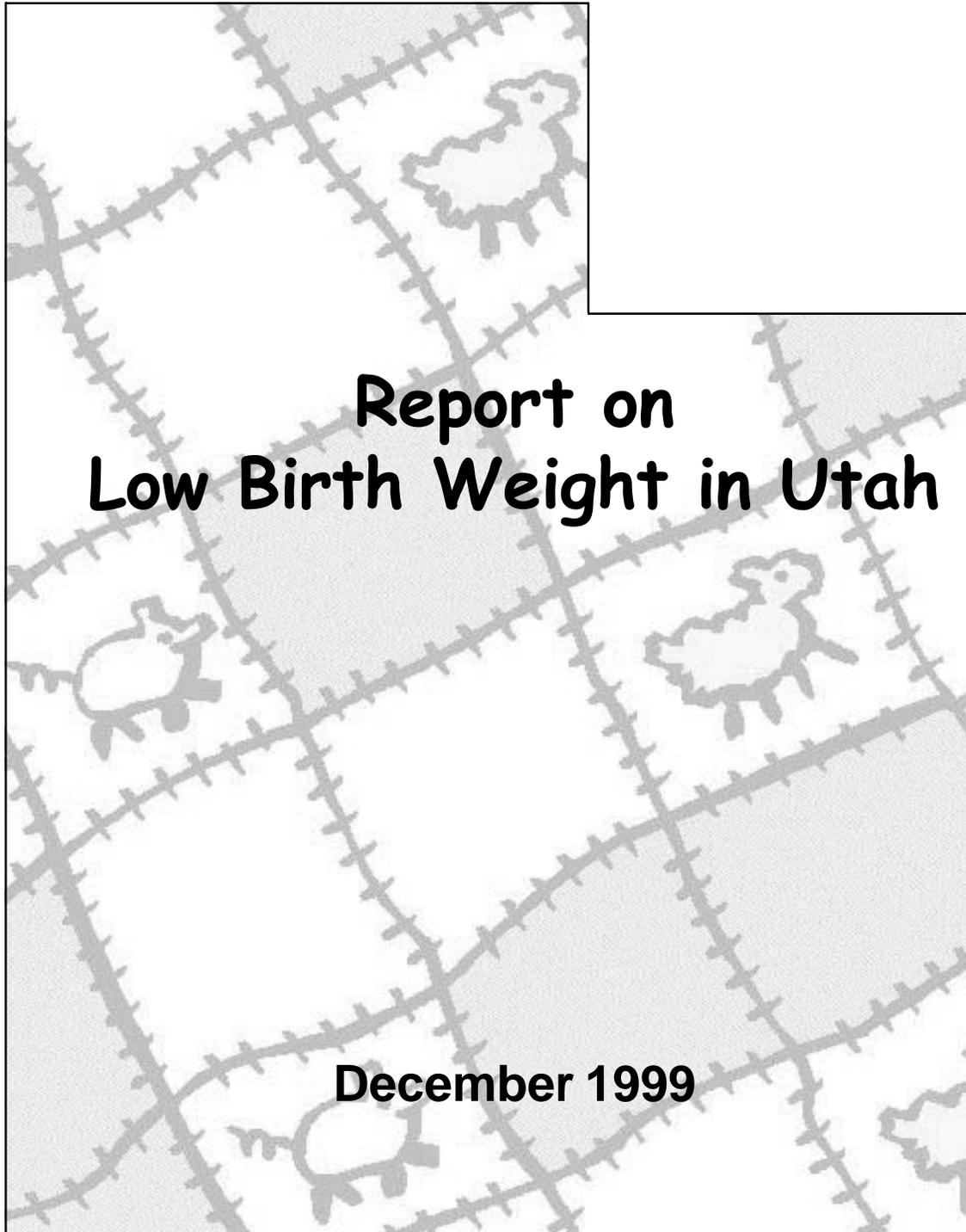


# Utah Department of Health



## Report on Low Birth Weight in Utah

December 1999

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Executive Director

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**Report on**  
**Low Birth Weight in Utah**

**Utah Department of Health**  
**Division of Community and Family Health Services**

**December 1999**

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# LOW BIRTH WEIGHT IN UTAH

## Executive Summary

In 1997, Governor Michael O. Leavitt initiated a statewide volunteer effort, Utah's Promise. One goal of this initiative is to "give Utah children a healthier start" that aims to reduce the number of low birth weight babies born in Utah by ten percent. This report is one of the Utah Department of Health's efforts in addressing the problem of low birth weight in the state.

Low birth weight is the birth of an infant weighing less than 2500 grams (5½ pounds). Nationally, low birth weight births have increased from 6.8% of live births in 1986 to 7.5% in 1997, moving away from the Healthy People 2000 Objective of 5%. In Utah, low birth weight has increased from 5.4% in 1986 to 6.6% in 1997. Reasons for this trend are not entirely clear, but it is worrisome because low birth weight is an important cause of infant mortality and of infant and child morbidity. Risk factors for low birth weight have been identified, however, these are only correlates of low birth weight and not proximal causes for low birth weight. At present, there are no known proven interventions to reduce the incidence of low birth weight births. Until we identify interventions that impact a reduction in low birth weight births, the current trend in these births in Utah and the United States probably cannot be expected to change in a positive direction.

- Low birth weight increases the risk for infant mortality and morbidity. Infant mortality increases with decreasing birth weight. Infant mortality rates were 228.5 per 1,000 live births for those born weighing less than 1500 grams, 19.9 per 1,000 live births for infants weighing between 1500-2499 grams compared to 3.4 per 1,000 live births for those weighing normal weight at birth. Low birth weight infants often require intensive care at birth, may develop chronic illnesses, and later may require special education services.
- Health care costs and length of hospital stay are higher for low birth weight infants. Utah data indicate that for 1997 births the total hospital charges were 6 times higher for newborns with a birth weight between 1500-2499 grams and almost 85 times higher for newborns with a birth weight of less than 1500 grams compared to those for an infant of normal birth weight. Length of stay was more than 4 times longer among those weighing between 1500-2499 grams and more than 32 times longer for those weighing less than 1500 grams compared to infants of normal birth weight.
- The national Healthy People 2000 Objective of increasing the proportion of pregnant women and infants who receive risk appropriate care to at least 90% can in part be measured by the percentage of very low birth weight infants born in facilities capable of addressing critically ill newborns. The percentage of very low birth weight infants born in tertiary centers in Utah has gradually increased from 68% in 1989 to 82% in 1997.
- Low birth weight percentages vary among geographic areas of Utah. Southwestern Utah Health District had the lowest percentage of low birth weight births, while Tooele County and Tri-County had the highest percentages. Small area analysis reveals that Downtown Ogden, Rose Park, Glendale, South Salt Lake, and Taylorsville had significantly higher rates than the state rate. Areas with low birth weight rates below the state average included: St. George, Logan, Southeast Sandy, American Fork/Alpine,

and Cedar City.

- The largest proportion of low birth weight births is caused by preterm birth. About 67% of all low birth weight infants in Utah are born preterm (before 37 weeks of gestation).
- Approximately 57% of all low birth weight infants born in Utah during 1989-1997 were categorized as small for gestational age, indicating that they did not grow appropriately in utero.
- Maternal risk factors for low birth weight include maternal age, race or ethnicity, multiple gestation, low pre-pregnancy weight, tobacco or alcohol use during pregnancy, lack of or inadequate prenatal care, short birth intervals, and previous low birth weight birth.
- Other risk factors include low median household income, marital status, and low educational attainment.

### **Recommendations**

Recommendations to promote the reduction of risk factors amenable to change include:

- Adhere to standards for use of assisted reproductive technology to reduce the frequency of higher order multiple pregnancies
- Perform a thorough formal documented risk assessment for all pregnant women along with written plan for intervention for identified risk factors
- Promote early prenatal care, smoking cessation and adequate weight gain
- Promote education among pregnant women about signs of preterm labor, danger signs of pregnancy and the importance of fetal kick counts to facilitate early recognition of problems and thus earlier intervention for improvement of pregnancy outcomes
- Refer pregnant women to appropriate support services, such as WIC and psychosocial counseling
- Promote effective contraception and preconceptional care to enhance health prior to conception and pregnancy and to encourage optimal pregnancy spacing
- Promote more research into the causes of preterm birth and low birth weight to identify preventable risk factors



### Overview of Low Birth Weight

The median birth weight of a child born in the United States in 1996 was 3,350 grams (7 pounds 7 ounces), but each year more than 250,000 babies are born weighing less than 5½ pounds (2,500 grams).<sup>1</sup> These babies are classified as low birth weight and are at an increased risk for serious health problems and long-term disabilities.

Birth weight categories are described by the following standardized definitions<sup>2</sup>:

Low birth weight (LBW) - less than 2,500 grams or about 5 pounds 8 ounces

Very low birth weight (VLBW) - less than 1,500 grams or about 3 pounds 5 ounces

Extremely low birth weight (ELBW) - less than 1,000 grams or about 2 pounds 3 ounces

The extremely low birth weight category has evolved as more babies in that weight range are surviving, largely due to advances in treatment<sup>3</sup> such as maternal corticosteroid administration, neonatal surfactant replacement and neonatal respiratory therapy.

Pregnancy term categories are described by the following standardized definitions<sup>4</sup>:

Full Term - infant born after 37 but before 42 completed weeks of gestation

Preterm - infant born before 37 completed weeks of gestation

Postterm - infant born after 42 completed weeks of gestation

Low birth weight can be caused by preterm delivery, poor fetal growth, or a combination of those two factors. It is important to distinguish between the two causes as they are significantly different pathophysiologically as well as in terms of potential problems after birth. Approximately 6.1% of all Utah births during 1989-1997 were classified as low birth weight, 9.6% of all births during the same period were classified as small for gestational age (SGA), and 9.1% of all births were classified as preterm. The categories of low birth weight, preterm, and small for gestational age are not mutually exclusive, thus creating complexities in analysis of the individual categories. In Utah during 1989-1997, approximately 62% of low birth weight infants were born preterm, and the remaining 38% were born at term but were small for gestational age. Some of the preterm low birth weight infants were also SGA, so that overall 57% of all low birth weight births were SGA.

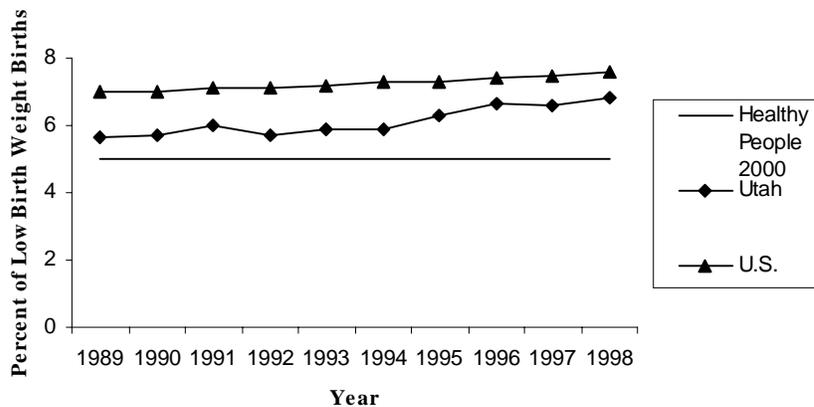
Complications faced by preterm low birth weight babies are different than those faced by term babies with low birth weight (intrauterine growth restriction). Preterm infants experience neurological, respiratory, cardiovascular and other problems as the result of premature birth. Infants that are SGA experience different problems that are related more to their growth restriction, such as nutritional and metabolic problems, and may manifest neurological problems as a result of the growth restriction incurred in utero. Infants that were both preterm and SGA, approximately 12% of all preterm births in Utah in 1989-1997, suffered from problems associated with both conditions, including a greater risk for infant mortality compared to their term counterparts.<sup>3</sup>

According to U.S. National Health Promotion and Disease Prevention Objectives, Healthy People 2000, decreasing the incidence of low birth weight is an important health risk reduction objective.<sup>5</sup> In order to achieve this goal, the incidence of low birth weight must decrease to no more than 5% of live births by the year 2000. The low birth weight incidence in the United States and Utah has risen steadily since 1981.

## Overview of Low Birth Weight

Nationally, low birth weight percentages have increased from 7.0% of live births in 1989 to 7.6% in 1998<sup>6</sup>, moving away from the Healthy People 2000 Objective. In Utah, the percentage low birth weight has increased from 5.7% in 1989 to 6.8% in 1998 (Figure 1).<sup>7</sup> Table 1 in the Reference Section includes numbers and percentages of live births based on weight categories.

**Figure 1: Percentage of Infants with Low Birth Weight by Year.  
Utah and United States, 1989-1998.**



Source: Utah's Vital Statistics Annual Report: 1998. Bureau of Vital Records, Utah Department of Health, 1999

### **Morbidity and Mortality Associated with Low Birth Weight**

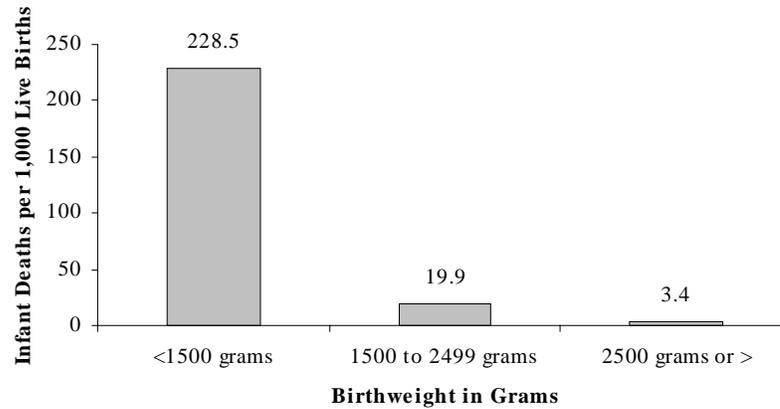
The increasing incidence of low birth weight births is concerning because these births are a major contributor to infant mortality. In addition, many of those who survive have significant health problems. Low birth weight infants often require neonatal intensive care because of respiratory and metabolic problems associated with immaturity or other related conditions. They have a higher incidence of subsequent health problems such as neuro-developmental disorders, cerebral palsy, deafness, blindness, seizure disorders, chronic lung disease, and learning disabilities. A low birth weight infant can take a tremendous emotional and financial toll on a family especially if there are significant chronic health problems.

In addition to possible chronic health problems, low birth weight infants require special education services more often than children born of normal weight.<sup>8</sup> They may have attention deficit and/or learning disorders or other problems that interfere with learning. Psychosocial problems, poor self-esteem, or difficulty with peer relationships associated with learning difficulties may also occur among these children.

Infant mortality rates are significantly higher among low birth weight infants compared to their normal weight counterparts. The risk of infant mortality is directly related to birth weight and is dramatically increased for the very low birth weight infants (Figure 2). Infant mortality rates for all groups have declined. However, for the time period of 1992-94 to 1995-1996, while the infant mortality rate declined, there has been a 25% increase in infant deaths in those born weighing less than 1500 grams due to the increase in numbers of births in this category (Table 2 in Reference Section).

## Overview of Low Birth Weight

**Figure 2: Infant Mortality Rates by Birth Weight, Utah, 1989-1996.**



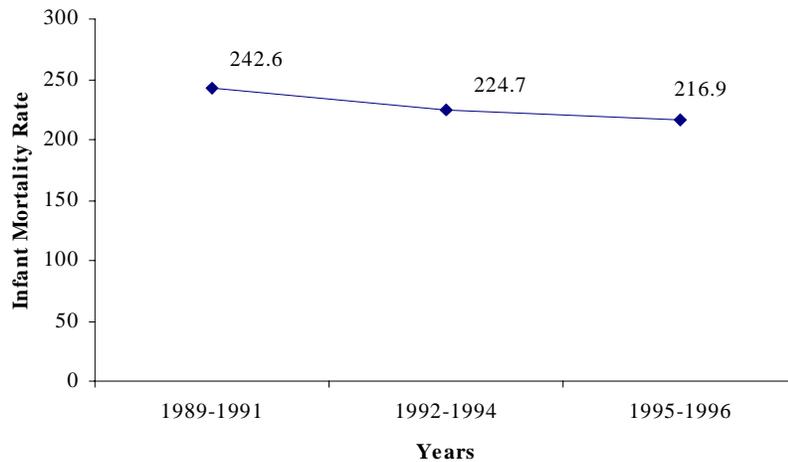
Source: Linked Birth and Death Dataset, Office of Vital Records and Statistics, Utah Department of Health

During the last 20 years the distribution of births and deaths in the very low birth weight group has changed substantially. A national study reported a 60% reduction in neonatal mortality for infants born weighing 500 to 999 grams and 90% for those weighing 1,000 to 1,499 grams over the years 1974 to 1994. Another important finding of the study was the increased reporting of very low birth weight births including a 2.5-fold increase in the under-500 grams group.<sup>9</sup> The authors speculate that as viability has moved downward to the under-500 grams group, more aggressive efforts to save these infants have become routine. This practice has resulted in more of the total births in the under-500 grams group recorded as live births rather than as spontaneous abortions or fetal deaths, accounting for at least a portion of the increase in low birth weight births. Utah data indicate steady decreases in infant mortality rates among those born weighing less than 1500 grams (Figure 3).

Infants born at term whose birth weight is at or below the 10<sup>th</sup> percentile are classified as small for gestational age. A recent study documented that infants that are born at the 3<sup>rd</sup> percentile for weight for their gestational age have significantly higher mortality rates compared to their counterparts with birth weights above the 3<sup>rd</sup> percentile.<sup>10</sup> This study documented an almost-tenfold higher neonatal mortality rate among infants at or below the 3<sup>rd</sup> percentile compared with infants born weighing above the 3<sup>rd</sup> percentile. Infants with intrauterine growth restriction have a higher incidence of birth asphyxia and abnormal neurological development. The effects of fetal growth restriction are apparently most important for those infants born at or below the 3<sup>rd</sup> percentile, a reflection of severe fetal underdevelopment and compromise.

## Overview of Low Birth Weight

**Figure 3: Infant Mortality Rates Among Infants Born Weighing Less Than 1500 Grams, Three Year Average. Utah. 1989-1996.**



Source: Linked Infant Birth and Death Dataset, Office of Vital Records, Utah Department of Health

### **Costs of Low Birth Weight Births**

Low birth weight results in significant financial impact on families, third party payers and the national economy since the majority of low birth weight infants require special health care. In 1988, there were approximately 3.5 to 4 million children under age 16 (7% of children in that age group) who were born low birth weight.<sup>11</sup> In the United States the incremental cost of health care, education and child care (costs of the resources used to care for low birth weight infants above and beyond those for infants of normal birth weight) for children born at low birth weight was approximately \$6 billion (1988 dollars) more than if they had been born normal birth weight. Health care costs during the first year of life for low birth weight babies alone were 35% of the annual cost of health care for all infants in the U.S in 1988. Costs for care in the first year increased with decreasing birth weight. Infants with birth weights between 1,000 and 2,500 grams without respiratory distress syndrome (RDS) averaged six times the cost for normal weight newborns (\$11,900 versus \$1,900). Costs for infants weighing less than 1,000 grams or those with RDS were three times higher than those for other low birth weight babies (\$33,900 versus \$11,900), representing more than 45% of the incremental costs associated with low birth weight.

In a national study of 1994 hospital cost and utilization rates, the mean total hospital charges were calculated utilizing three diagnostic related group (DRG) categories: normal newborn; premature birth with major problems; and extreme premature birth and/or RDS.<sup>12</sup> The cost of hospital care, prior to discharge after birth, for infants categorized as normal was \$896 compared to \$20,143 for premature infants with major problems and \$73,964 for those in the extreme premature birth and/or RDS category. Average length of stay ranged between 1.7, 13.6 and 33.9 days for the respective three groups of newborns.

Utah statistics mirror national health care costs for low birth weight. Hospital discharge data for Utah births in 1997 indicated that the average hospital charges for normal newborns were \$866 compared with \$17,995 for preterm infants with major problems and \$65,907 for extremely preterm infants.<sup>13</sup> Length of stay varied as well, with normal newborns having an average length of stay of 1.5 days versus 12.3 days for preterm infants with major problems, and 29.3 days for the extremely preterm infants.<sup>13</sup>

## Overview of Low Birth Weight

Increased costs related to low birth weight births continue throughout childhood due to higher health care expenses and the need for special education and grade repetition. Children ages 6 to 15 with a history of low birth weight were almost 50% more likely to be enrolled in some type of special education program than were normal birth weight children according to national data. One study found that the costs of providing special education for these children through the sixth grade were about 2.3 times the costs of regular education to the same grade.<sup>14</sup>

As the number of low birth weight infants increases along with health care costs, so will the economic burden. Perhaps the greatest cost is difficult to measure – the cost of lost lives and productivity among the low birth weight children who are unable to achieve their full potential.

### **Birth Hospital for Low Birth Weight Infants**

Immediate availability of specialized health care for high-risk pregnant women and infants is critical in promoting optimal pregnancy outcomes. As a result, the federal Maternal and Child Health Bureau (MCHB) requires all state Maternal and Child Health programs to address the percentage of very low birth weight infants delivered in tertiary care facilities. This requirement is related to the national Healthy People 2000 objective of increasing to at least 90% the proportion of pregnant women and infants who receive risk appropriate care. Both mother and infant benefit from the specialized care necessary to appropriately manage a high-risk pregnancy to prevent potential adverse pregnancy outcomes. A tertiary care center has high-risk obstetrical and neonatal specialists (perinatologists and neonatologists) and intensive care services. Early consultation with a specialist can assist in provision of the most up-to-date care with possible transfer of the mother to a tertiary care center so that the infant can receive immediate intensive care after birth. Although there are some circumstances when maternal transport to a tertiary center is not practical due to time, distance, weather, maternal condition or fetal viability, pregnancy outcomes are optimized when very low birth weight infants are delivered in a tertiary care center.

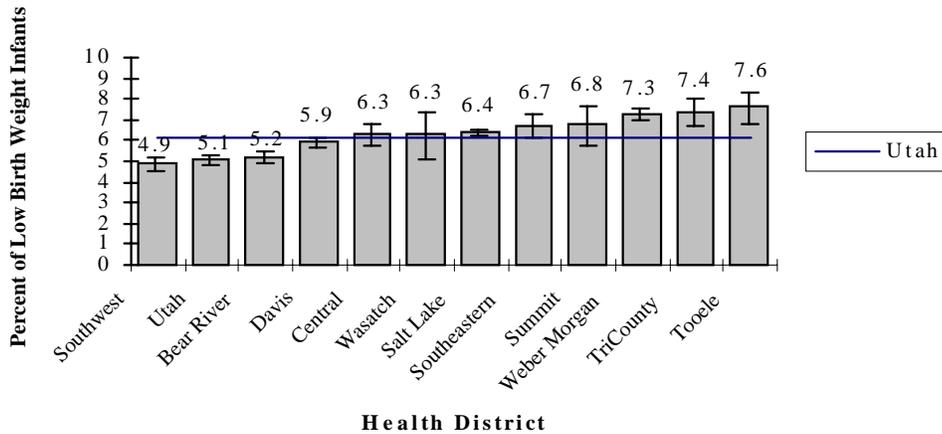
In Utah the percentage of very low birth weight infants born in tertiary care centers has gradually increased from 68% in 1989 to 87% in 1998.<sup>15</sup> Utah data indicated that 71% of infants born weighing 500 grams or less were born in a tertiary facility during the years 1989 through 1997.<sup>15</sup> Of infants born weighing 500 grams or less, those weighing 400 grams or less were less likely to be born in a tertiary facility than were those weighing between 401-500 grams. This finding may reflect several issues: preterm labor that was precipitous, lack of time to transport mother to a tertiary care facility due to timing of labor and distance, or appropriate management of an infant not expected to be viable. Utah still has more work to do to accomplish the Healthy People 2000 goal of 90%, which would help ensure better health outcomes for mothers and infants.

### **Geographic Distribution of Low Birth Weight Births**

During the years 1989-1997, 6.1% of all live births in Utah were low birth weight infants. Geographic areas of the state varied in low birth weight percentages with the lowest percentage in Southwestern Utah Health District and the highest percentage in Tooele County (Figure 4).<sup>16</sup>

## Overview of Low Birth Weight

**Figure 4: Percentage of Infants with Low Birth Weight by Local Health District. Utah, 1989-1997.**



Source: Birth Certificate Database, Office of Vital Records and Statistics, Utah Department of Health

To provide more information at the community level, a geographic distribution of the incidence of low birth weight from 1994-1996 for small areas in Utah is illustrated in the state maps and table in the reference section (Figures A – D and Table 3).<sup>17</sup> Of the 61 small areas, 29 had low birth weight percentages above the state average, ten of which were significantly higher than the state average. Downtown Ogden had the highest low birth weight percentage. Other small areas with higher percentages of low birth weight included: South Ogden, Rose Park, Avenues, Glendale, South Salt Lake, Kearns, Taylorsville, Tooele, and Tri-County Health Department.

Further analysis of 1995-1996 birth certificate and census data found the following variables were significant indicators of low birth weight rates for small areas in Utah: lower average per capita income; lower educational level; later initiation of prenatal care; and smoking during pregnancy. These four factors explained about 67% of the variations in low birth weight percentages among the 61 small areas in Utah.<sup>18</sup> For example, if a small area had higher percentages of mothers with low income, less than high school education, late initiation of prenatal care, and smoking during pregnancy, the small area was more likely to have a higher low birth weight percentage.

# Risks for Low Birth Weight

## Risks for Low Birth Weight

Risk factors for low birth weight are numerous, with some amenable to change. Low birth weight is strongly associated with preterm birth. Factors that may be related to low birth weight, but not necessarily a cause for low birth weight, include socio-demographic factors and lack of or inadequate prenatal care. Conditions that may be related directly to low birth weight include maternal chronic diseases, such as diabetes; poor placental-fetal blood flow; intrauterine growth restriction; poor nutrition before and during pregnancy; smoking during pregnancy; short intervals between pregnancies; maternal age; and multiple gestation births.

This section identifies risk factors related to low birth weight utilizing Utah specific data. Risk factors have been classified into five categories: demographic risks; medical risks prior to pregnancy; medical risks during the current pregnancy; behavioral and environmental risks; and, health care risks. Some known risk factors related to low birth weight, such as maternal chronic diseases, were not included in this report due to difficulty in obtaining accurate data from Utah birth certificates.

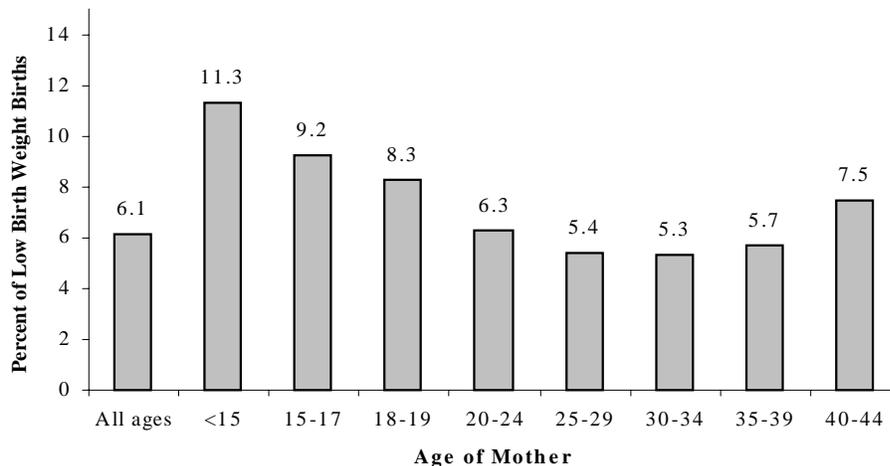
Tables 4 and 5 in the Reference Section detail individual risk factors available on Utah birth certificates as they relate to birth weight categories.

### Demographic Factors

#### *Maternal Age*

Younger and older mothers tend to have the highest percentages of low birth weight infants. Mothers between the ages of 25 and 39 years had the lowest percentage (Figure 5).<sup>16</sup>

**Figure 5: Percentage of Infants with Low Birth Weight by Maternal Age. Utah, 1989-1997.**



Source: Birth Certificate Database, Office of Vital Records and Statistics, Utah Department of Health

#### *Race and Ethnicity*

National data indicate that certain subpopulations, especially Black women, have a higher incidence of low birth weight births compared with the entire population of women delivering live births.<sup>1</sup> Utah data

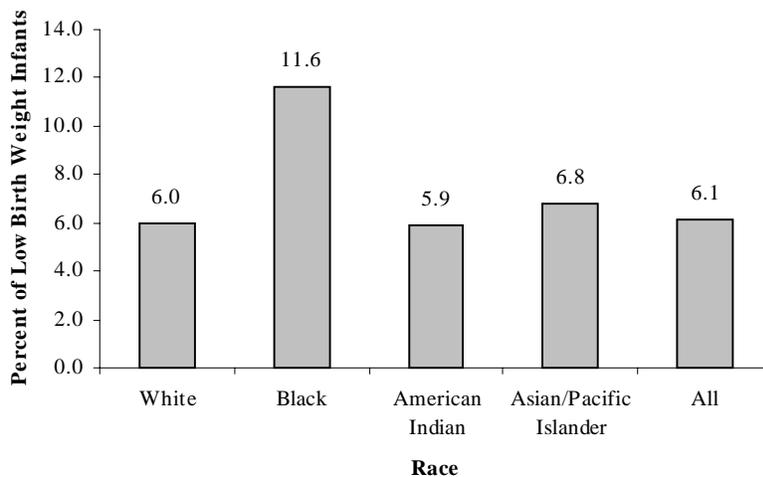
## Risks for Low Birth Weight

support these findings even though the state's racial minority subpopulations make up a small part of the state population. The distribution of live births in Utah during the period of 1989-1997 by mother's race and ethnicity was: 88.0% Non-Hispanic White, 7.0% Hispanic White, 2.6% Asian, Filipino, Hawaiian, and Pacific Islander, 1.8% American Indian, and 0.6% Black.<sup>16</sup>

Overall, 6.1% of live births in Utah were born low birth weight during this time interval. When racial groups were examined separately, Black women had a notably higher percentage of low birth weight births (Figure 6).<sup>16</sup> Hispanic women and women in the diverse Asian, Filipino, Hawaiian and Pacific Islander group also had higher rates (7.6% and 6.8% respectively) than the state as a whole. In 1998, Black women had a low birth weight percentage of 14.6% compared to 6.7% for White women.

Although these relatively small population groups contributed to only a small proportion of the state's low birth weight births, closer examination is necessary to determine strategies to reduce the higher rates in these subpopulations. The difference in racial distributions between Utah and the U.S. may account for part of the lower low birth weight percentage in Utah. In recent years, the low birth weight rate increased in Utah, paralleling increases in the national rate for the white population (Figure 7).<sup>7</sup>

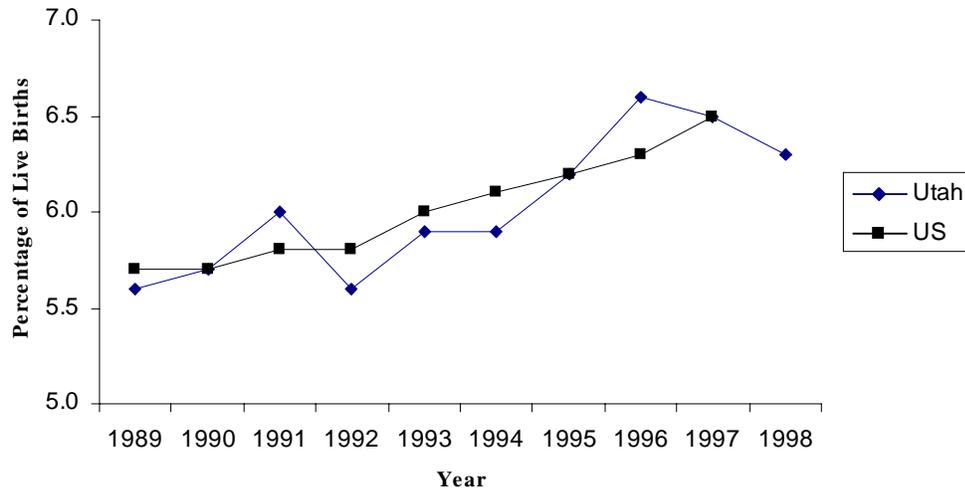
**Figure 6: Percentage of Infants with Low Birth Weight by Mother's Race. Utah, 1989-1997.**



Source: Birth Certificate Database, Office of Vital Records and Statistics, Utah Department of Health

## Risks for Low Birth Weight

**Figure 7: Percentage of Infants with Low Birth Weight for White Mothers. Utah and United States, 1989-1997.**

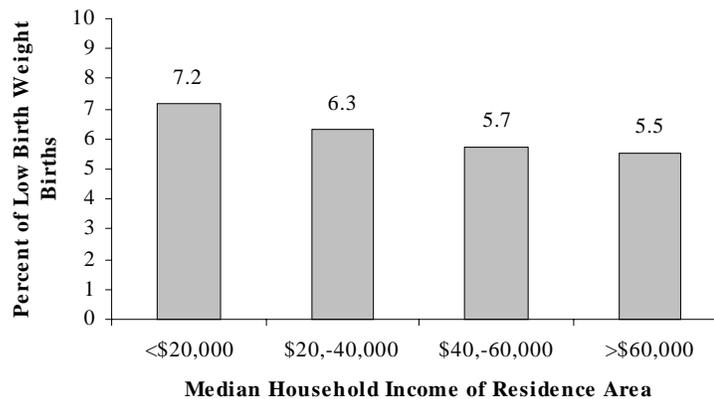


Source: Office of Vital Records and Statistics, Utah Department of Health  
 \*Final US rates for White mothers not available for 1998

### *Socio-Economic Status*

Utah data indicate that the rate of low birth weight was highest for those mothers living in neighborhoods with lower median household income (Figure 8).

**Figure 8: Percentage of Low Birth Weight Infants by Median Household Income of Residence Area of Mother, Utah, 1994-1996.**



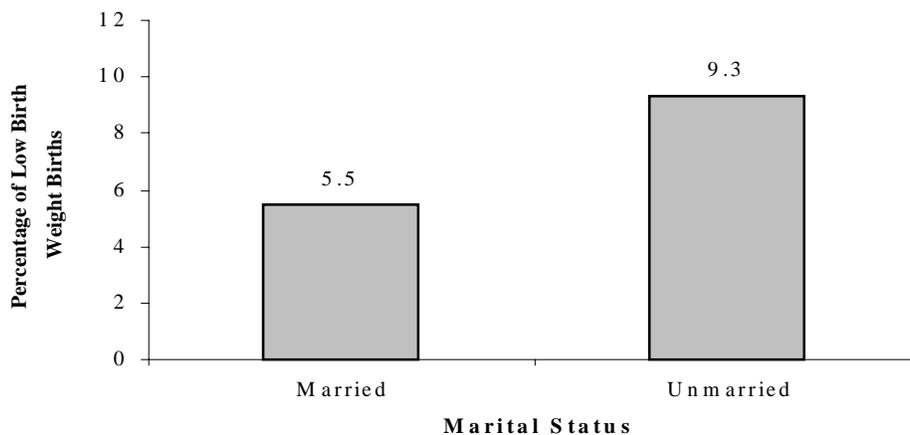
Source: Office of Vital Records and Statistics, Utah Department of Health, and Utah State Geographic Information Database, 1990 Census data, Automated Geographic Reference Center, Information Technology Service, State of Utah

## Risks for Low Birth Weight

### *Marital Status*

Women who reported being unmarried at conception, birth, or any time between, were more likely to deliver a low birth weight infant than married women (Figure 9).<sup>16</sup>

**Figure 9: Percentage of Low Birth Weight Infants by Maternal Marital Status. Utah, 1989-1997.**

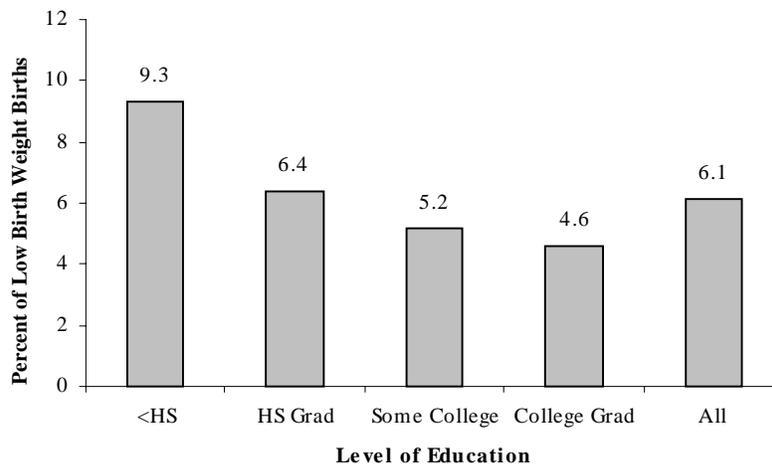


Source: Birth Certificate Database via MatCHIIM database, Office of Vital Records and Statistics, Utah Department of Health

### *Mother's Educational Level*

Maternal educational attainment is associated with lower low birth weight percentages (Figure 10).<sup>16</sup> Women with less education tend to have a higher percentage of low birth weight infants compared to women with more education. This observation is particularly noticeable among women without a high school diploma.

**Figure 10: Percentage of Infants with Low Birth Weight by Education Level. Utah, 1989-1997.**



Source: Birth Certificate Database via MatCHIIM database, Office of Vital Records and Statistics, Utah Department of Health

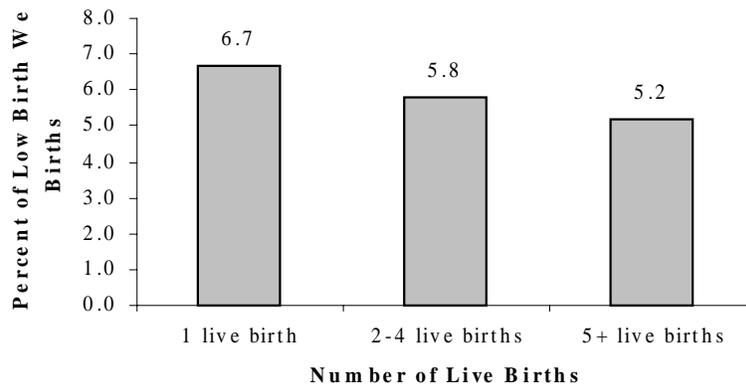
# Risks for Low Birth Weight

## Medical Risks Prior to Pregnancy

### *Parity*

Low birth weight has been associated with parity, both among women who have never given birth (nulliparous), and among those who have had four or more previous births according to national data.<sup>19</sup> Utah data support an increased risk among nulliparous women, but not among women who have had four or more live births, as illustrated in Figure 11.<sup>15</sup> First pregnancies carry a significantly higher incidence of low birth weight than subsequent pregnancies.

**Figure 11: Percentage of Infants with Low Birth Weight by Parity\*, Utah, 1989-1997.**



Source: Office of Vital Records and Statistics, Utah Department of Health \*Includes the current live birth for which the risk of low birth weight is being examined

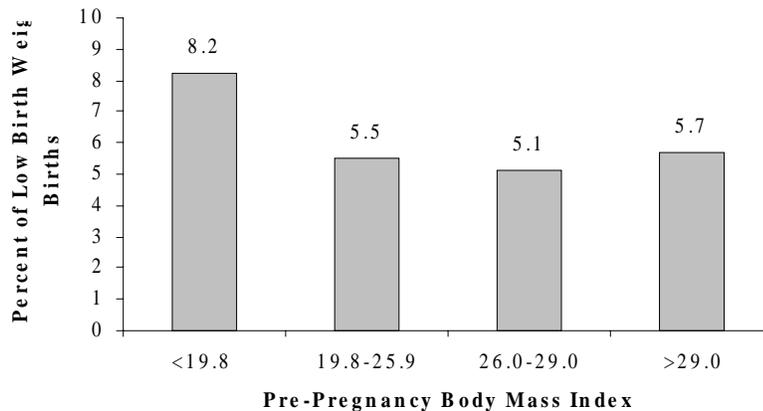
### *Pre-Pregnancy Weight*

Low pre-pregnancy weight has been associated with intrauterine growth restriction and low birth weight.<sup>20,21</sup> Utah women with low pre-pregnancy body mass index (BMI) have a significantly higher incidence of low birth weight births compared to women with normal or higher pre-pregnancy BMIs. Women with a pre-pregnancy BMI of less than 19.8 had the highest incidence of low birth weight com-

## Risks for Low Birth Weight

pared to women with higher BMIs (Figure 12).<sup>15</sup> Women with a lower pre-pregnancy weight are at greater risk for low birth weight births than women who have normal or high weight for height before pregnancy.

**Figure 12: Percentage of Infants with Low Birth Weight by Maternal Pre-pregnancy Weight. Utah, 1989-1997.**



Source: Office of Vital Records and Statistics, Utah Department of Health

### ***History of Previous Low Birth Weight Infants***

Utah data indicate that women who have previously given birth to a low birth weight infant are more likely to have a second low birth weight infant in a subsequent pregnancy. Birth certificate data from Utah deliveries occurring between 1989-1996 were analyzed to examine the risk for low birth weight based on pregnancy history of the birth immediately prior to the one analyzed. Births were classified into low birth weight or normal weight categories. The chances of a woman having a low birth weight infant after a previous live birth that was normal weight versus low birth weight were compared (Table 6 in Reference Section). The risk of women having a second low birth weight infant after having had a low birth weight infant in their last pregnancy was almost 38% compared to only 4% among women who had not had a low birth weight infant in their last pregnancy.<sup>15</sup> In examining the chances of a third low birth weight infant after a second, the chances increased to almost 40% compared to only 4% for women who had not had a low birth weight infant in their second pregnancy during the study period. Women whose first pregnancy in the study period resulted in a low birth weight infant also had increased risk for their third child being low birth weight compared to women who had a normal weight infant (21% versus 6%).<sup>15</sup> These data indicate that women who have had one low birth weight infant have a greater risk of giving birth to low birth weight infants during subsequent pregnancies.

### ***Maternal Genetic Factors***

Genetics or maternal constitution may play a role in the risk of having a low birth weight infant. Preterm or low birth weight may pass from generation to generation of mothers. Utah data indicate that women who themselves were born preterm have a significantly higher risk of giving birth prematurely.<sup>22</sup> Women who themselves were born before 37 weeks of gestation were found to have a 20% greater risk for preterm delivery of their offspring. Risk for preterm delivery among these women was inversely related to maternal gestational age at birth. In addition, increasing parity and decreasing maternal age compounded

## Risks for Low Birth Weight

the intergenerational risk for preterm delivery. Preterm and low birth weight births in some women may be related to an intergenerational genetic or maternal constitutional factor.

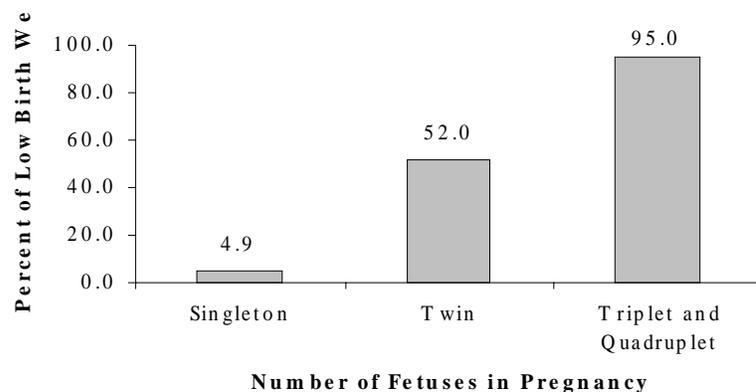
### Medical Risks During Current Pregnancy

#### *Multiple Gestation Pregnancies*

Twins have a higher likelihood of being born low birth weight than does a singleton birth; higher order multiple births have even greater risks for being born low birth weight and for infant mortality. Nationally the numbers of infants born from higher order gestation pregnancies (triplets, quadruplets, etc.) have increased dramatically.<sup>1</sup> Between 1989 and 1996, twin births increased 12%; triplets births more than doubled (109%); quadruplet births increased by 145%; and, quintuplet or higher order births doubled. This trend is due in part to older women giving birth as well as to increased use of artificial reproductive technologies (ART) such as in vitro fertilization and ovulation induction.<sup>1</sup> The increase in multiple gestation pregnancies reflects, in part, the impact of the growing population of women who delay childbirth until later in their childbearing years and advancing maternal age being associated with a higher incidence of naturally occurring multiple gestation.<sup>1</sup>

In 1998 in Utah, there were 1,157 multiple births, including 1081 twins, 66 triplets and 10 quadruplets. Twin births increased 40% from 1989 to 1998, a large increase compared to the increase in total births in the state of 27% during that time period.<sup>9</sup> Triplet births increased by 22 live births from 1997 to 1998, while quadruplet births increased by 10 live births from the previous four years during which there were no quadruplet births. The incidence of low birth weight in multiple gestation pregnancies is directly associated with the number of fetuses in a pregnancy. During the years 1989 through 1997, more than half (53.4%) of all multiple births in Utah were low birth weight, with dramatically increasing low birth weight percentages as the number of fetuses in a single pregnancy increased (Figure 13).<sup>9</sup> Concurrently, the rate of low birth weight multiple births in Utah increased from 504 per 1,000 live births to 591 per 1,000 live births.<sup>15</sup>

**Figure 13: Percentage of Low Birth Weight Births by Number of Fetuses in a Pregnancy, Utah, 1989-1997.**



Source: Office of Vital Records and Statistics, Utah Department of Health

## Risks for Low Birth Weight

Recently, questions have been asked about the practice of assisted reproductive technology (ART) resulting in pregnancies with more than three fetuses. Infertility clinics that follow the guidelines and standards of the American Society of Reproductive Medicine<sup>23</sup> (ASRM) are diligent in their efforts to avoid higher order pregnancies due to the increased risk for poor pregnancy outcomes for the mother and the subsequent offspring. ASRM certified clinics have strict policies that limit the number of fertilized ova implanted for ART pregnancies. Only one infertility clinic in Utah is currently certified by the Society of Assisted Reproductive Technology. Information about individual program characteristics, types of ART, diagnoses, and success rates for certified clinics in each state is included on the CDC Internet website: [www.cdc.gov/ncc.dphp/drh/](http://www.cdc.gov/ncc.dphp/drh/).

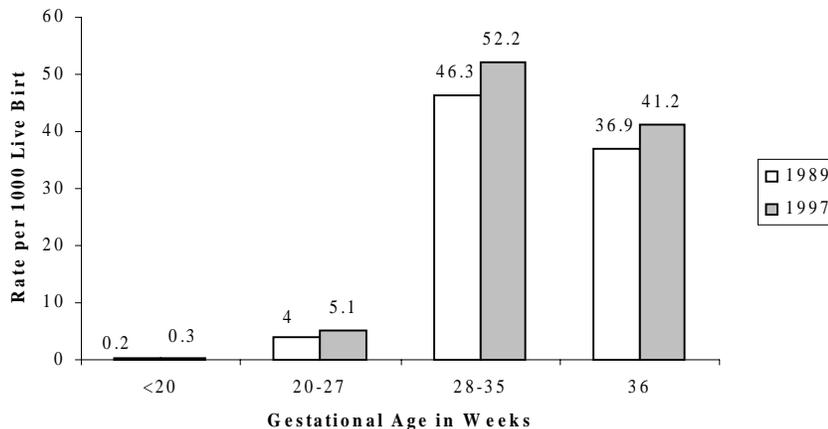
### *Preterm Births*

Low birth weight births are strongly related to preterm labor and delivery. Of all low birth weight infants born in 1997 in Utah, approximately 67% were born before 37 weeks' gestation, while 99% of the extremely low birth weight infants (less than 1,000 grams) were born before 37 weeks' gestation.<sup>15</sup>

Preterm delivery is known to be associated with bacterial vaginal infections, bacteriuria, sexually transmitted diseases, cervical and uterine malformations, and diseases of pregnancy, but often has no identified cause. Nationally the proportion of preterm births steadily increased between 1981 and 1996.<sup>1</sup> The rate of preterm births nationally in 1996 was 110.0 per 1,000 live births, unchanged from 1995. There are three basic categories of preterm birth that are not mutually exclusive: 1) spontaneous preterm labor; 2) preterm rupture of the membranes (PROM); and 3) medical induction (induced delivery for medical reasons). While the proportion of births related to PROM has slightly declined since 1989, births that were medically induced rose from 6.7 percent in 1989 to 11.8 percent in 1996.<sup>1</sup>

In Utah in 1997, 98.9 per 1,000 live births were preterm (before 36 completed weeks of gestation).<sup>15</sup> Preterm live births in the state increased from 87.4 preterm births per 1,000 live births in 1989 to 98.9 in 1997. Each gestational age category of preterm births has experienced an increased incidence since 1989 (Figure 14). Tables 7a and 7b in the Reference Section present the birth data for 1989-1997 by six categories based on term, birth weight and gestational age by risk factors.

**Figure 14: Preterm Birth Rate by Gestational Age at Delivery. Utah, 1989 and 1997.**

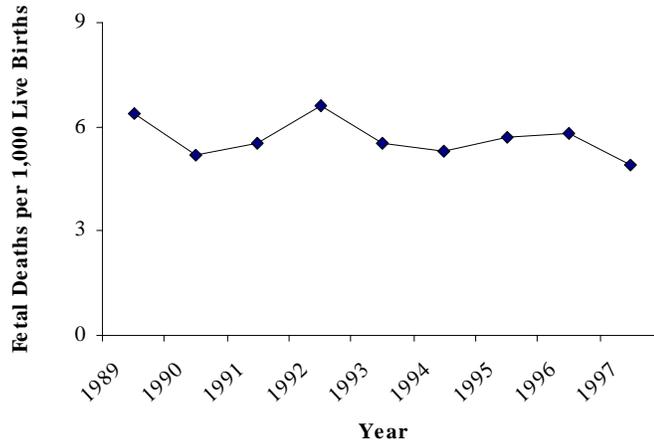


Source: Office of Vital Records and Statistics, Utah Department of Health

## Risks for Low Birth Weight

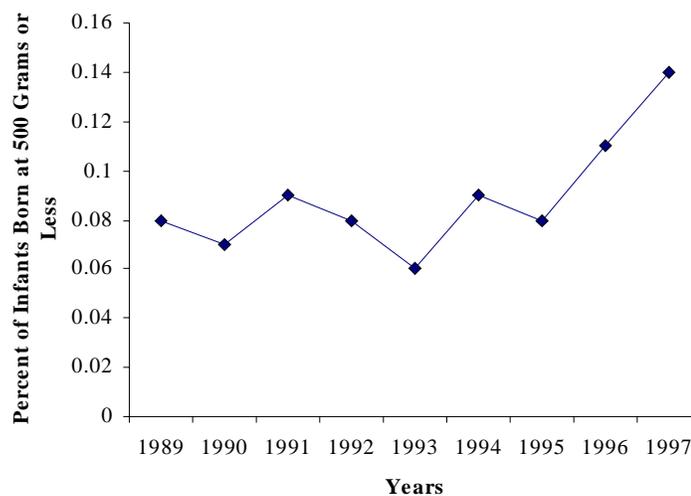
The data suggest that there has been a shift from fetal deaths to preterm low birth weight live births in Utah from 1989 to 1997. In 1989, the fetal death rate was 6.4 per 1,000 live births compared to an all time low rate of 4.9 per 1,000 live births in 1997.<sup>15</sup> In 1998 the fetal death rate dropped to 4.5 per 1,000 live births. There has been a trend of decreasing fetal death rates with concurrent increase in live births of infants of 500 grams or less (Figures 15 and 16), although this change could only account for a small proportion of the observed increase in the low birth weight percentage.

**Figure 15: Fetal Death Rates, Utah, 1989-1997.**



Source: Office of Vital Records and Statistics, Utah Department of Health

**Figure 16: Birth Rate for Infants Weighing 500 Grams or Less, Utah, 1989-1997.**



Source: Office of Vital Records and Statistics, Utah Department of Health

## Risks for Low Birth Weight

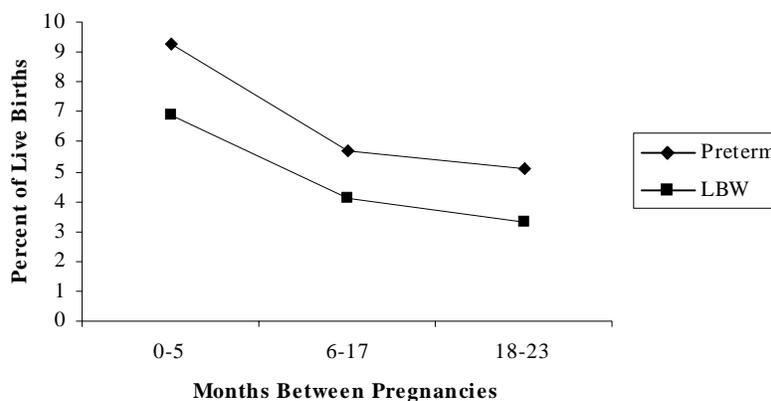
### *Intrauterine Fetal Growth Restriction*

Intrauterine fetal growth restriction, in which the fetus has not grown as expected for its gestational age, is linked with poor pregnancy outcomes. Infants born with growth restriction are those whose birth weight is below the tenth percentile for gestational age, otherwise known as small for gestational age. Small for gestational age infants often have incurred some intrauterine condition that restricted their expected fetal growth, such as poor placental blood flow, maternal hypertension or certain maternal chronic diseases. Approximately 9.3% of all term births in Utah for the years 1989-1997 were classified as small for gestational age (SGA), accounting for more than 29,000 births during this period. Of these 29,000+ births, 27.2% were low birth weight. In addition, of all preterm births during this same period, more than 3,900 infants were classified as SGA, accounting for 12.7% of all preterm births. Approximately 57.1% of all low birth weight infants born in Utah during 1989-1997 were categorized as small for gestational age. Table 7 in the Reference Section presents the birth data into categories of preterm and term, low birth weight by risk factors.

### *Birth Intervals*

Short interpregnancy intervals (defined as the time between delivery dates of consecutive live-born infants minus the gestational age of the most recent infant) have been reported to be associated with poor pregnancy outcomes.<sup>24</sup> In fact, the shorter the interval between pregnancies, the greater the risk of premature delivery. The rate of premature delivery decreased as the interval between pregnancies increased, with the lowest rate among women with intervals of 12 to 24 months between pregnancies. Utah data show similar findings to those reported in the literature.<sup>25</sup> Women with shorter interpregnancy intervals had higher percentages of preterm and low birth weight infants (Figure 17).

**Figure 17: Low Birth Weight and Preterm Births by Interval Between Pregnancies. Utah, 1989-1996.**



Source: BaoPing Zhu, unpublished manuscript presented at the Population Studies Seminar, Department of Sociology, University of Utah, March 4, 1998.

# Risks for Low Birth Weight

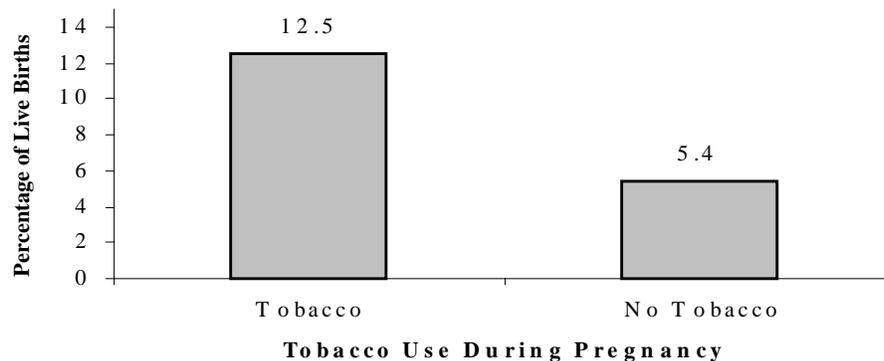
## Behavioral and Environmental Risks

### *Smoking*

Tobacco use during pregnancy is associated with adverse pregnancy outcomes, including intrauterine growth restriction, low birth weight, and infant mortality. The risk for low birth weight is compounded by the number of cigarettes smoked daily during pregnancy.<sup>1</sup> Infants and children of mothers who smoked during pregnancy and/or have been exposed to environmental smoke suffer negative health effects. The risk of Sudden Infant Death Syndrome (SIDS) is reported to be higher among infants who have been exposed to environmental smoke.<sup>26</sup>

Nationally in 1996, 13.6% of women reported tobacco use during pregnancy<sup>1</sup> compared to 9.4% of mothers in Utah.<sup>15</sup> Nationally, 12.1% of infants born to smokers were low birth weight compared to 6.9% for nonsmokers.<sup>1</sup> Utah data for the period of 1989-1997 indicate that 12.5% of women who reported tobacco use had low birth weight infants compared to 5.4% of women who did not report use of tobacco (Figure 18).<sup>16</sup> In 1998, 13.2% of Utah mothers who reported tobacco use had low birth weight infants compared to 6.1% of women who reported no tobacco use. Although only 9.4% of Utah mothers reported tobacco use during pregnancy, 20% of all low birth weight births were to mothers who used tobacco during their pregnancies.<sup>7</sup> Based on a simplistic assumption that women who smoke have the same risk for low birth weight as women who don't smoke, the percentage of low birth weight births in Utah for 1997 would drop from 6.6% to 5.9% if women who smoked had quit smoking prior to their pregnancies, preventing approximately 295 low birth weight births.

**Figure 18: Percentage of Infants with Low Birth Weight by Maternal Tobacco Use. Utah, 1989-1997.**



Source: Birth Certificate Database via MatCHIM data base, Office of Vital Records and Statistics, Utah Department of Health

It is interesting to note that tobacco use decreased significantly from 8.9% in the first trimester to less than 1% in the second and third trimesters among women in Utah.<sup>15</sup> Unfortunately Utah specific data on use of tobacco after birth to determine if mothers continue to abstain from tobacco use are not available. It has been estimated that only about 20% of women quit smoking during pregnancy and most resume smoking after they give birth.<sup>27</sup> Despite the fact that the percentage of Utah mothers who report tobacco use during pregnancy is lower than reported national rates, concerted efforts at smoking cessation need to be

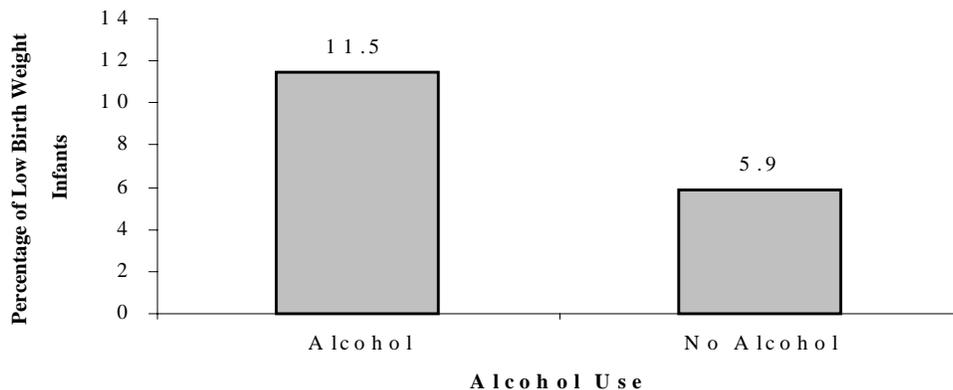
## Risks for Low Birth Weight

directed to women not just during pregnancy but also after delivery. Use of tobacco during pregnancy has a definite relationship with low birth weight outcomes.

### *Alcohol Use During Pregnancy*

Alcohol use during pregnancy has been reported to be associated with low birth weight. In Utah, during 1989-1997, approximately 1.8% of all mothers reported that they had used alcohol during their pregnancies. In comparing women who used alcohol with women who reported they did not use alcohol, women who used alcohol had a higher percentage of low birth weight (Figure 19). In 1998, 12% of women who reported use of alcohol during their pregnancy had low birth weight babies compared to 6.7% among women who reported no alcohol use.

**Figure 19: Percentage of Low Birth Weight Births by Maternal Alcohol Use, Utah, 1989-1997.**



Source: Birth Certificate Database via MatCHIM data base, Office of Vital Records and Statistics, Utah Department of Health

### *Weight Gain During Pregnancy*

Adequate weight gain during pregnancy has been positively associated with infant well-being. Inadequate weight gain has been associated with intrauterine growth restriction and low birth weight.<sup>28</sup> Among Utah women with inadequate weight gain during pregnancy, the low birth weight incidence is significantly higher (6.2%) than among women with adequate weight gain (5.9%).<sup>15</sup>

### **Health Care Risks**

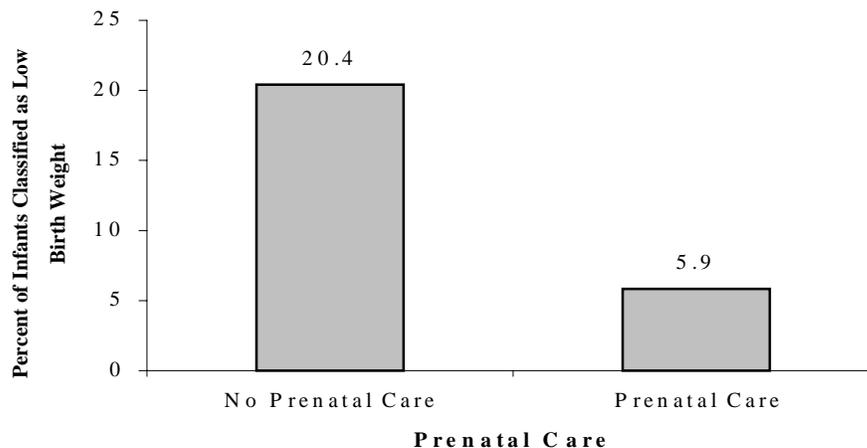
#### *Inadequate or No Prenatal Care*

Women who do not receive prenatal care are much more likely to have a low birth weight infant. Prenatal care offers providers an opportunity to identify potential risks for poor pregnancy outcome, but it is difficult to reduce risks for poor outcomes when care is delayed, inconsistent or lacking. Although the percentage of Utah mothers with no prenatal care decreased from 2.1% in 1989 to 1.5% in 1997, birth certificate data for 1989-1997 indicated that mothers who receive no prenatal care had much higher percentages of low birth weight births (Figure 20).<sup>16</sup> Women who received inadequate prenatal care (late entry into care or inadequate number of visits) had a significantly higher incidence of low birth weight (6.3%)

## Risks for Low Birth Weight

compared to women who adequate care (5.8%).<sup>16</sup> Lack of prenatal care may be a marker for high risk factors, such as substance abuse or domestic violence. Mothers who receive no prenatal care or those with inadequate care have a higher risk for low birth weight.

**Figure 20: Percentage of Infants with Low Birth Weight by Prenatal Care. Utah, 1989-1997.**



Source: Birth Certificate Database via MatCHIIM database, Office of Vital Records and Statistics, Utah Department of Health

### Summary of Risk Factors Associated with Low Birth Weight Births

The previous sections presented low birth weight as it is associated with individual risk factors. However, individual risk factors often interact, creating a higher risk for low birth weight. Many of the predictors of low birth weight included in this section and in the tables in the Reference Section are correlated with each other. We used a statistical method, logistic regression, to identify the most important independent predictors of low birth weight in Utah. That is, when all of the potentially important predictors are examined at the same time, which are most important. The results of that logistic regression analysis are presented in Table 8. In that analysis, the strongest predictor of low birth weight was a multiple gestation pregnancy. The adjusted odds of LBW was over 25 times higher for a multiple gestation pregnancy than for a singleton pregnancy (odds ratio 27.4, 95% confidence interval 26.1-28.8). In 1995-1997, multiple gestation pregnancies accounted for 2.4% of all live births and 21.7% of LBW births. In the logistic regression analysis, other important predictors included absence of any prenatal care (odds ratio 3.3; 95% CI 2.9-3.8), and smoking either alone or in combination with consumption of alcohol. Smoking was recorded for 9.2% of live births and 18.7% of LBW births in 1995-97. Absence of prenatal care, while a reasonably strong predictor, accounted for a very small proportion of LBW births (0.4% of live births and 1.4% of LBW births).

As noted elsewhere in this report, about two thirds of LBW births are pre-term deliveries (gestational age at delivery < 37 weeks). Risk factors and predictors for LBW that is due to pre-term delivery might well differ from those for LBW that is related to intrauterine growth restriction. To examine that question, we also examined predictors of those two subsets of LBW births using the same statistical methods as for LBW overall. In those analyses, many of the predictors were similar for both preterm and term

## Risks for Low Birth Weight

LBW births. Some differences were observed, however (Tables 9 and 10). Multiple gestation pregnancy and absence of prenatal care were predictors of both subsets of LBW, but were substantially stronger predictors of preterm LBW than of term LBW. In contrast, smoking and consuming alcohol during pregnancy were stronger predictors of term LBW than of preterm LBW. In predicting a woman's risk for having a low birth weight infant, logistical regression analysis was done relative to a reference group consisting of women who are 20-34 years of age, are high school graduates, are married, are non-hispanic white, etc. This analysis (see Table 11) demonstrates that the highest risk for low birth weight is related to being unmarried and young as well as older maternal age.

The rise in low birth weight rates in the state has occurred at the same time as an increase in the percentage of births that were preterm. During the years 1989-1998, low birth weight rates increased from 5.7% to 6.8% of all live births while the percentages of preterm births increased from 8.7% to 10.1% of all live births, with a relatively stable percentage of term low birth weight births of 2.9-3.3%. Several factors may play a role in these increases including a very small contribution by declining fetal deaths concurrent with rising births of infants weighing less than 500 grams; earlier obstetrical intervention due to advances that have led to improved survival among low birth weight infants, such as surfactant and betamethasone; possible increase in conditions known to be associated with preterm birth, such as infection; and, perhaps improved accuracy in pregnancy dating with widespread use of ultrasound. The rising low birth weight rates in Utah are not completely explained by multiple gestation pregnancies as they have not increased that much from 1989 to 1997, although the dramatic increase in triplet and quadruplet births contributed to a portion of the increase in 1998. Probably the most important risk factor for low birth weight remains preterm birth, although its causes remain incompletely understood.

### Recommendations

Low birth weight, an outcome of complex interrelated factors during pregnancy, presents a difficult problem to address effectively. Since little is known about effective strategies to prevent low birth weight (especially as it is associated with preterm birth), it will be difficult to achieve a reduction in rates until successful methods for the prevention of preterm labor have been developed. The following recommendations may assist health care providers and women of childbearing age to reduce risks known to be associated with low birth weight.

- All pregnant women should be encouraged to enter prenatal care early in their pregnancies to facilitate early identification of risk factors.
- All pregnant women should be assessed during their first prenatal care visit to identify risks for adverse pregnancy outcome, including health history, pregnancy history, nutritional status, screening for alcohol, tobacco and other drug use, psychosocial history, including stress, depression, anxiety, and domestic violence.
  - Pregnant women should be asked about their own mother's pregnancy history of having low birth weight infants because it may repeat itself in the current generation.
  - Women at high risk for low birth weight need close monitoring and tracking by a qualified prenatal care provider with possible referral to a high risk obstetrical specialist and /or referral for case management and social support. A pregnant mother who threatens to deliver a very low birth weight infant should be delivered in a tertiary center to ensure availability of appropriate medical care for mother and infant.
  - Pregnant women with chronic medical conditions need a medical provider with the necessary expertise to manage their obstetrical care concurrent with their medical condition. This may mean that one medical provider with the necessary expertise manage the obstetrical care along with the medical condition, or it may necessitate collaboration between an obstetrical specialist and a medical specialist for the particular medical condition depending on its severity
- Pregnant women should be referred to ancillary services, such as WIC, Medicaid, Family Employment Program (FEP), food stamps, child care, psychosocial support services, housing and transportation resources.
- For risk factors amenable to change, such as appropriate weight gain, smoking, and/or substance use, pregnant women need to be counseled and supported in their efforts to reduce risks.
  - Weight before pregnancy as well as weight gain during pregnancy should be carefully monitored to promote optimal outcomes for mother and infant.
  - Women who smoke should be referred to smoking cessation classes or one-on-one counseling.
  - Women who use alcohol or other substances should be counseled as to their potential impact on pregnancy and referred to appropriate resources for treatment if necessary.

## Recommendations

- Case management should be initiated to assist prenatal providers with support services for high-risk pregnant women to enhance a positive pregnancy outcome. This service can include home health care, social support, educational materials and information.
- Early recognition and appropriate intervention for preterm labor by providers to reduce low birth weight births due to preterm delivery should be promoted.
  - Screening for and treating urinary and genital tract infections may reduce preterm labor.
  - Pregnant women should be educated about recognition of the signs and symptoms of preterm labor and the importance of follow-up with their health care provider if they occur.
  - Women should be encouraged to do fetal kick counts in pregnancy, increasing awareness of changes in fetal activity.
- The standards developed by the American Society for Assisted Reproductive Medicine should be followed by all infertility clinics. Assisted reproductive technology standards and practices should be instituted to avoid the growing numbers of higher order gestation pregnancies with their associated risks for pregnant women and fetuses.
  - Use of fertility drugs should be closely monitored by infertility specialists to reduce the risk of higher order multiple gestation pregnancies.
- Promotion of effective contraception can be helpful in reducing poor pregnancy outcomes due to short interpregnancy intervals and unintended pregnancies. For example, postpartum women can be given a pack of birth control or other form of contraceptive method prior to discharge home.
- Women should be encouraged to seek preconceptional health care to assist them in preparing for healthy pregnancies.
- Promotion of improved data collection on birth certificates will assure that accurate and complete data are available for further analysis of the possible links between pregnancy outcomes and complications of pregnancy and labor and delivery.
- Promotion of more research into the causes of preterm birth and low birth weight will assist in identification of preventable risk factors.

### **Additional Analysis**

Further analysis is necessary in order to pinpoint more modifiable risk factors for low birth weight. For example, what is it about a certain geographic area that results in higher rates? Is it because more women in that area don't get into prenatal care? Or are there other reasons? Obviously more data analysis is needed to pinpoint more specifics about certain populations within Utah that are at higher risk for low birth weight.

One source for additional information about pregnancy and pregnancy outcomes is a new project that began mid-1999. The Utah Department of Health has developed a new surveillance program called

## Recommendations

Pregnancy Risk Assessment Monitoring System (PRAMS). PRAMS is a program that was developed by the Centers for Disease Control and Prevention (CDC). The Utah Department of Health is conducting the Utah PRAMS Program, with technical assistance from CDC.

PRAMS is a survey mailed out to a sample of women two to four months after delivery to ask them about their experiences and behaviors before, during and after pregnancy. The Utah sample is stratified by birth weight and race. This sampling approach will enable the Department to collect data on a large enough sample of women to report findings in each group after several years of data have been collected. Data collection began mid-1999 with the first results to be available early 2001. Examples of information collected through PRAMS includes: maternal practices during pregnancy, information given to a mother by her provider, stresses during pregnancy, intendedness of pregnancy, and breastfeeding information.

## Support Programs

### **Support Programs**

#### **Baby Your Baby**

Baby Your Baby, a Utah Department of Health program, is a service to assist in locating prenatal and well child health care providers and financial resources so that pregnant women and their children can obtain needed health care. The program also assists in locating providers and financial resources for well child health care. The Baby Your Baby Hotline number is 1-800-826-9662.

#### **Pregnancy RiskLine**

Pregnancy RiskLine, a service of the Utah Department of Health and University of Utah Health Sciences Center, provides specific information regarding potential harm to a pregnancy due to exposure to substances, such as medications (over-the-counter and prescribed drugs), street drugs, chemicals, and infectious agents. Confidential information is provided to all callers. Pregnancy RiskLine can be reached by calling 801-328-2229 or outside the Salt Lake metropolitan area, call 1-800-822-2229.

**Women, Infant Child (WIC) Services** (Supplemental Nutrition Program for Women, Infants and Children) The Utah WIC Program supports nutritional needs, breastfeeding, and good nutrition by providing nutritional counseling and assessment and enhanced food packages for women and children under 5 years of age in need. Women on WIC tend to have good pregnancy outcomes. WIC's number is 1-800-662-3638.

#### **Case Management Programs**

Many private insurance payers offer case management services for high-risk pregnant participants. Medicaid managed care organizations offer these services for pregnant women in Utah. Providers and participants can request case management services which help reduce the risk of poor pregnancy outcomes through close monitoring of the pregnancy and coordination of needed services. These services can be arranged by contacting the managed care agency or third party payer.

#### **Family Planning Services**

Family planning services are available throughout the state through private providers and Planned Parenthood, public, and community health clinics. There is a great need to increase family planning services particularly for low-income women and men. The Alan Guttmacher Institute<sup>29</sup> estimated that more than 123,000 women in Utah are in need of publicly funded family planning services. Health care visits for men and women need to include discussions of healthy spacing of pregnancies through effective family planning methods. Health care providers can use non-traditional health care visits to promote planning for pregnancy; for example, during a well child visit, the provider might discuss pregnancy spacing in order to foster optimal interaction between parent and child. The Baby Your Baby Hotline can provide callers with the names and locations of family planning clinics.

**Smoking Cessation Resources** Local health departments, American Cancer Society, and the Utah Lung Association offer smoking cessation programs. Smoking cessation during pregnancy as well as after promotes better outcomes for both mother and infant. The risk of SIDS is reduced with elimination of environmental smoke exposure after birth. The Tobacco Control and Prevention Program at the Utah Department of Health can provide callers with information about availability of smoking cessation resources for pregnant women. Information on locations for smoking cessation resources in the state can be obtained by calling 538-6120 or 1-800-894-7651.

## References

### References:

1. U.S. Department of Health and Human Services. Monthly Vital Statistics Report. National Center for Health Statistics. Centers for Disease Control and Prevention, 46:11; supplement. June 30, 1998.
2. Shiono, PH, Behrman, RE. Low birth weight: Analysis and recommendations. The Future of Children, Low Birth Weight. The David and Lucille Packard Foundation. 5(1), 1995.
3. Paneth, N. The problem of low birth weight. The Future of Children, Low Birth Weight. The David and Lucille Packard Foundation. 5:19-34, 1995.
4. Cunningham, et al. *William's Obstetrics*. 20<sup>th</sup> edition. Stamford, CT: Appleton and Lange, 1997.
5. Healthy People 2000: National Health Promotion and Disease Prevention Objectives. Public Health Service, U.S. Department of Health and Human Services, Washington, DC, 1990.
6. National Center for Health Statistics internet database. Centers for Disease Control and Prevention. Internet address: <http://www.cdc.gov/nchs>
7. Utah's vital statistics annual report: 1997. Bureau of Vital Records, Office of Public Health Data, Utah Department of Health, 1998.
8. Hack, M, Klein, N and Taylor, HG. Long term developmental outcomes of low birth weight infants. The Future of Children, Low Birth Weight. The David and Lucille Packard Foundation. 5:187, 1995.
9. Phelan, S, Goldenberg, R, Alexander, G and Cliver, S. Perinatal mortality and its relationship to the reporting of low birth weight infants. American Journal of Public Health. 88(8):1236-1239, 1998.
10. McIntire, D., Bloom, S., Casey, B., and Leveno, K. Birth weight in relation to morbidity and mortality among newborn infants. New England Journal of Medicine. 340(16):1234-8, 1999.
11. Lewit, EM, Baker, S, Corman, H and Shiono, PH. The direct cost of low birth weight. The Future of Children, Low Birth Weight. The David and Lucille Packard Foundation. 5(1):35-56, 1995.
12. Healthcare Cost and Utilization Project (HCUP3) Nationwide Inpatient Sample for 1994: DRG from Medicaid Expenditure Panel Survey (MEPS). Agency for Health Care Policy and Research. AHCPR Pub No 97-0056. Available on-line: <http://www.ahcpr.gov/data/hcup/94drgb.htm>
13. Utah Inpatient Hospital Discharge Dataset. Utah Office of Health Data Analysis. Utah Department of Health. 1997.
14. Schraeder, BD, Heverly, MA, O'Brien, C and Goodman, R. Academic achievement and educational resource use of very low birth weight (VLBW) survivors. Pediatric Nursing. 23(1):21, 1997.
15. Birth Certificate Database. Bureau of Vital Records, Utah Department of Health
16. Birth Certificate Database. Maternal and Child Health Information Internet-Query Module (MatCHIIM). Utah Department of Health. Internet address: <http://hlunix.hl.state.ut.us/MatCHIIM/main/index.htm>
17. Bureau of Surveillance and Analysis. Community health status: Selected measures of health status by small area in Utah. Salt Lake City, UT: Utah Department of Health, 1998.
18. Kemp, E. MCHB GISP interim report on small area analysis of pregnancy characteristics and outcomes in Utah, 1995-1996. Salt Lake City, UT. Utah Department of Health Division of Community and Family Health Services, 1998.
19. Klein, L and Goldenberg, RL. Prenatal care and its effect on preterm birth and low birth weight. New Perspectives on Prenatal Care. Elsevier, New York, 1990.
20. Cnattingius, S, Bergstrom, R, Lipworth, L, and Kramer, M. Prepregnancy weight and the risk of adverse pregnancy outcomes. New England Journal of Medicine 338 (3):147-152, 1998.
21. Walling, AD. Effect of pregravid body mass index on pregnancy outcome. American Family Physician 56(2): 614, 1997.
22. Porter, TF, Fraser, AM, Hunter, CY, et al. The risk of preterm birth across generations. Obstetrics and Gynecology 90(1):63-67, 1997.
23. American Society for Reproductive Medicine. Revised minimum standards for in vitro fertilization, gamete intrafallopian transfer, and related procedures. Fertility and Sterility 70:4, suppl. 2, 1998. Internet address: [www.cdc.gov/ncc.dphp/drh](http://www.cdc.gov/ncc.dphp/drh)
24. Klerman, LV, Cliver, SP, and Goldenberg, RL. The impact of short interpregnancy intervals on pregnancy

## References

- outcomes in a low-income population. *American Journal of Public Health* 88(8): 1182-1185, 1998.
25. Zhu, BP, Rolfs, RT, Nangle, BE, Horan, JM. Effect of the interval between pregnancies on perinatal outcomes. *New England Journal of Medicine*. 340(8):589-94, 1999.
  26. Blair, PS, Fleming, PJ, Bensley, D, et al. Smoking and sudden infant death syndrome: Results from 1993-5 case-control study for confidential inquiry into stillbirths and deaths in infancy. *British Medical Journal* 313:195-198, 1996.
  27. North Carolina Project Assist. A guide for counseling women who smoke: A focus on pregnancy and the childbearing years. 1995.
  28. Institute of Medicine. *Nutrition During Pregnancy and Lactation*, Washington DC, National Academy Press, 1992.
  29. Alan Guttmacher Institute. *Contraception counts: State by state information*. New York, NY, 1997.  
Internet address: <http://www.agi-usa.org/>

## Definitions

### Definitions

**Adequate weight gain in pregnancy** - the amount of weight gained during pregnancy at specific gestational ages of the pregnancy. Women who are under the level determined to be appropriate for their BMI and gestational age of the pregnancy are considered to have inadequate weight gain

**Alcohol use** - any consumption of alcohol (wine, beer, and liquor) during pregnancy reported by mother on birth certificate

**Body Mass Index (BMI)** - measure of weight for height to determine level of appropriateness of weight

Normal BMI - body mass index between 19.8 and 26

Low BMI - body mass index less than 19.8 (low weight for height)

High BMI - body mass index greater than 26 (obese)

**Chronic disease** – usually refers to a condition that lasts a long time; may refer to a condition that lasts three months or longer

**Fetal death** – fetus of 20 weeks of gestation or more that is not born alive; reportable by state law

**Fetal death rate** – Number of fetal deaths per 1000 live births in a year

**Iatrogenic** – usually refers to a side effect that is induced by the treatment itself

**Infant mortality** - death of an infant within the first year of life (364 days)

**Infant mortality rate** - number of death of infants under one year of age per 1000 live births in one year

**Intrauterine growth restriction**- condition in which fetus does not grow appropriately for gestation of pregnancy, weight less than 10% for gestational age on growth curve

**Low birth weight** - birth weight less than 2500 grams or 5.5 pounds

Moderate low birth weight - birth weight between 1500-2500 grams (three pounds five ounces to five pounds seven ounces)

Very low birth weight - birth weight between 1000 –1499 grams (two pounds four ounces to three pounds four ounces)

Extremely low birth weight- birth weight of less than 1000 grams (two pounds four ounces)

**Low birth weight percentage** - number of low birth weight infants per 100 live births

**Low birth weight rate** - number of low birth weight births per 1000 live births

**Low educational achievement** - mothers 19 or older who have not achieved a high school education

**Morbidity** – usually refers to a disease state, or complications of a condition

**Multiple gestation** - a pregnancy in which there is more than one fetus, i.e., twins, triplets or quadruplets

**Neonatal death** - death of an infant under 28 days of age

**Neonatologist** - pediatric physician with board certification as a specialist in high risk newborn care

**Parity** – Number of pregnancies that have resulted in a delivery

**Perinatologist** - obstetric physician with board certification as a specialist in high risk obstetrics

**Pregnancy interval** - the time between delivery dates of consecutive live-born infants minus the gestational age of the most recent infant.

**Premature rupture of membranes (PROM)** - rupture of membranes prior to onset of labor

**Prenatal care**- health care received during pregnancy, optimally beginning in the first three months of pregnancy and continuing on a regular basis throughout the entire pregnancy

**Respiratory distress Syndrome (RDS)** – respiratory disease of premature infants

**Short interpregnancy interval** - less than 12 months between the completion of one pregnancy resulting in a live born infant and conception of the next pregnancy

**SIDS - Sudden Infant Death Syndrome** - the sudden of an infant under one year of age that remains unexplained after a complete investigation, which includes an autopsy, examination of the death scene, and review of the symptoms or illnesses the infant had prior to dying and any other pertinent medical history.

## Definitions

**Small for gestational age (SGA)** – birth weight of infant is below the 10<sup>th</sup> percentile of weight for gestational age, indicating intrauterine growth restriction

**Smoking** - use of cigarettes during pregnancy as reported by mother on birth certificate

**Term of pregnancy:**

**Preterm** - infant born before 37 weeks of gestation

**Term** - infant born between 37 and 42 weeks of gestation

**Postterm** - infant born after 42 weeks of gestation

**Tertiary Center** - a medical center with high risk obstetrical specialists (board certified perinatologists) and neonatal specialists (board certified neonatologists) and newborn intensive care facilities

**Unmarried** - a pregnant woman reporting that she is single or not married on her baby's birth certificate

# **REFERENCE TABLES AND FIGURES**