.

Figure 4.16 Birth Weight Specific Infant Mortality Rate: Utah, 1992-1995



Source: Bureau of Vital Records, Utah Department of Health

Table 4.6 depicts the birth weight specific survival and major neonatal morbidity among VLBW survivors in a multi-center study funded by the National Institute of Child Health and Human Development during 1989-1990.[30] These data clearly indicate *decreasing* morbidity with *increasing* birth weights. (See Chapter 5 pages 5.13-5.19 for more information about infant mortality.)

Table 4.6 Birth Weight-Specific Survival by Major Neonatal Mortality and Morbidity, Study Group: United States, 1989-1990

Result	Birth Weight in Grams 501-750 (n=329)	751-1,000 (n=423)	1,001-1,250 (n=498)	1,251-1,500 (n=554)
Deaths	201 (61.1%)	98 (23.2%)	51 (10.2%)	39 (7.0%)
Survived With Morbidity	68 (53.1%)	112 (34.5%)	93 (20.8%)	45 (8.7%)
Survived Without Morbidity*	60 (46.9%)	213 (65.5%)	354 (79.2%)	470 (91.3%)

*Defined as: Chronic Lung Disease, oxygen requirement at 36 weeks corrected age; IVH, grade III to IV intraventricular hemorrhage; NEC, necrotizing enterocolitis (stage >=II).
Source: Very-low-birth-weight outcomes of the National Institute of Child Health and Human Development Neonatal Network, November 1989 to October 1990. American Journal of Obstetrics and Gynecology. 1995.172:457-464.

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