

# Infant Mortality from Perinatal Conditions, Utah 2003-2008



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# Infant Mortality Due to Perinatal Conditions in Utah, 2003-2008

## Background

Infant mortality is defined as the death of a liveborn infant before 365 days of age. The infant mortality rate is an important measure of a nation's health, and allows for comparisons of health and well-being across and within countries, states, and communities. The infant mortality rate reflects the current health status of infants and predicts the next generation's health. It also gives some indication of maternal health and the quality and accessibility of primary health care available to infants and women prior to and between pregnancies.

Data from the Utah Department of Health (UDOH) Office of Vital Records and Statistics (OVRs) show the overall infant mortality rates in Utah for all causes combined for the years 2003-2008 ranged from 4.48 to 5.17/1,000 live births. The rates have been stable in this range since 1999. During 1991-1998, Utah's infant mortality rate was higher, ranging from 5.18 to 6.17/1,000 live births.

The three leading causes of overall infant mortality during 2003-2008 included conditions related to the perinatal period, particularly short gestation, birth defects, and infant medical conditions. Table 1 shows the breakdown by cause.

**Table 1 Leading Causes of Infant Mortality, Utah 2003-2008**

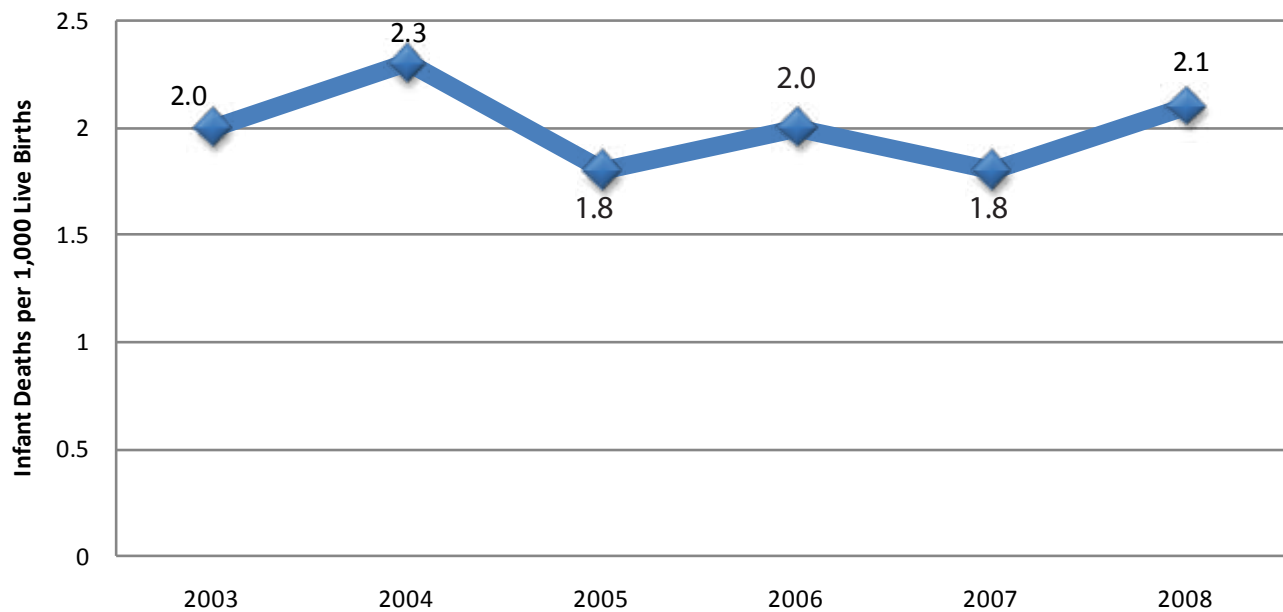
Rank	Cause of Death	Total # Infant Deaths (n= 1,719)	% of Total Deaths	Rate per 1,000
1	Perinatal conditions (e.g., short gestation and low birth weight. <sup>1</sup> )	739	43.0%	2.3
2	Congenital malformations and chromosomal abnormalities	509	29.6%	1.6
3	Medical conditions	222	12.9%	0.7
4	Sudden Infant Death Syndrome (SIDS)	86	5.0%	0.3
5	All other causes	163	9.5%	0.5

These figures include all infants born in Utah, regardless of mother's state of residency.

Data from Utah Department of Health, Office of Vital Records and Statistics

This report will examine only a subset of Utah's infant mortality: the 640 infants whose deaths are attributed solely to perinatal conditions. These are infants liveborn at 20 weeks or greater gestation who died before one year of age due to a maternal or infant condition related to pregnancy or delivery. The infant mortality rate for deaths due to perinatal conditions ranged from 1.8 to 2.3 deaths/1,000 live births for the years 2003-2008. Figure 1 shows infant mortality rates due to perinatal conditions by year.

**Figure 1. Infant Mortality Rates Due to Perinatal Conditions, Utah 2003-2008**



Data from Utah Department of Health;  
Numerator from Perinatal Mortality Review Program;  
Denominator from Office of Vital Records and Statistics

This report does not address infant deaths due to congenital or chromosomal anomalies, as those are tracked by the Utah Birth Defects Network (UBDN). This report does not include stillbirths, which are defined as fetal deaths occurring in utero after 20 completed weeks of gestation which are not born alive. Data used in this report cover only through 2008 because a change in the birth certificate form in 2009 rendered many variables not comparable between the two forms.

## Perinatal Mortality Review Program

The UDOH Perinatal Mortality Review (PMR) Program was launched in 1995. The PMR program is based on the National Fetal-Infant Mortality Review (NFIMR) model. The NFIMR methodology was developed in a partnership between the American College of Obstetricians and Gynecologists (ACOG) and the U.S. Department of Health and Human Services (HHS) Maternal and Child Health Bureau (MCHB), in the Health Resources and Services Administration (HRSA). All cases of infant mortality at 20 weeks gestation or greater due to perinatal conditions are recorded in the PMR program's database. Infants born at 23 and 24 weeks gestation and who later die are more closely reviewed, since this age is considered the edge of viability. Every infant death of 25 weeks gestation and greater is thoroughly reviewed by the PMR Committee. This group is comprised of experts in obstetric and pediatric health care who explore factors that may have contributed to a specific death, discuss strategies that may mitigate those factors, and make recommendations that may prevent future deaths. Infant deaths are reviewed through the lens of asking or determining whether there was any chance the outcome could have been prevented by altering the care or the systems of care that impacted the mother's prenatal course and delivery or the infant's birth and outcome.

The Cycle of Improvement is at the core of the FIMR process (see Figure 2). Review of fetal-infant mortality has been shown to be an effective perinatal systems intervention, and has been done for more than 20 years. According to the FIMR manual, the presence of a local FIMR "...appears to significantly improve a community's performance of public health functions as well as enhance the existing perinatal care system's goals, components and communication mechanisms."<sup>2</sup>

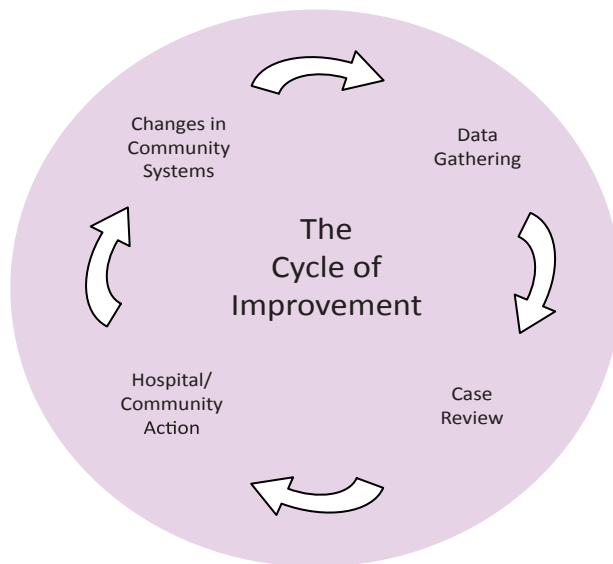


Figure 2. The FIMR Process

## Methods

Birth and death certificates for all infants who died under one year of age were linked by the UDOH Office of Vital Records and Statistics and reviewed by the Perinatal Mortality Review Coordinator. Deaths from perinatal conditions were identified by selecting all records containing International Classification of Disease, 9th Revision (ICD-10) codes P00-P96 and excluding infants who died of other causes. The PMR Coordinator accessed the medical records from the facilities where the birth and/or death occurred as allowed by Utah Code, Chapter 25 section 26-25-1, which grants authority to provide data to the Department of Health for the purpose of reducing morbidity and mortality. Data were abstracted from infant and maternal medical records using field-tested tools provided by the NFIMR Program and entered into an Access database. Cases were summarized, de-identified and reviewed by the PMR Committee. The chi-square test of independence was used to examine the statistical significance of bivariate association between each independent variable and infant mortality.

## Results

The Office of Vital Records and Statistics reports 739 infant deaths due to perinatal conditions for 2003-2008, with an infant mortality rate of 2.3/1,000 live births. The PMR Committee reviewed 640 of the 739 deaths recorded by OVRS for these same years, with an infant mortality rate of 2.0/1,000 live births due to perinatal conditions. Thus, there were 99 infant deaths reported by OVRS as due to perinatal conditions which were excluded from the PMR database and reviews. Death certificates for these 99 infants included various co-occurring causes of death, including significant birth defects, chromosomal anomalies, or significant metabolic disorders. If a perinatal condition co-occurs with a lethal structural birth defect or a significant chromosomal anomaly, that case is not reviewed by PMR, but rather by the Utah Birth Defects Network (UBDN).

As they have for many years, perinatal conditions still account for the majority of infant deaths, as shown in Table 1. SIDS had long been the third most-common cause of infant death, but due to the success of the American Academy of Pediatrics' (AAP) Back to Sleep campaign, it has dropped to fourth position.



Table 2 shows infant mortality rates by the infant’s gestational age at birth, birth weight, and plurality of birth. Infant mortality for 2003-2008 was highest at the lower gestational ages and lower birthweights, and higher among infants of multiple gestation. All comparisons were statistically significant with a p value <0.05 unless otherwise noted.

Data sources for Table 2 below and Figures 3-10 on pages 6-13 are: Numerator of infant deaths from Perinatal Mortality Review Program database, and Denominator of all live births from Office of Vital Records and Statistics.

**Table 2. Cause-specific Infant Mortality Rates Attributed to Perinatal Conditions, Utah 2003-2008**

Infant Characteristics	Number of Infant Deaths Attributed to Perinatal Conditions	Number of Live Births 20+ Weeks	Cause-specific Mortality Rate (per 1,000 Live Births)*	p value
<b>Total 2003-2008</b>	<b>640</b>	<b>323,022</b>	<b>2.0</b>	
<b>Gestational Age</b>				
20-21 weeks	134	153	875.8	< 0.001
22-24 weeks	293	544	538.6	< 0.001
25-27 weeks	112	938	119.4	< 0.001
28-31 weeks	35	2,447	14.3	< 0.001
32-33 weeks	9	3,497	2.6	< 0.001
34-36 weeks	12	24,466	0.5	< 0.001
37-38 weeks	19	100,804	0.2	NS
39 + weeks	26	190,158	0.1	reference
<b>Birth Weight</b>				
Under 500 gm	225	302	745.0	< 0.001
500-999 gm	301	1,294	232.6	< 0.001
1000-1499 gm	36	1,897	19.0	< 0.001
1500-2499 gm	22	18,701	1.2	< 0.001
2500 gm and +	51	300,764	0.2	reference
<b>Plurality of Birth</b>				
Singleton	465	313,622	1.5	reference
Twins	150	8,975	16.7	< 0.001
Triplets	18	366	49.2	< 0.001
Quadruplets or higher	8	44	181.8	< 0.001

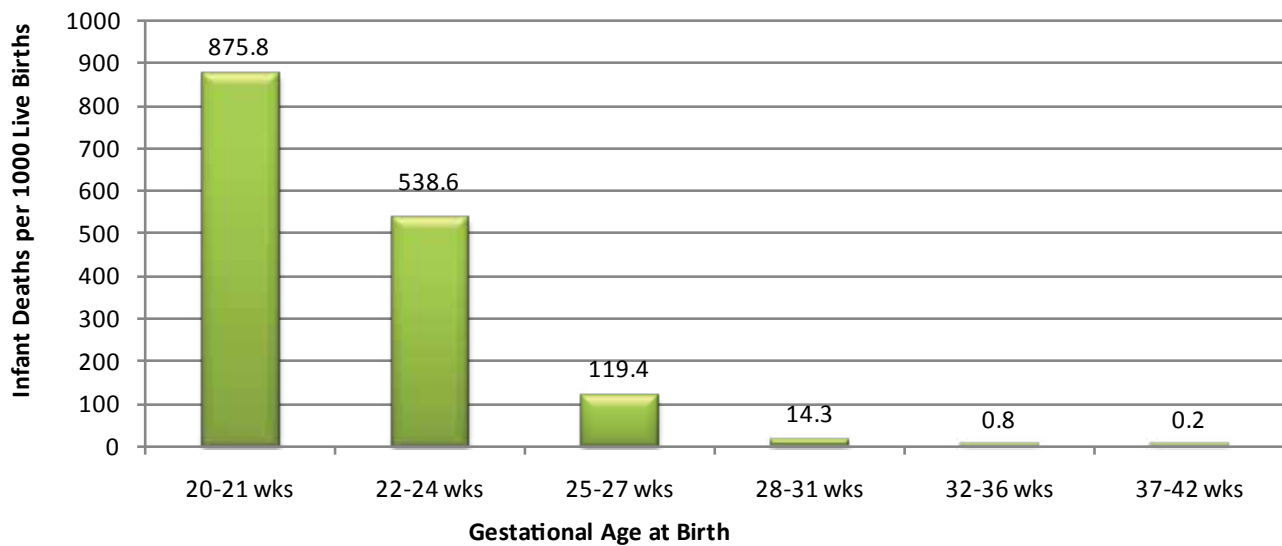
NS = Not Significant

\*Deaths from causes other than perinatal conditions are not included.

## Gestational Age

Infants born at less than 22 weeks gestation are generally considered to be non-viable at the time of birth; most infants born during the 22<sup>nd</sup> week of gestation are also not viable.<sup>3</sup> Viability increases weekly as the gestational age at birth increases. Figure 3 shows infant mortality rates for varying gestational ages.

**Figure 3. Cause-specific Infant Mortality Rate Due to Perinatal Conditions by Gestational Age at Birth, Utah 2003-2008**



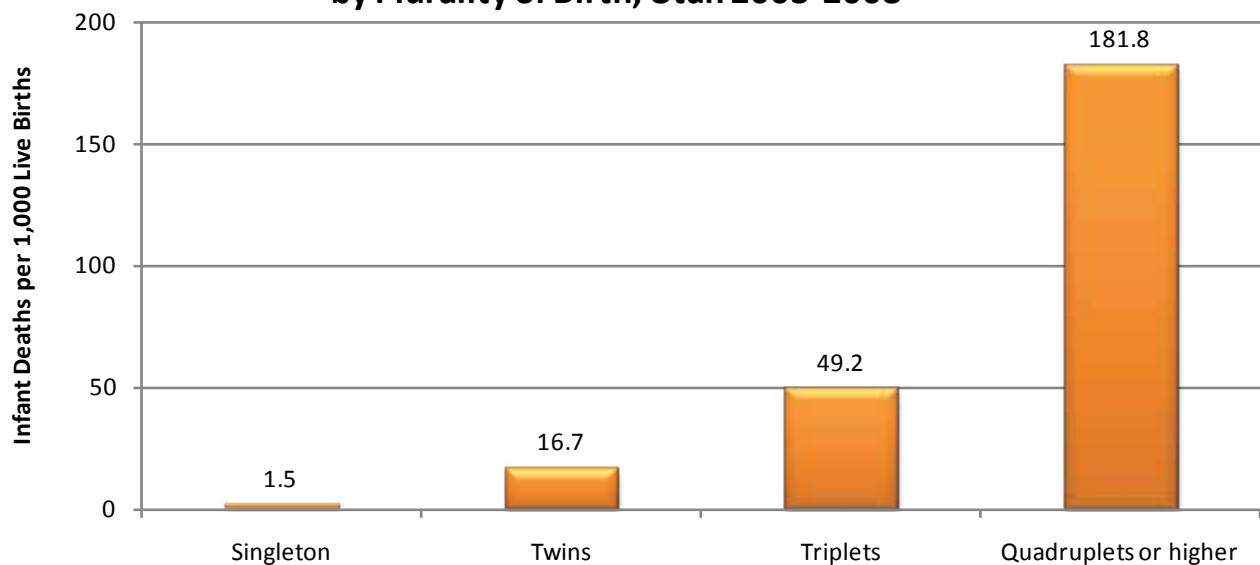


## Multiple Births

Multiple births continue to be associated with significantly higher rates of infant mortality than do singleton births. The higher rate occurs with spontaneously-conceived multiples as well as with fertility-assisted pregnancies. The increasingly common use of assisted reproductive technology, especially multiple embryo implantation, presents a considerable mortality risk that may not be understood by a prospective parent. It is important that counseling is presented to prospective parents in understandable terms about potential poor birth outcomes in multi-fetal pregnancies prior to obtaining informed consent for reproductive assistance.

Figure 4 shows infant mortality rates for multiple births. For these pregnancies, 20% of twins who died were born at less than 22 weeks gestation (non-viable gestational age); 50% of the triplets who died were born at less than 22 weeks gestation, and 50% of the quadruplets or higher order were born at 22 weeks.

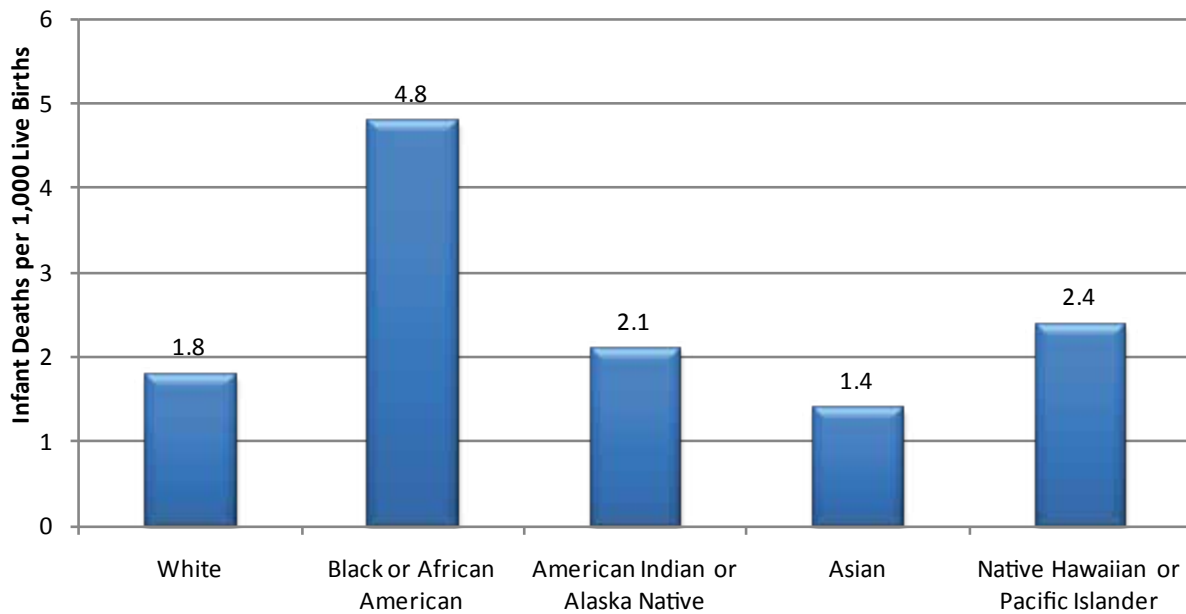
**Figure 4. Cause-specific Infant Mortality Rate  
Due to Perinatal Conditions  
by Plurality of Birth, Utah 2003-2008**



## Race and Ethnicity

Disparities in infant mortality related to race and ethnicity have been persistent over time on both national and state levels. The UDOH Maternal and Infant Health Program is working with the UDOH Office of Health Disparities Reduction on interventions targeted to specific populations to address and reduce infant mortality in these Utah communities. Figure 5 illustrates the disparate infant mortality rates due to perinatal conditions among Utah's racial groups.

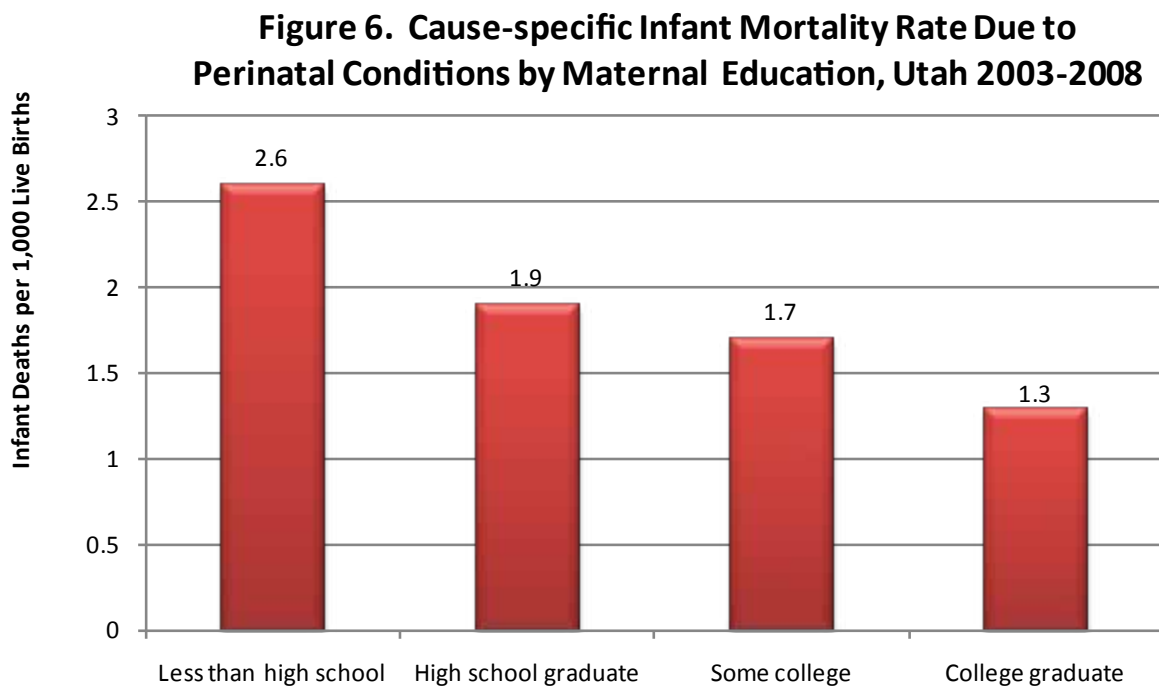
**Figure 5. Cause-specific Infant Mortality Rate Due to Perinatal Conditions by Maternal Race, Utah 2003-2008**



For these same years, Utah's infant mortality rate for mothers of Hispanic ethnicity was 2.5/1,000 live births, compared to 1.7 in mothers of non-Hispanic ethnicity.

## Education

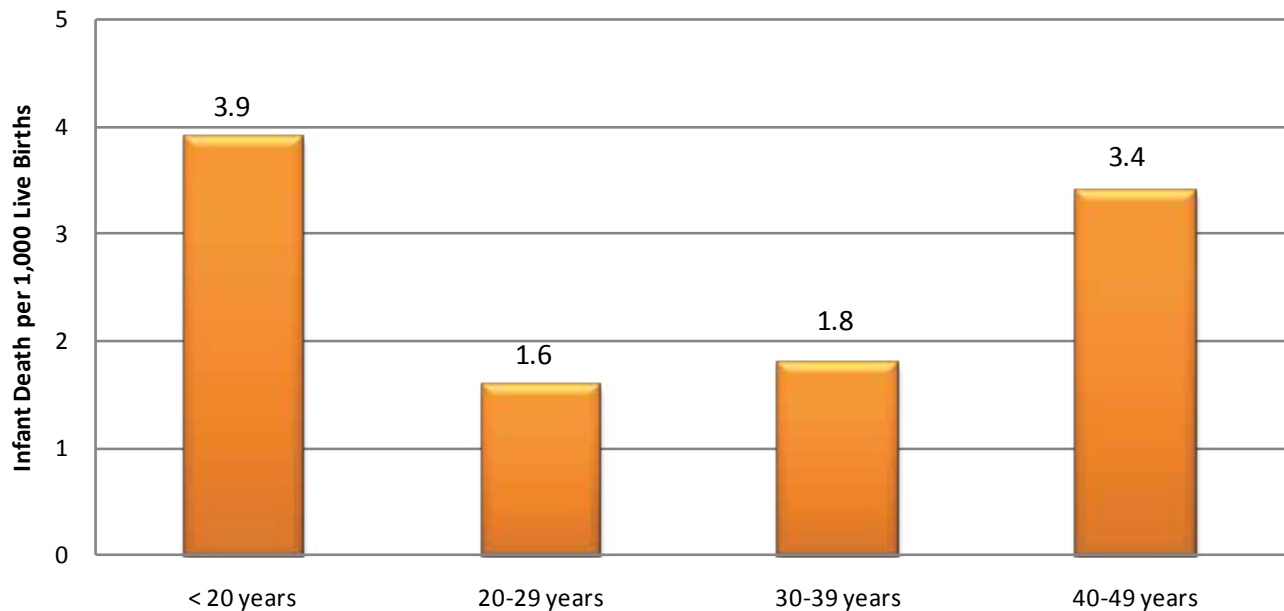
Figure 6 notes that lower levels of education (particularly less than high school graduation) are linked to higher rates of infant mortality, a finding which has been persistent over many years.



## Maternal Age

Infant mortality from perinatal conditions is notably higher for women under 20 years and for women aged 40 or older at time of birth. The birth rate for mothers under the age of 20 for the years 2003-2008 was 21 births/1,000 women in the population. The birth rate for women aged 40-49 was 5.2 births/1,000 women. Women in these two age groups had the lowest birth rates, but a disproportionate burden of infant mortality from perinatal conditions, as shown in Figure 7. Birth rates for women ages 20-29 and 30-39 were 145/1,000 and 87/1,000 respectively.

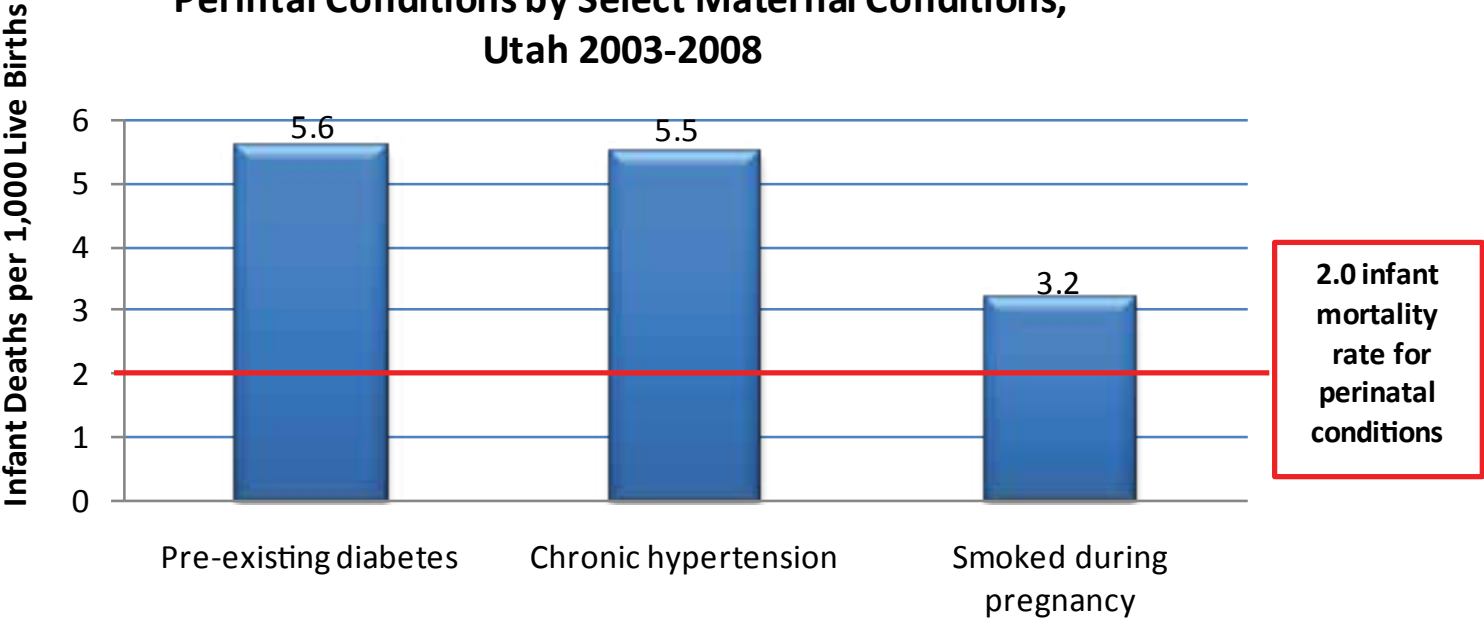
**Cause-specific Infant Mortality Rate Due to Perinatal Conditions by Maternal Age, Utah 2003-2008**



**Maternal Medical Conditions**

An increasing incidence of maternal medical conditions is now noted in increasingly younger women and prior to pregnancy onset. These conditions are associated with higher rates of infant mortality, and also include risks such as smoking and diet, which may be modifiable if addressed before pregnancy or early in the course of prenatal care. Figure 8 shows infant mortality rates associated with various maternal conditions.

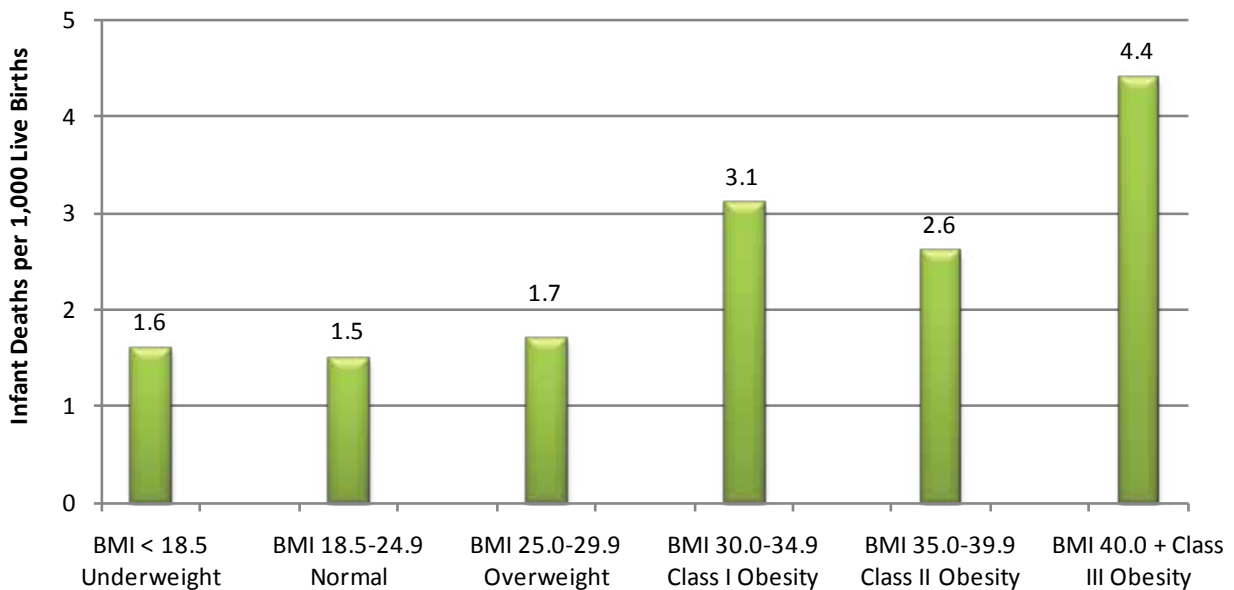
**Figure 8. Cause-specific Infant Mortality Rate due to Perinatal Conditions by Select Maternal Conditions, Utah 2003-2008**



## Maternal Obesity

Obese women have approximately twice the risk of stillbirth as do women of normal weight. In addition, obese women have an increased incidence of preterm birth and certain birth defects (e.g., cleft palate, neural tube defects, congenital heart disease) in their offspring. Fetal anomalies can be more difficult to detect with ultrasound in a woman who is obese. Infants of obese women are also more likely to be overweight themselves, and hence will have a greater lifetime risk of developing cardiac disease, diabetes, and obesity than infants born to women of healthy weight.<sup>4</sup> Figure 9 notes the infant mortality rates for each class of prepregnancy body mass index (BMI) as reported on the birth certificate.

**Figure 9. Cause-specific Infant Mortality Rate Due to Perinatal Conditions by Reported Prepregnancy Body Mass Index, Utah 2003-2008**



Of women whose babies died of a perinatal-related condition during the first year of life, 5.5% were underweight, 55.4% were of normal weight, 20.7% were overweight, and a total of 15% were in one of the obesity categories.

## Infant Age at Death

Figure 10 offers information about how long these most vulnerable preterm infants lived. Among the 640 infant cases reviewed by the Perinatal Mortality Review Committee, 28% of infants died within the first hour of life, 26% between 1 hour and 24 hours, and 38% died between day 1 and 28 days. The remaining 8% died between 29-364 days of life.

**Figure 10. Age at Death for Infants Dying from Perinatal Conditions**

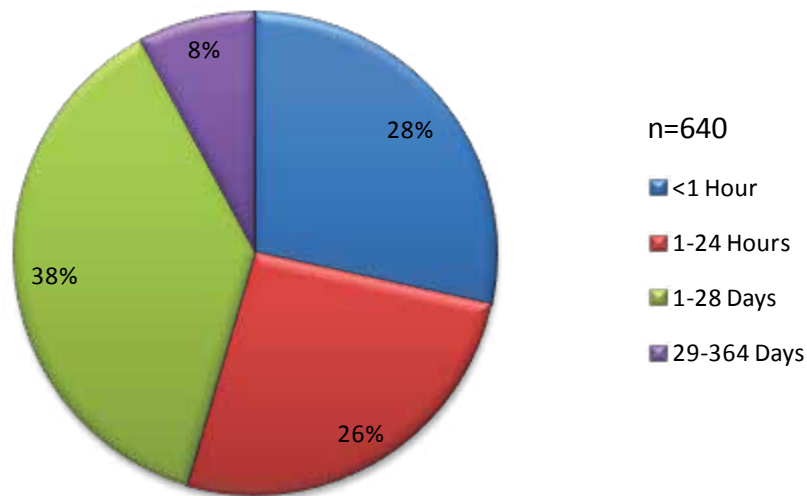




Figure 11 shows that 94.2% of infants born at 22-24 weeks died in the neonatal period (first 28 days of life). This finding underscores the importance of these infants being born at facilities with the highest levels of perinatal and NICU care whenever possible.

**Figure 11. Age at Death by Gestational Age at Birth for Infants Who Died from Perinatal Conditions**

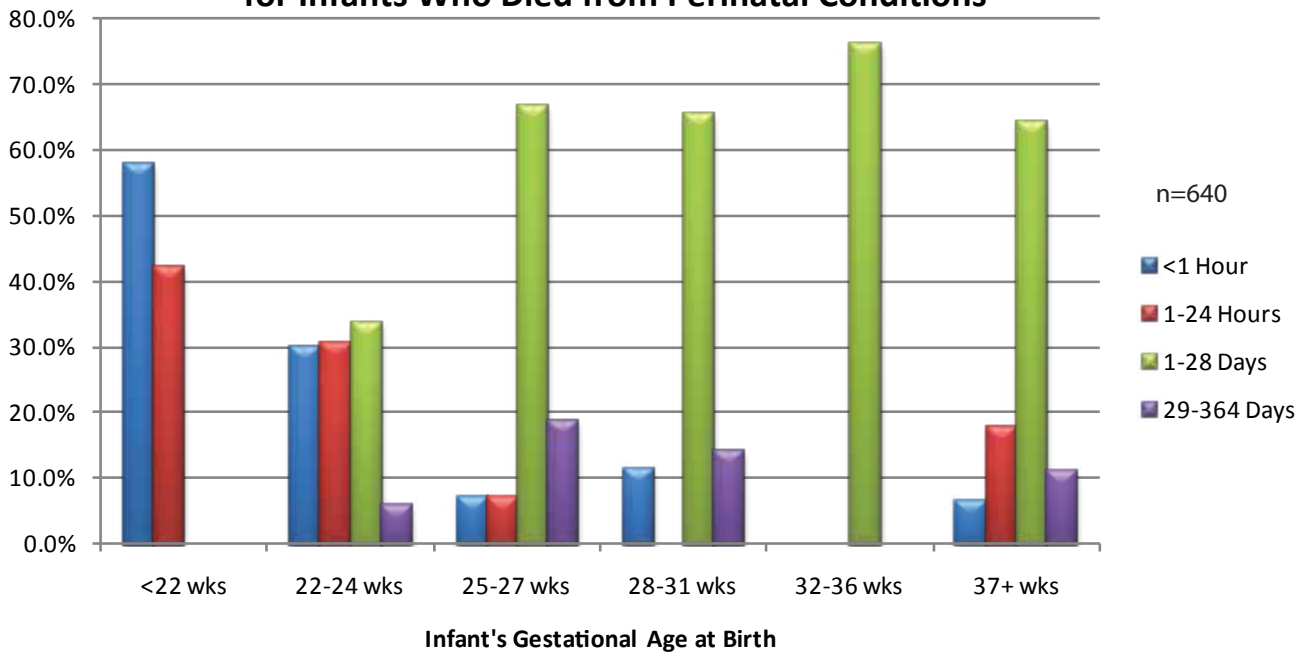
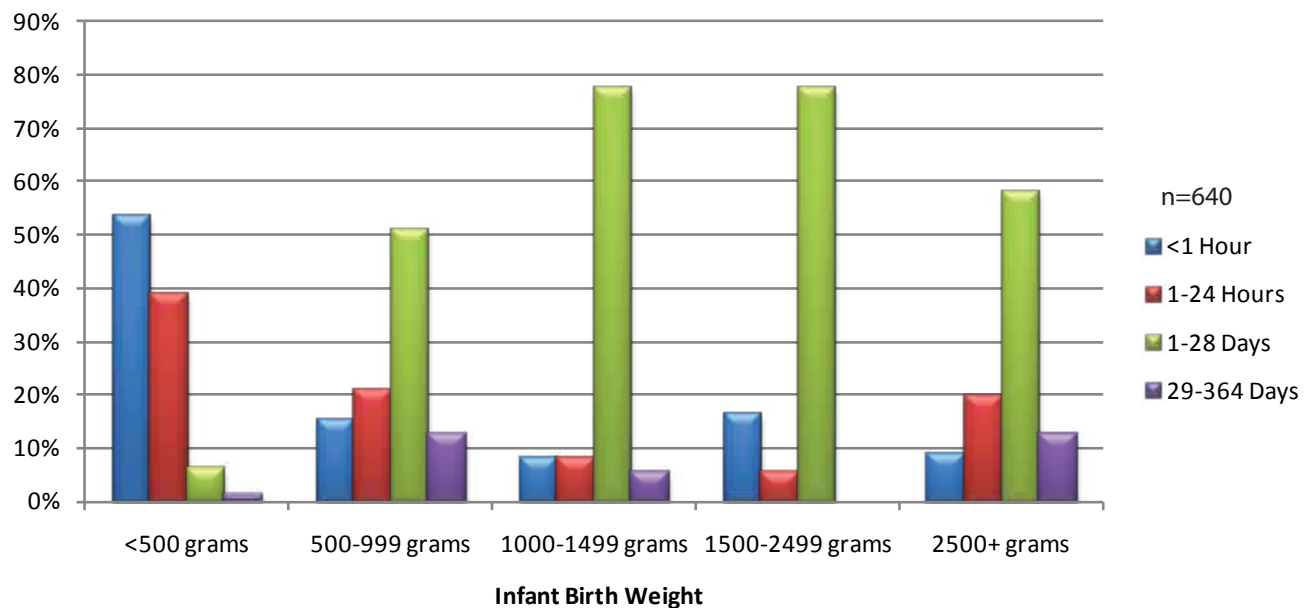


Figure 12 shows that 98.7% of infants with birth weights less than 500 grams died within the neonatal period, as did 87.3% of infants weighing 500-999 grams at birth.

**Figure 12. Age at Death by Infant Birthweight for Infants Who Died from Perinatal Conditions**



Small numbers have been suppressed and are not represented.

Numerator from Office of Vital Records and Statistics;  
Denominator from Perinatal Mortality Review Program

## **Findings of Infant Mortality Reviews**

Of the 640 infant deaths reviewed by the Perinatal Mortality Review Committee, 87% were determined to be non-preventable, as the majority were extremely premature births. Of the remaining 13%, 9.2% of the deaths were determined to have had some chance of being preventable; 1.6% had a good chance of being preventable, and 2.2% had a strong chance of being preventable.

In all instances where the PMR Committee found that there was a strong chance that the infant death may have been preventable, the Patient Safety Director for the Utah Department of Health was informed. The Director then contacted the institution(s) involved to determine whether the institution had reviewed the case, and if so, the findings and the actions the facility had taken after its review. Sometimes there is further identification and sharing of findings, as two different groups reviewing the same case may notice different issues. The facility or the hospital system involved is able to translate the findings into action toward closing gaps in care or improving the processes of care involved. In this way, the community is involved in systems improvement and the entire public benefits from increased quality assurance and quality of care.

## PMR Committee Recommendations

This section reports specific recommendations emerging from the systematic review of Utah's perinatally-related infant mortality cases during the years 2003-2008.

For 83 of the 640 infant death cases (13%), the Perinatal Mortality Review Committee found that there was either some chance (n=59), a good chance (n=10), or a strong chance (n=14) that the death might have been prevented. Of these case reviews:

- 14.3% mentioned a need for prompt recognition and response by providers to signs of fetal distress (including need for internal fetal scalp electrode, need to distinguish maternal from fetal heart rates, need for quicker response to non-reassuring tracing, and need to check and record fetal heart rate via electronic fetal monitor in the operating room prior to Cesarean delivery)
- 11.9% noted a need for education of the public on the importance of early and consistent prenatal care
- 7.1% noted a need for moms themselves to notify providers sooner when warning signs of problems, including decreased fetal movement, are noted. Do moms know the warning signs, and when and how to call their providers, and are they able to get through the office phone system at all hours?
- 6.0% found that all staff involved with newborn delivery need to be current and practiced in newborn resuscitation skills following Neonatal Resuscitation Program (NRP) guidelines, including guidelines on intravenous lines, volume resuscitation, adequate epinephrine, and prompt placement of umbilical line catheter
- 6.0% noted instances when providers need to consult a perinatologist/neonatologist/pediatrician in a timely manner to be present at a delivery or to do a medical work-up, regardless of night hours or holidays

## Committee Recommendations Specific to Maternal Care

### During the preconception period

- Referral of morbidly obese women to a weight reduction program prior to being treated with ovulation induction medications or other reproductive assistance
- Nutritional counseling for women not at healthy weight both preconceptionally and during pregnancy
- Appropriate discretion for in-vitro fertilization candidates and number of embryos implanted

### During pregnancy

- Cervical length measurements and fetal fibronectin testing to be done on women with history of previous preterm birth
- Vaginal (rather than abdominal) ultrasound for cervical length assessment in morbidly obese women
- Fetal fibronectin testing to be done on women with symptoms of preterm labor, even without prior history of preterm birth
- Increased provider awareness of dangers of hypertension during pregnancy, including risks of pre-eclampsia

### During labor

- Timely transport of women with extreme prematurity or high risk medical or obstetric conditions to a tertiary facility prior to delivery
- Closer monitoring of preterm labor patients to avoid precipitous and unattended deliveries
- Maternal antibiotics:
  - Intrapartum IV antibiotics if febrile during labor
  - Gentamycin as antibiotic of choice for chorioamnionitis
  - Intrapartum treatment of positive GBS with penicillin (not ampicillin)
  - Assure prophylactic coverage for both gram negative and gram positive organisms in latent preterm labor
- Betamethasone administration to all women presenting with labor symptoms beginning at 23 weeks gestation and/or who have a positive fetal fibronectin test regardless of gestation
- Consider vaginal delivery for a 24-week gestation pregnancy, as opposed to Cesarean birth
- Trial of labor after previous Cesarean is recommended for appropriate candidates

## Committee Recommendations Specific to Maternal Care

### During labor (cont.)

- Obstetric provider communication with pediatric provider prior to infant delivery regarding fetal compromise during labor, and pediatric provider attendance at birth
- Use of spinal or general anesthesia, rather than epidural, for emergency Cesarean delivery
- Umbilical cord blood samples (both venous and arterial) are recommended for high-risk OB and neonatal conditions
- Placental pathology in all cases of malodorous amniotic fluid and preterm birth

## Committee Recommendations Specific to Infant Care

- Neonatal resuscitation:
  - assure at least one person capable of performing full resuscitation is present at each delivery
  - all personnel must be trained to recognize ineffective resuscitation efforts and response
  - ensure adequate personnel available at multiple gestation delivery to handle unanticipated problems
  - all neonatal providers to follow Neonatal Resuscitation Program (NRP) guidelines
  - recommend post-resuscitation education such as STABLE or equivalent training for nursing and medical staff in all birthing facilities, but particularly in all level 1 and 2 facilities where STABLE issues are not addressed on a routine basis
- Any abnormal vital sign warrants critical investigation
- Acutely ill infants (including unexpected cardiorespiratory arrest) warrant:
  - consideration of sepsis
  - consideration of metabolic disorders
  - consideration of cardiopulmonary anomalies
- Consider confirmatory negative blood culture prior to discontinuation of antibiotics
- Heparin therapy in the neonatal intensive care unit (NICU) warrants written protocols for use and management
- Avoid enteral feedings during medical treatment for patent ductus arteriosus
- Avoid early neonatal discharge for:
  - late preterm infants
  - infants at risk for infection
  - infants with known red blood cell (RBC) antibody incompatibility
  - infants who have not established normal vital signs
  - infants who have not established adequate feeding
  - if early discharge is necessary, follow-up should be within 24-48 hours

## Areas for Action Toward the Prevention of Perinatal Mortality

### Screening for and Recognition of Risk Factors for Preterm Birth

Current literature suggests that careful and thorough risk assessment at the first prenatal visit can identify mothers at risk. Risks for preterm birth include certain demographics, behavioral factors, and elements of past obstetric history. Some demographic risk factors for preterm birth include nonwhite race, maternal age less than 17 years and greater than 35 years, low socioeconomic status, and low maternal weight prior to pregnancy. Obstetric risk factors for preterm birth include prior history of preterm birth, especially in the second trimester, any preterm birth with or without premature rupture of membranes, vaginal bleeding in more than one trimester, multiple gestation, and other causes of uterine overdistention. Some bacterial infections and smoking are associated with increased risk of preterm birth, and physically stressful work, including long periods of standing, may also be associated with preterm birth.<sup>5</sup> Some studies have also associated obesity with a higher rate of preterm birth.<sup>6</sup>

An incompetent or short (insufficient) cervix may lead silently to a preterm birth, and in many cases an extremely preterm birth. The infant mortality rate associated with incompetent cervix as recorded on birth certificates for 2003-2008 was 77.1/1,000 live births (data not shown). The rate for this condition may be even higher due to cases of preterm labor which result from short cervixes where this was not known or recorded. The rate of short cervix in the reviewed infant mortality cases was 13.4%; the rate of short cervix as recorded for overall births in the population was 0.3%. Of all the associations presented in this report, preterm birth following the diagnosis of a short cervix may be the one most readily addressed with existing interventions.

Early interventions for preterm birth prevention include baseline cervical length measurement (and serial measurements thereafter), initiation of progesterone supplementation in appropriate women at 16 weeks gestation, and evaluation for early cerclage placement.<sup>7</sup> Fetal fibronectin testing may be done in women who present with symptoms of preterm labor, even without a history of preterm birth or a known short cervix. These collective interventions can increase pregnancy duration, even if 37 weeks gestation is not reached, and reduce infant morbidity and mortality.<sup>8</sup>

## Preconception and Interconception Care

Screening for and prevention of chronic disease and its morbidities with women during all health encounters are opportunities to impact infant mortality rates. The chronic disease effects upon reproductive health are apparent in women even prior to pregnancy, as evidenced by impaired fertility in women who are obese or who have diabetes. Counseling, treatment, dietary modification, and physical activity for all overweight and obese women of reproductive age have been recommended by the American Dietetic Association and the American Society for Nutrition.<sup>4</sup> A chronic disease affects the health of both mothers and infants, and can have long term impacts for both. The most common chronic health factors affecting birth outcomes include maternal diabetes, hypertension, hyperlipidemia, depression, maternal smoking, and obesity. Women with any of these conditions are at greater risk for pregnancy complications, long term illness, and even premature death.

It is recommended that all providers offering women's health care include evaluation and health counseling in areas of general fitness, including weight management, nutrition, and exercise. Comprehensive and primary women's health care includes routine screening and disease prevention in the following areas: cardiovascular disorders, diabetes, cancer, smoking, and substance abuse.<sup>9</sup> Screening also includes health issues such as depression and mood disorders, and intimate partner/domestic violence. Depression and other mental health disorders can affect a woman's ability to make healthy life choices and lifestyle changes.<sup>10</sup>

The American College of Obstetricians and Gynecologists (ACOG) recommends that BMI be calculated for every woman and that prepregnancy weight loss, nutrition, and maternal and fetal risks with obesity are discussed in the preconception setting. Weight reduction should be undertaken prior to attempting pregnancy and before initiating fertility treatment.<sup>6</sup> Data show increased rates of miscarriage in obese women who undergo fertility treatment as well as in obese women who conceive naturally.<sup>11</sup> Maternal obesity during pregnancy can compromise the accuracy of fetal ultrasound diagnosis as well as the reliability of fetal heart rate monitoring during labor.



Improvement can also be made in increasing postpartum screening for diabetes in women who experienced gestational diabetes. In Utah in 2010, only 48.5% of women diagnosed with gestational diabetes said they received a postpartum glucose screen.<sup>12</sup> Postpartum screening is especially pertinent since more women now become pregnant at higher weights and at older ages. Screening and management recommendations are available in ACOG Committee Opinion Number 435, Postpartum Screening for Abnormal Glucose Tolerance in Women who had Gestational Diabetes Mellitus, June 2009.<sup>13</sup>

Motivational interviewing is a well-established counseling style which is effective in helping patients along the path to behavior change. The technique is based on allowing the patient to talk and the provider to practice active and reflective listening, and adds no more than three minutes to a patient visit.<sup>14</sup> This ACOG Committee Opinion notes CPT codes which qualify for reimbursement for the use of motivational interviewing done by a qualified provider or staff member. Motivational interviewing can be used when discussing a patient's readiness to make a commitment to lose weight or stop smoking or other substance use.

### **Chronic Disease during Pregnancy**

During pregnancy and delivery, women with chronic disease can suffer a number of obstetric complications. These include higher rates of miscarriage, increased rates of labor induction, less success in trial of labor after Cesarean, increased rates of primary and repeat Cesarean delivery, increased risk for venous thromboembolism (especially with Cesarean delivery), greater incidence of infection and wound breakdown, greater need for blood transfusion, and maternal death and morbidity.<sup>8</sup>

## **Life Course Perspective in Health Care**

Research studies have indicated that there are underlying socioeconomic, historic, and behavioral factors which predispose to, or increase the likelihood of, preterm birth. This life course approach views health from the context of an individual's existence within the community, within the cultural milieu, socioeconomic conditions, and considering the experiences of one's life. Level of education is correlated with a woman's socioeconomic status and, from a life course perspective, education is an important contributor to health outcomes for mothers and infants. A life course perspective promotes access to preconception care, interconception care, improvement in the quality of prenatal care, and continuing access to health care, particularly to primary care, over the life course.<sup>15</sup> In addition to aiming interventions at health systems, a life course approach addresses family, community, educational, and societal systems (including issues of poverty, stress, racism, nutrition, housing, employment, and neighborhood conditions), which seem to underlie persistent health disparities.

Awareness of the life course perspective in the structure and delivery of health care may foster better prevention and earlier diagnosis of chronic maternal health conditions which will serve to improve the health of mothers and infants. Screening for obesity and other increasingly common chronic health conditions may be done in settings other than primary care, such as college health centers, family planning clinics, and community health centers. Followed by appropriate referral for care, these interventions can form a basis for preconception and interconception care and will benefit the health of women, infants, families, and communities even before a pregnancy begins.

### **Summary**

This paper reports on a subset of infant mortality associated with perinatal conditions in Utah for the years 2003-2008. In reality, the topic of infant mortality is quite broad, as it presupposes the health of mothers, as well as the health of communities, and also requires a comprehensive, well-functioning, and quality-based perinatal health care system. Infant mortality is intrinsically tied to the mother's preconceptional health. Using information obtained in these reviews, the Utah Department of Health will continue to track infant mortality due to perinatal conditions and work to support improvements in the systems of care for women, infants, and families throughout the state.

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*Flowers carry many special meanings. Certain flowers have been chosen to underscore the information contained in this report.*



*The Lily of the Valley symbolizes sweetness and the returning of hope*



*The Elderflower symbolizes compassion*



*Daisies symbolize innocence*



*Snowdrops symbolize consolation or hope*

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