

### 3 CHILD, INFANT AND MATERNAL HEALTH

The health of mothers, infants, and children reflects the current health status of a large segment of our population and helps us to predict the health status of the next generation. This section addresses an array of health indicators affecting maternal, infant, and child health, including those of pregnant and postpartum women. Many of the conditions and risk factors reviewed in this section affect certain racial and ethnic groups disproportionately and suggest areas where we may need to focus efforts to eliminate health disparities.

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### 3.1 INFANT MORTALITY

**HP 2010 Objective 16-5:** Reduce infant mortality to no more than 4.5 infant deaths per 1,000 live births.

**Jefferson County Status:** There were 5.3 infant deaths per 1,000 live births to county mothers in the 5-year period 1998 – 2002.

An infant death is one that occurs in the first year of life. The infant mortality rate, the number of infant deaths per 1,000 live births, is an important measure of a nation's health and is recognized worldwide as an indicator of health status and social well-being. It reflects an overall state of maternal health as well as the quality and accessibility of primary health care available to pregnant women and infants. Despite steady declines in the 1980s and 1990s, the U.S. infant mortality rate remains among the highest in the world. As of 1998, the U.S. infant mortality rate ranked 28<sup>th</sup> among industrialized nations, with disparities persisting between whites and specific racial and ethnic groups.

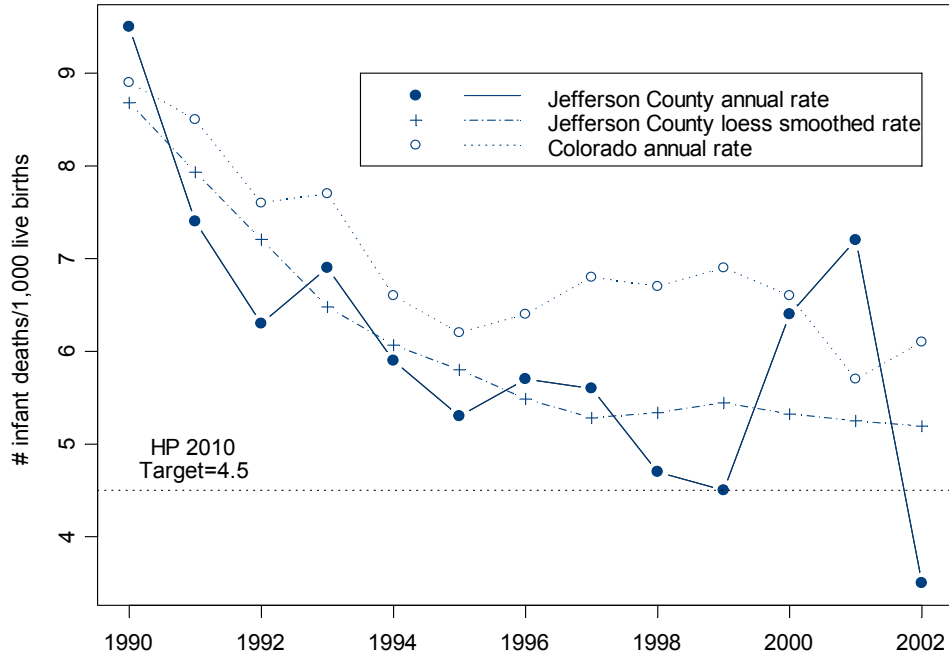
The U.S. infant mortality rate in 2002 was 7.0, and the Colorado rate in 1998 – 2002, 6.2 infant deaths per 1,000 live births.

Nationally, the leading causes of infant mortality are birth defects, disorders related to short gestation and low birth weight, and sudden infant death syndrome (SIDS).

#### Jefferson County Findings

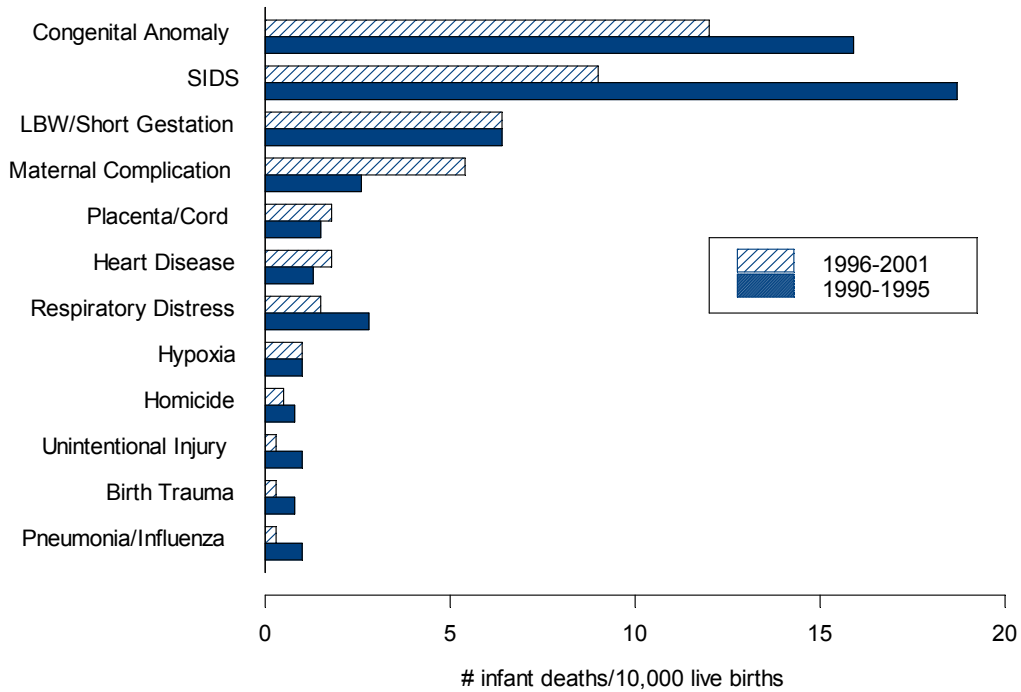
- The annual infant mortality rate declined steeply in the early 1990s and has been highly variable since 1997 (Figure 3.1). The loess smoothed annual rate in Figure 3.1 adjusts for the variability that occurs with small numbers of events, and indicates that, over the 6-year period, the rate has remained near 5.3/1,000 live births. (See Technical Notes, Section 10.2, for a description of the loess method of smoothing.) The county's rate has generally been lower than the state's rate throughout the period, although there have been years when the county's rate was higher.
- The leading causes of infant death changed over the period 1990 – 2001 (Figure 3.2). In the earlier years, SIDS was the leading cause, more recently it has shifted to congenital anomalies (birth defects). There were significant declines in both causes. The improvement in infant mortality during this period is likely due to the success of public health education programs that teach parents the benefits of putting newborns and young infants on their backs during sleep.

Figure 3.1 Infant mortality rates, Colorado and Jefferson County, by year, 1990 - 2002



Source: JCDHE-Epidemiology and CDPHE-HSVRD

Figure 3.2 Major causes of infant mortality, Jefferson County, 1990 – 1995 and 1996 - 2001



Source: JCDHE-Epidemiology and CDPHE-HSVRD

## 3.2 NEONATAL AND POSTNEONATAL MORTALITY

### HP 2010 Objectives:

**16-1d:** Reduce neonatal deaths to no more than 2.9 infant deaths per 1,000 live births.

**16-1e:** Reduce postneonatal deaths to no more than 1.2 infant deaths per 1,000 live births.

**Jefferson County Status:** The neonatal and postneonatal mortality rates for 1998 – 2002 were 3.0 and 2.3 deaths, respectively, per 1,000 live births.

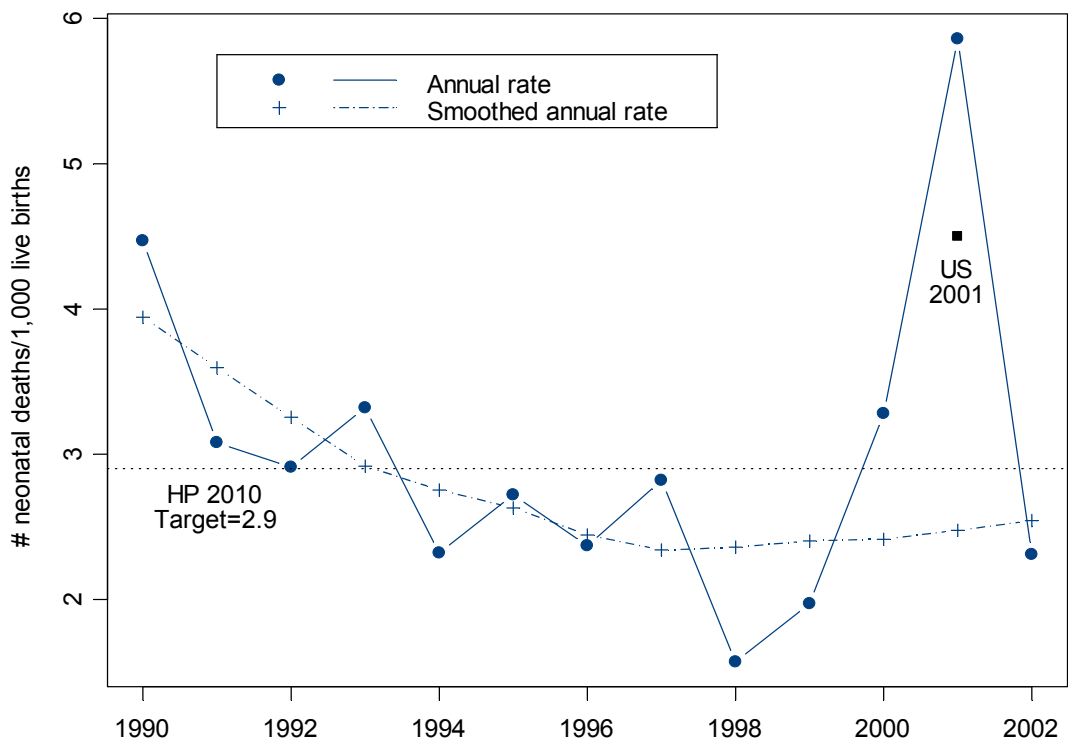
Infant mortality is comprised of *neonatal mortality*, an infant death occurring during the first 28 days of life, and *postneonatal mortality*, a death occurring between day 29 and the end of the first year. In general, neonatal mortality is more likely due to birth defects, disorders of short gestation and low birthweight, respiratory distress and maternal complications of pregnancy. Postneonatal mortality has most commonly been attributed to sudden infant death syndrome (SIDS).

In 2001 in the U.S., the neonatal mortality rate was 4.5, and the postneonatal mortality rate 2.3 infant deaths per 1,000 live births.

### Jefferson County Findings

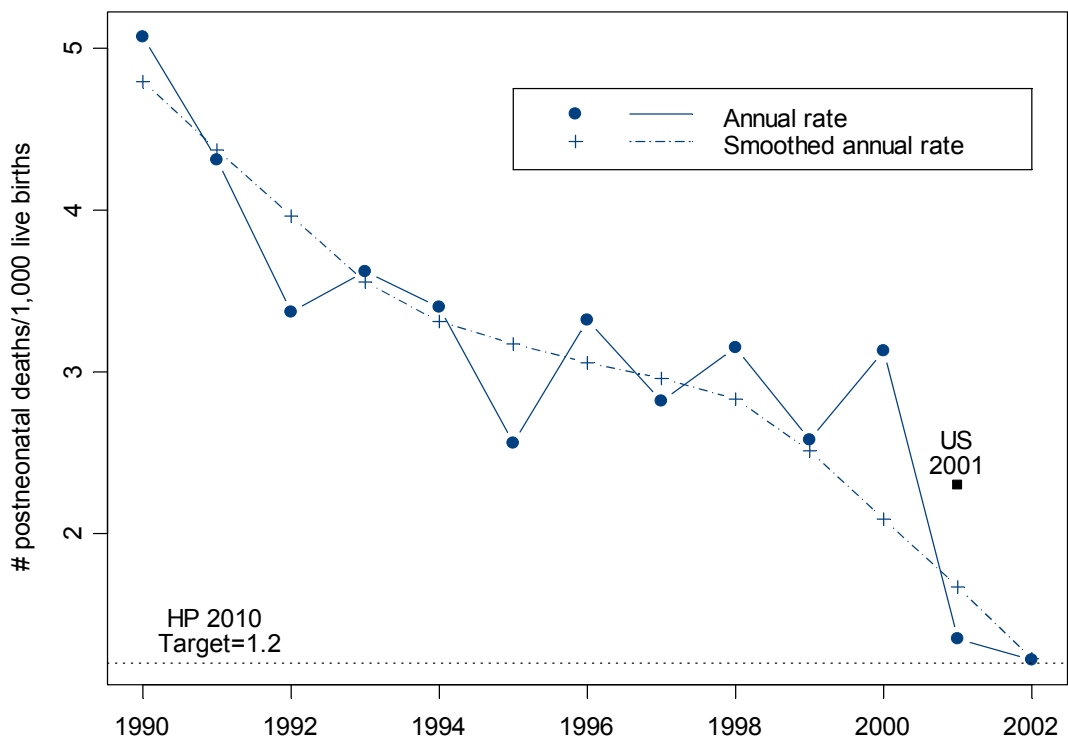
- Both neonatal and postneonatal mortality declined over the period 1990 – 2002.
- Between 1993 and 1999, the neonatal mortality rate declined and, as in 2002, the county attained the HP 2010 target (Figure 3.3). Neonatal mortality was more highly variable than postneonatal mortality in the most recent years.
- The postneonatal mortality rate declined throughout the 1990s, and by 2002 the county had nearly attained the HP 2010 target (Figure 3.4). (See Technical Notes, Section 10.2, for a description of smoothing trend lines.)

Figure 3.3 Neonatal mortality rate, Jefferson County, by year, 1990 - 2002



Source: JCDHE-Epidemiology and CDPHE-HSVRD

Figure 3.4 Postneonatal mortality rate, Jefferson County, by year, 1990 - 2002



Source: JCDHE-Epidemiology and CDPHE-HSVRD

### 3.3 PRENATAL CARE

**HP 2010 Objective 16.6:** Increase to 90% the proportion of pregnant women who receive prenatal care beginning in the first trimester of pregnancy.

**Jefferson County Status:** During the 5-year period 1998 – 2002, 89.2% of mothers entered prenatal care early in pregnancy.

Adequate prenatal care for a successful birth outcome includes risk assessment for the mother and fetus, monitoring and treatment for medical conditions, risk reduction and education. Adequate care contributes to reductions in perinatal illness, disability, and maternal and infant death by identifying and mitigating potential risks and helping women to address behaviors such as smoking and alcohol use that can cause poor outcomes.

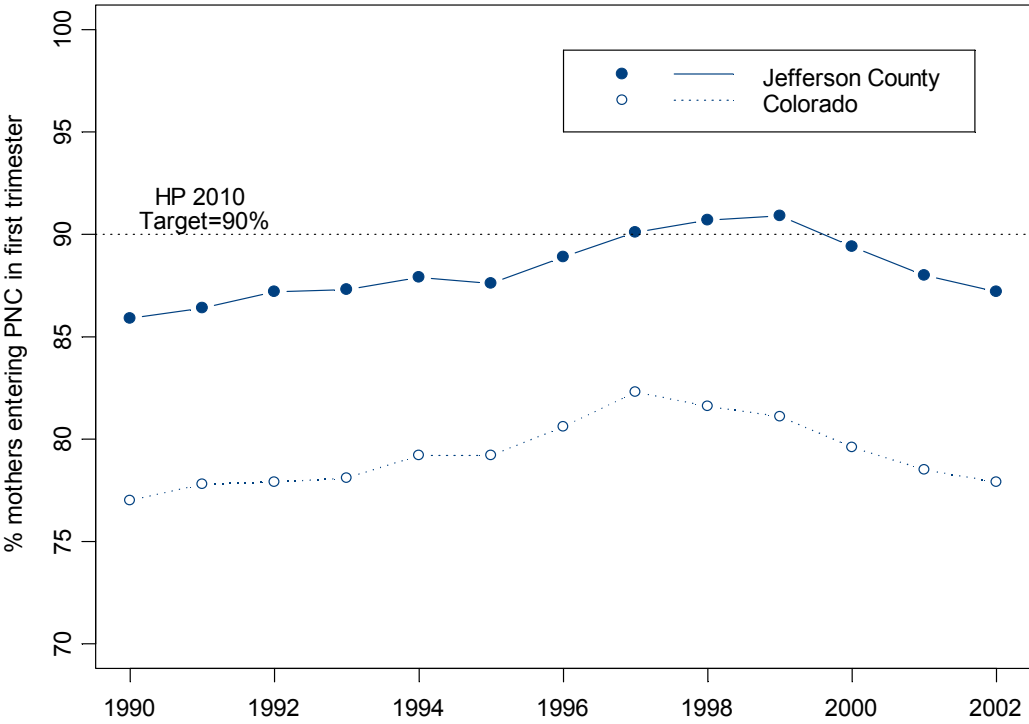
Prenatal care is more effective if women begin receiving care early in pregnancy, i.e., during the first three months, or first *trimester*, of pregnancy.

Certain groups of mothers are less likely to enter early prenatal care. They include mothers in minority racial or ethnic groups, younger mothers, and those for whom pregnancy was not intended.

#### Jefferson County Findings

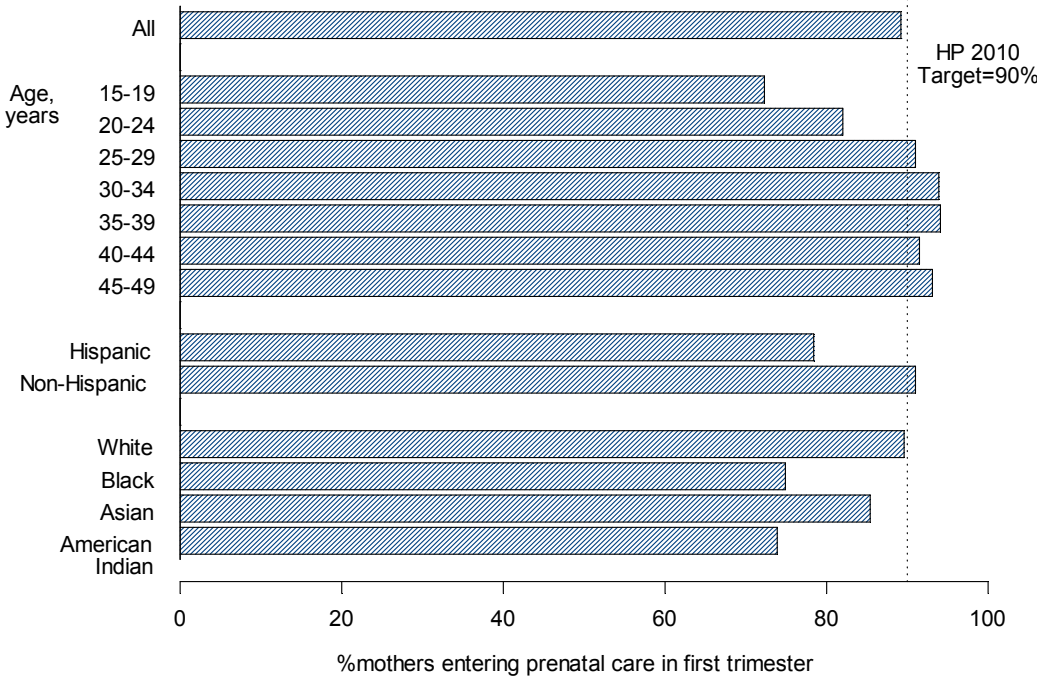
- The county's early prenatal care rate was higher than the state's rate during the 1990s and early 2000s (Figure 3.5). In the late 1990s, over 90% of county mothers entered early prenatal care, thereby meeting the national HP 2010 objective. However, by 2002, the rate had declined to 87%.
- Reflecting national trends, minority mothers and those who were younger than 25 years were less likely to enter early prenatal care (Figure 3.6).
- Although a large portion of the county met the target of 90% of mothers entering early prenatal care (Figure 3.7), some areas had much lower rates, including portions of Arvada, Edgewater, Golden and Lakewood.

Figure 3.5 Early prenatal care (PNC), Jefferson County and Colorado, by year, 1990 - 2002



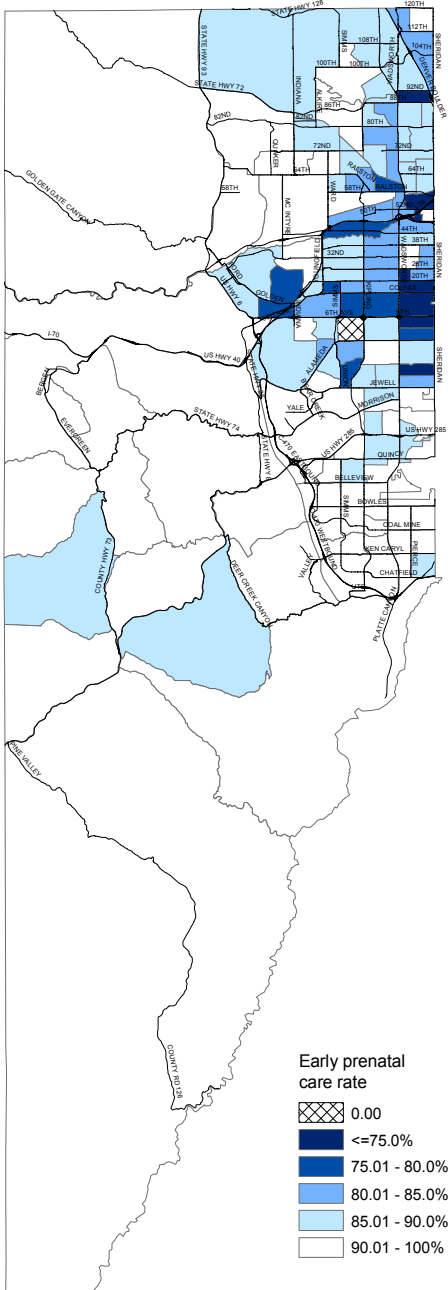
Source: JCDHE-Epidemiology and CDPHE-HSVRD

Figure 3.6 Early prenatal care in Jefferson County, by maternal age, ethnicity and race, by percent 1998 - 2002



Source: JCDHE-Epidemiology and CDPHE-HSVRD

Figure 3.7.  
 Percent of mothers who  
 obtained prenatal care in the  
 trimester of pregnancy,  
 Jefferson County, 2000-2002.  
 (Source: JCDHE  
 Epidemiology and CDPHE-  
 HSVRD.)



### 3.4 MATERNAL TOBACCO AND ALCOHOL USE

#### HP 2010 Objectives

**16-17a:** Increase to 94% the reported abstinence from alcohol use in the past month by pregnant women.

**16-17c:** Increase to 99% the reported abstinence from cigarette smoking in the past month by pregnant women.

**Jefferson County Status:** In 1997 – 2001, 12% of mothers reported smoking cigarettes and nearly 13% of mothers reported drinking alcohol during the last trimester of pregnancy.

The use of tobacco, alcohol, cocaine or marijuana during pregnancy has been linked to a number of health problems and poor birth outcomes, including spontaneous abortion, low birthweight and preterm delivery. Nationally, the rate of smoking during pregnancy dropped 33% between 1990 and 1999, so that by 1999, 12% of women reported smoking during pregnancy. Adolescents were more likely than women of any other age group to smoke while pregnant. After adolescent mothers' smoking rates declined in the early 1990s, they later increased to 19%.

There is no safe level of alcohol use by pregnant women. In Colorado, about 10% of pregnant women reported using alcohol during the last trimester of pregnancy, and this rate has remained fairly constant for several years.

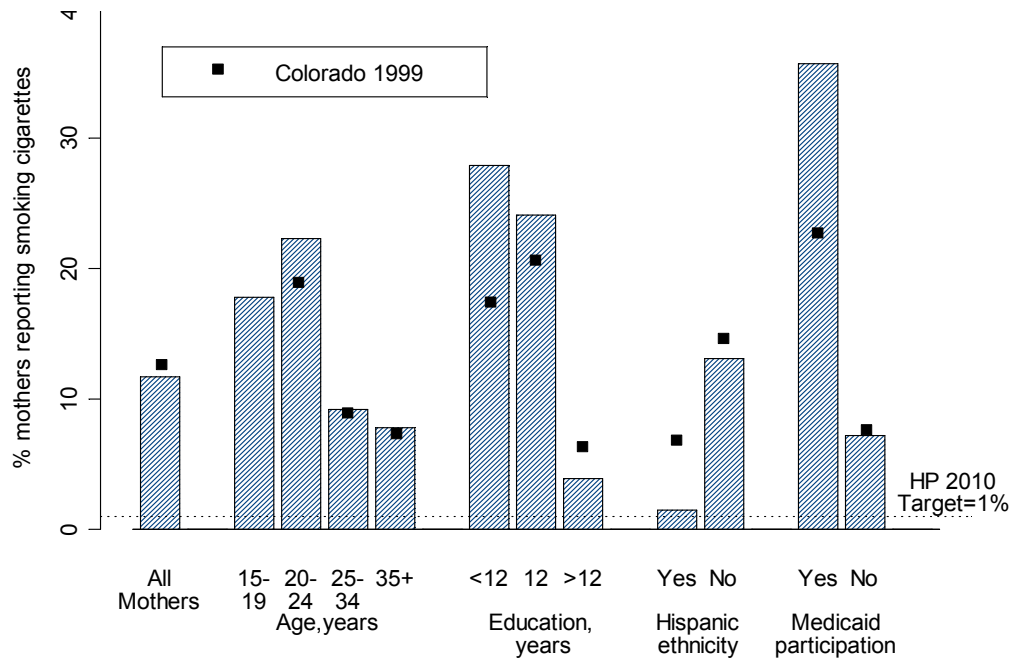
HP 2010 objectives 16-17a and 16-17c referenced in this assessment measure maternal abstinence from cigarette smoking and alcohol use during pregnancy in the past month. Data collected by the Pregnancy Risk Assessment Monitoring System (PRAMS)<sup>6</sup> of the Colorado Department of Public Health and Environment regarding maternal smoking and alcohol use reference the last trimester, or three months, of pregnancy.

#### Jefferson County Findings

- Although the PRAMS data that were used for comparison with the HP 2010 target were not exactly matched, maternal alcohol and tobacco use rates during pregnancy appeared far higher than the HP 2010 targets (Figures 3.8 and 3.9).
- Smoking rates varied by maternal age, education, ethnicity and participation in Medicaid. Younger mothers and Medicaid enrollees were far more likely to smoke than older and non-Medicaid enrolled mothers.

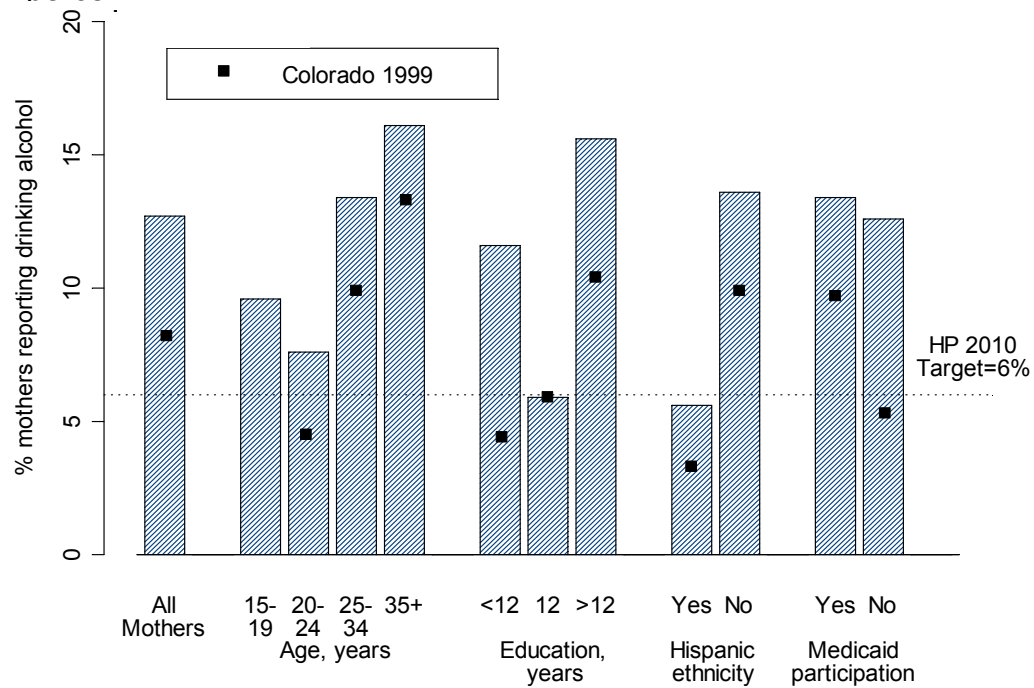
A comparison of county mothers with those statewide indicates that Jefferson County mothers (Figures 3.8 and 3.9) were more likely to drink alcohol during pregnancy. Smoking behavior was mixed: some subgroups of Jefferson County mothers had higher rates of smoking than their Colorado counterparts while some had lower rates.

Figure 3.8 Maternal cigarette smoking during last trimester of pregnancy in Jefferson County, by age, education, ethnicity and Medicaid participation, by percent, 1997 - 2001



Source: JCHDE-Epidemiology and CDPHE-PRAMS

Figure 3.9 Maternal alcohol use during last trimester of pregnancy in Jefferson County by age, education, ethnicity and Medicaid participation, by percent. 1997 - 2001



Source: JCDHE-Epidemiology and CDPHE-PRAMS

### 3.5 LOW BIRTHWEIGHT

**HP 2010 Objective 16-10a:** Reduce low birthweight to no more than 5% of all births.

**Jefferson County Status:** During the period 1998 – 2002, 8.2% of newborns were born below normal birthweight.

Low birthweight (LBW) babies weigh less than 2,500 grams (5 pounds, 8 ounces) at birth and have a high risk of long-term morbidity and early death. LBW is associated with disabilities such as cerebral palsy, autism, mental retardation and vision and hearing impairments. Expenditures for the care of LBW infants total more than half of the costs incurred for all newborns, despite the relatively low proportion, about 5-10%, of pregnancies that result in LBW.

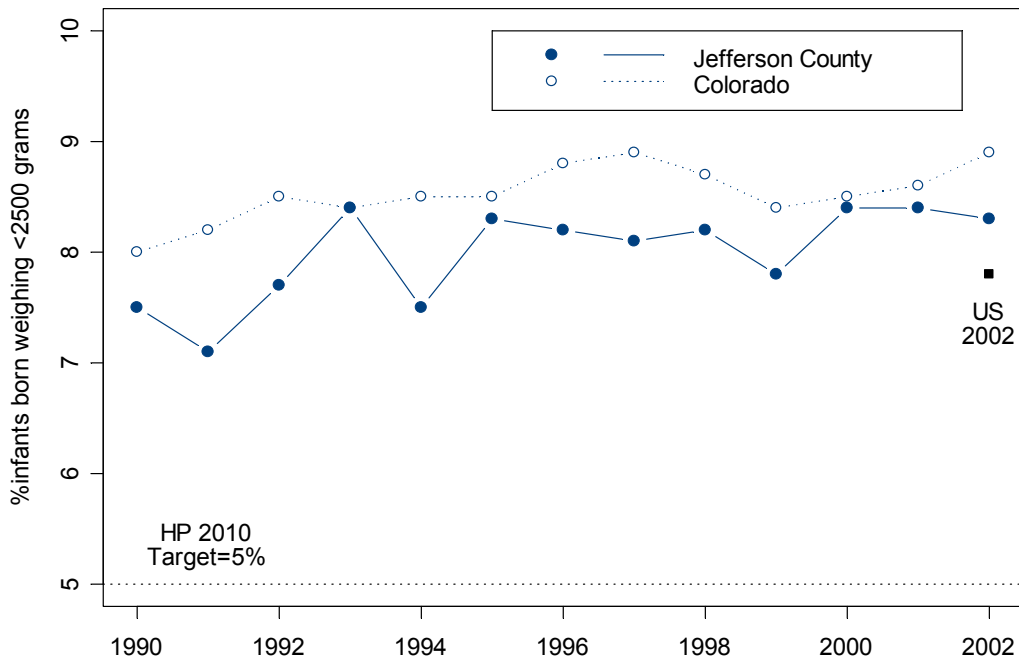
In 2001, Colorado ranked 12<sup>th</sup> among the 50 states for the highest percentage of LBW infants, with 8.6% of Colorado infants born below normal weight. In 2002, 7.8% of U.S. babies were low birthweight.

The key factors contributing to LBW in Colorado are inadequate maternal weight gain, smoking during pregnancy, delay in starting prenatal care and short birth interval (<18 months, between pregnancies)<sup>7</sup>.

#### **Jefferson County Findings**

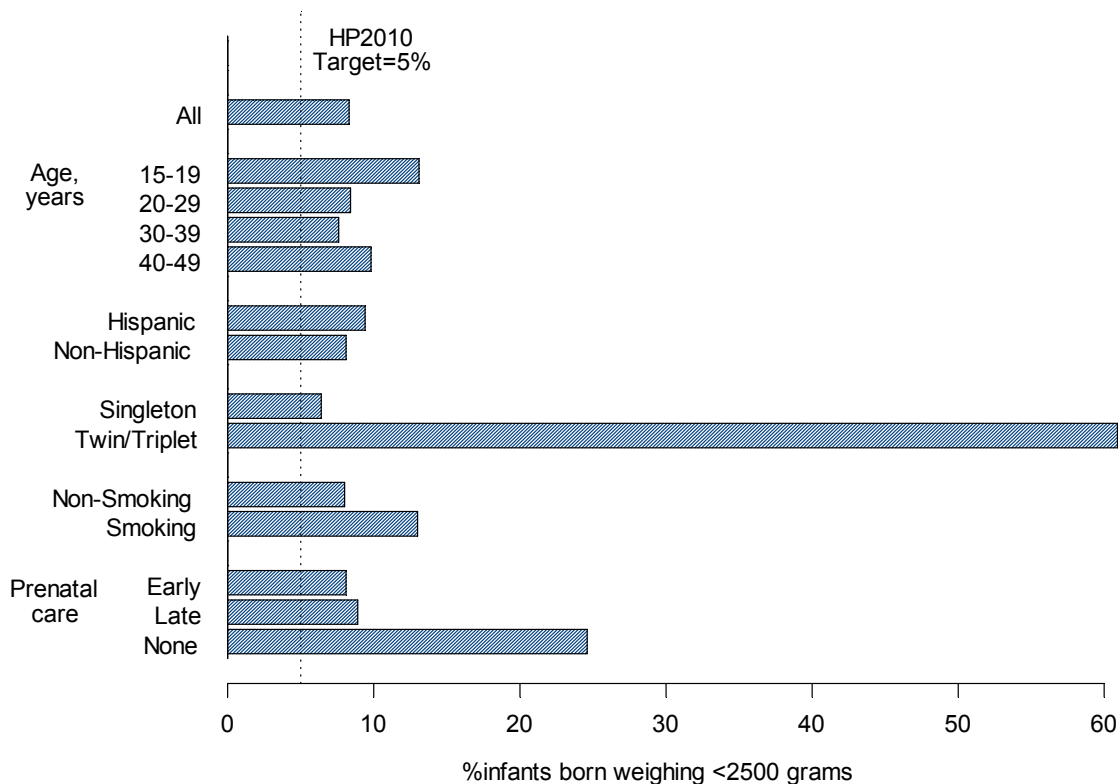
- The county's rate has generally been lower than that for Colorado (Figure 3.10). Since 1990 the percentage of LBW infants has gradually increased and was 8.3% of all live births in 2002.
- LBW rates in every maternal subgroup exceeded the HP 2010 target of 5% (Figure 3.11). LBW rates were extremely high among multiple births and were higher among younger mothers, those who smoked cigarettes, and those who did not obtain prenatal care.
- Many areas of the county have met the HP 2010 objective (Figure 3.12). However, LBW has a complex, multifactorial etiology and risk factors may differ by location of residence. Socioeconomic status, use of assisted reproductive technology, multiple births, maternal age, inadequate weight gain, tobacco use, and altitude, have all been associated with LBW. These factors may vary geographically.

Figure 3.10 Low birthweight infants in Jefferson County and Colorado, by year, 1990 - 2002



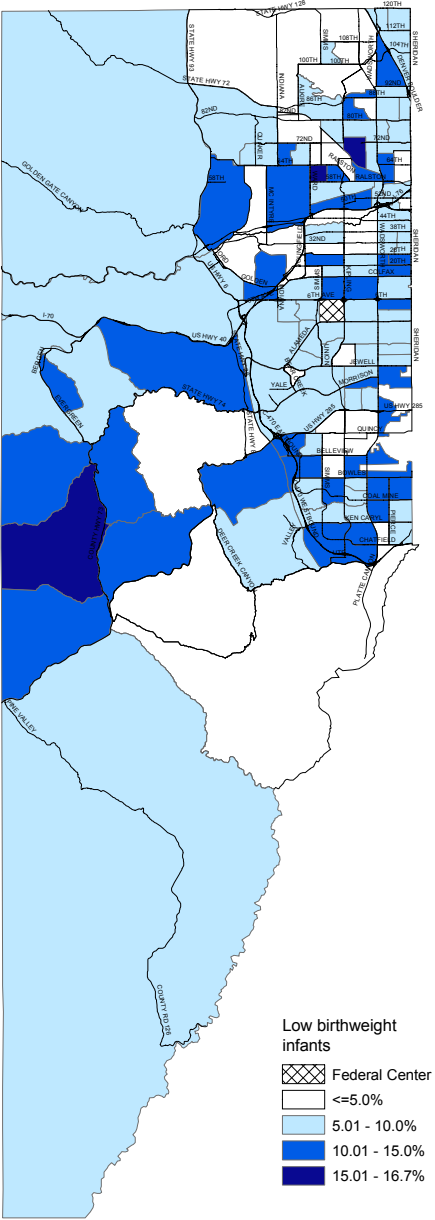
Sources: JCDHE-Epidemiology and CDPHE-HSVRD

Figure 3.11 Low birthweight infants in Jefferson County by maternal age, ethnicity, plurality and prenatal risk, by percent, 2001 - 2002



Source: JCDHE-Epidemiology and CDPHE-PRAMS

Figure 3.12.  
 Percent of infants  
 born weighing less  
 than 2,500 grams,  
 Jefferson County,  
 2000-2002.  
 (Source: JCDHE-  
 Epidemiology and  
 CDPHE-HSVRD.)



### 3.6 INFANT SLEEP POSITION

**HP 2010 Objective 16-13:** Increase to 70% the number of healthy, full-term infants who are put down to sleep on their backs.

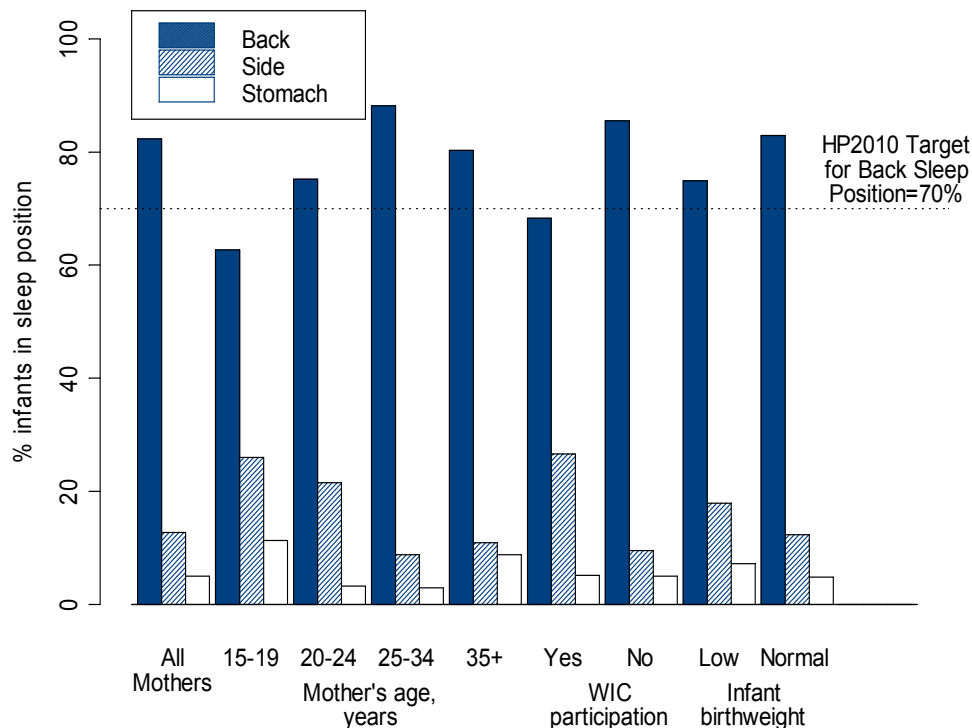
**Jefferson County Status:** In 1997 – 2001, 75% of mothers reported putting their infants down to sleep on their backs.

Much research has shown that putting a healthy, full-term infant down to sleep on his/her side or back rather than the stomach greatly decreases the risk of sudden infant death syndrome (SIDS). The National Institute of Child Health and Human Development and the Maternal and Child Health Bureau instituted the “Back to Sleep” campaign in 1994 to educate parents and physicians about recommendations for sleep positions. The percentage of infants put to sleep on their stomachs dropped dramatically between 1992 and 1997.

#### Jefferson County Findings

- Data from the Pregnancy Risk Assessment Monitoring System (PRAMS) survey (Figure 3.13) showed that mothers have exceeded the HP 2010 target for putting infants to sleep on their backs, and only a small percentage of mothers put infants to sleep on their stomachs.
- Some disparities remain. Younger mothers and those enrolled in the Women, Infants and Children (WIC) program have not yet attained the national goal, but are very close.

Figure 3.13 Infant sleep position by mother’s age, WIC program participation and infant birthweight, Jefferson County, by percent, 1997 - 2001



Source: JCDHE-Epidemiology and CDPHE-PRAMS

### 3.7 BREASTFEEDING

#### HP 2010 Objectives

**16-19a:** Increase to 75% the number of women who breastfed their babies in the early post-partum period.

**16-19b:** Increase to 50% the number of women who are breastfeeding their babies at 6 months.

**Jefferson County Status:** During 1997 – 2001, 87% of mothers breastfed their infants in the early post-partum period and 63% of mothers sustained breastfeeding through the first nine weeks post-partum.

Breastfeeding provides many benefits to both the infant and mother, including reduced infant illness, earlier return to pre-pregnancy weight, reduced risk of pre-menopausal breast cancer, and reduced risk of osteoporosis. An important public health goal is to increase breastfeeding by mothers, particularly among low-income and certain racial and ethnic populations who are less likely to be supported in initiating or sustaining breastfeeding for an infant's first year.

Efforts to increase breastfeeding among low-income and ethnically diverse women are undertaken through programs such as the Women, Infants and Children (WIC) program of the U.S. Department of Agriculture. The WIC program provides food supplementation for children in families living at 185% of poverty. Other programs for breastfeeding support include the Nurse Family Partnership and Prenatal Plus programs.

#### Jefferson County Findings

- Initiation of breastfeeding among county mothers who participated in the Pregnancy Risk Assessment Monitoring System (PRAMS) exceeded the HP 2010 target (Figure 3.14) and the rate for Colorado mothers. Mothers older than 25 years and not participating in the WIC program were most likely to initiate breastfeeding.
- Although PRAMS data are not a perfect match for comparison with the HP 2010 target for breastfeeding duration (and no 6-month duration data are available), mothers aged 25 years and older were more likely to sustain breastfeeding through the first 2 months and may be meeting the HP 2010 target (Figure 3.15).

Figure 3.14. Breastfeeding initiation by mother's age and WIC program participation, 1997-2001

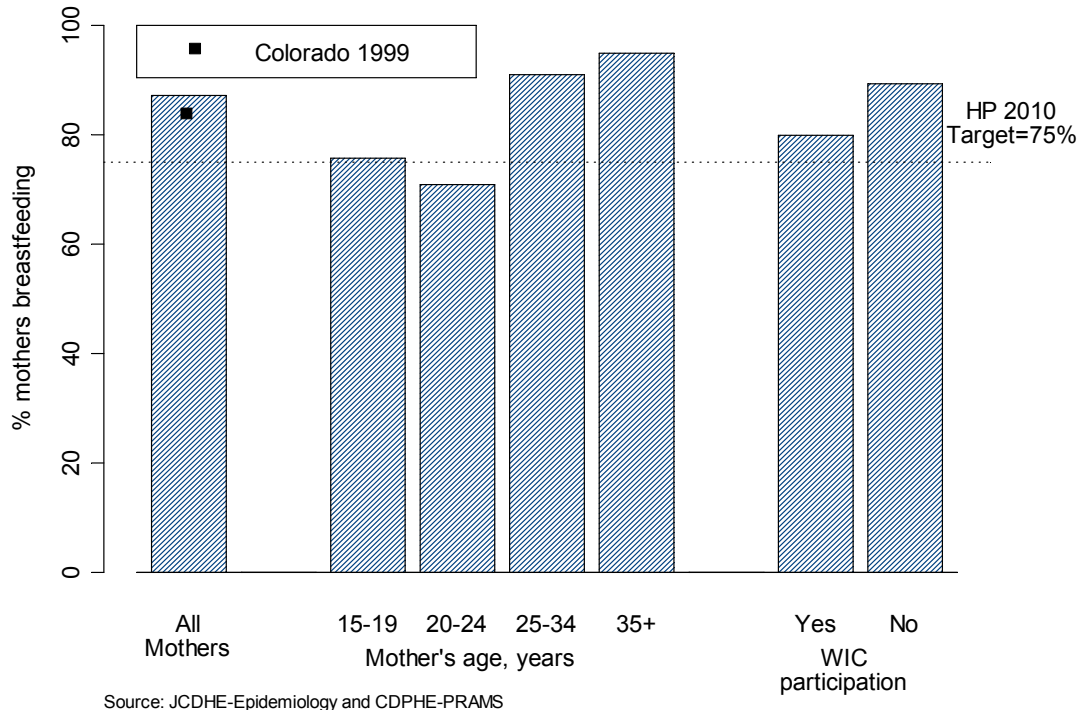
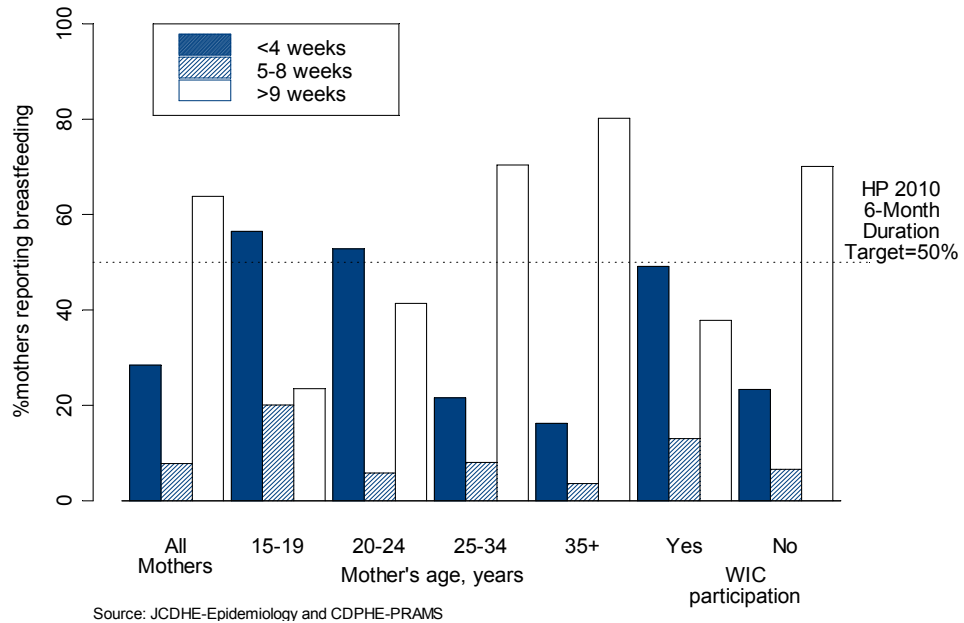


Figure 3.15 Breastfeeding duration by mother's age and WIC program participation, Jefferson County, by percent, 1997 - 2001



### **3.8 BIRTH DEFECTS**

**HP 2010 Objective 16-15:** Reduce new cases of spina bifida and other neural tube defects to no greater than 3 per 10,000 live births.

**Jefferson County Status:** In 1997 – 2001 there were 6.8 new cases of spina bifida per 10,000 live births to county mothers.

The most common birth defects, or congenital anomalies, among Colorado children affect the cardiovascular, musculoskeletal and genitourinary systems. Rates of occurrence of congenital anomalies vary by maternal race, with Asian mothers having a notably lower prevalence, and by maternal age, with the highest rates occurring in mothers older than 35 years of age. The prevalence rate of major congenital anomalies increased in Colorado between 1989 and 1996.

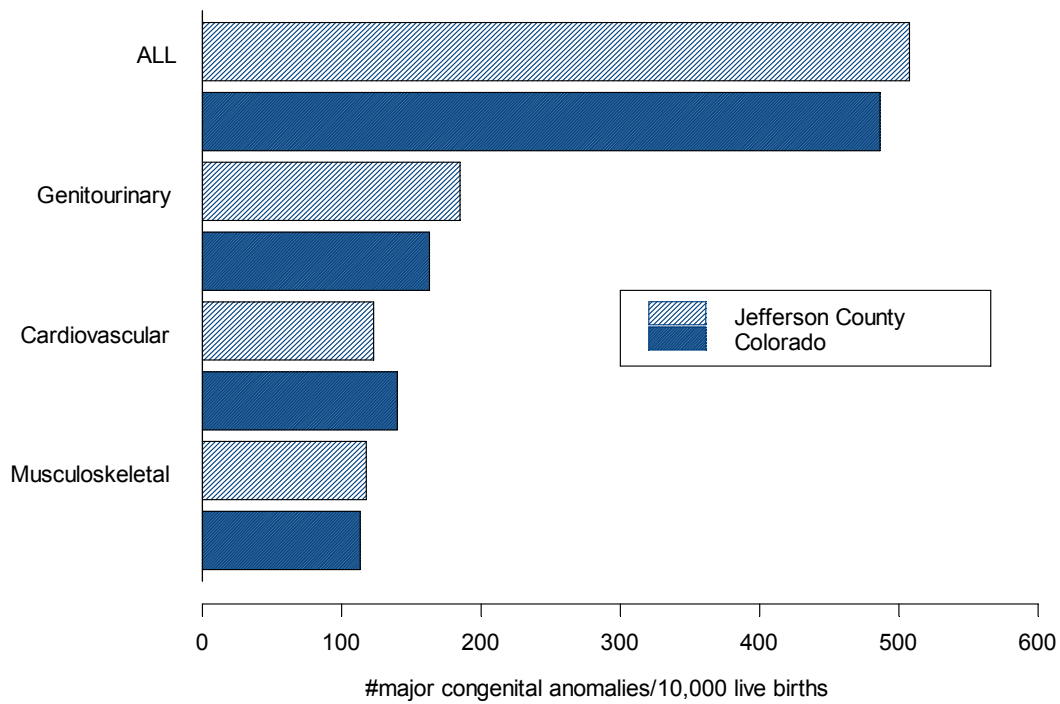
Neural tube defects (NTDs) occur when the fetal neural tube fails to close fully, interrupting development of the central nervous system. Approximately 50% of pregnancies resulting in NTDs could be prevented with adequate intake of folic acid by the mother from one month before conception through the first three months of pregnancy. In 1992 the U.S. Public Health Service recommended that all women of childbearing age consume 400 micrograms of folic acid daily.

Unlike NTDs, developmental disabilities, including cerebral palsy, mental retardation, autism and epilepsy, are often not identified in children until they begin pre-school or kindergarten. Significant factors related to the occurrence of developmental disabilities are low birthweight, intrauterine infections and childhood injury, indicating the preventable nature of many types of birth defects and developmental disabilities.

#### **Jefferson County Findings**

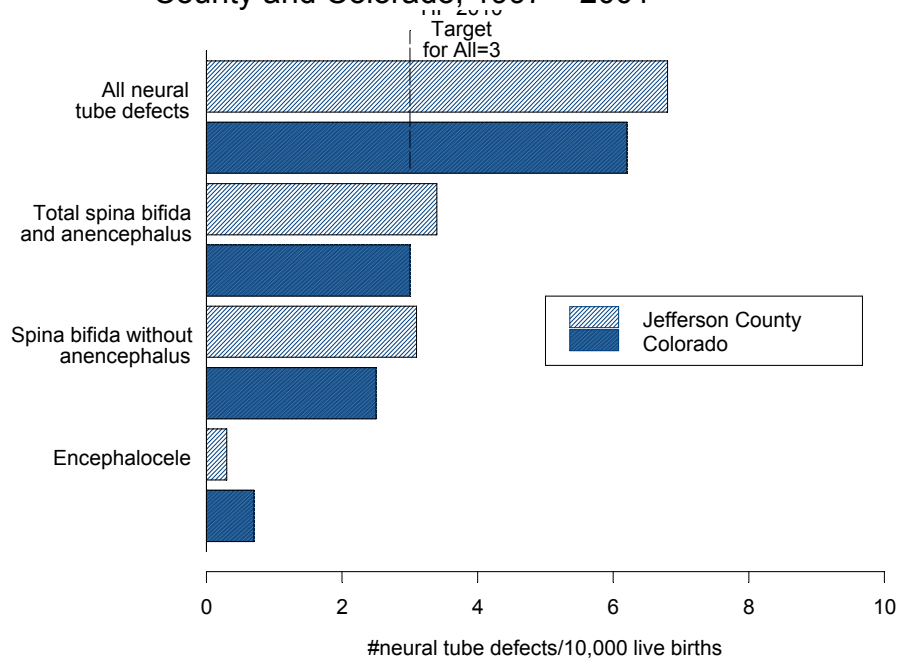
- Rates of major congenital anomalies were similar between the county and state (Figure 3.16). County rates were marginally higher for genitourinary and musculoskeletal defects.
- The rate of new cases of NTDs, 6.8 per 10,000 live births, was more than double the HP 2010 target. As with other major congenital anomalies, this may be a reflection of the older maternal ages of Jefferson County mothers.

Figure 3.16 Major congenital anomalies in live births, Jefferson County and Colorado, 1997 - 2001



Source: JCDHE-Epidemiology and CDPHE-CRCSN

Figure 3.17 Spina bifida and other neural tube defects in live births, Jefferson County and Colorado, 1997 – 2001



Source: JCDHE-Epidemiology and CDPHE-CRCSN

### **3.9 CHILDHOOD MORTALITY**

#### **HP 2010 Objectives**

- Among children aged 1 – 4 years, reduce the mortality rate to 1.86 deaths per 10,000 population.
- Among children aged 5 – 9 years, reduce the mortality rate to 1.23 deaths per 10,000 population.
- Among youths aged 10 – 14 years, reduce the mortality rate to 1.68 deaths per 10,000 population.
- Among young adults aged 15 – 19 years, reduce the mortality rate to 3.98 deaths per 10,000 population.

#### **Jefferson County Status**

For the period 1998 – 2002, per 10,000 population,

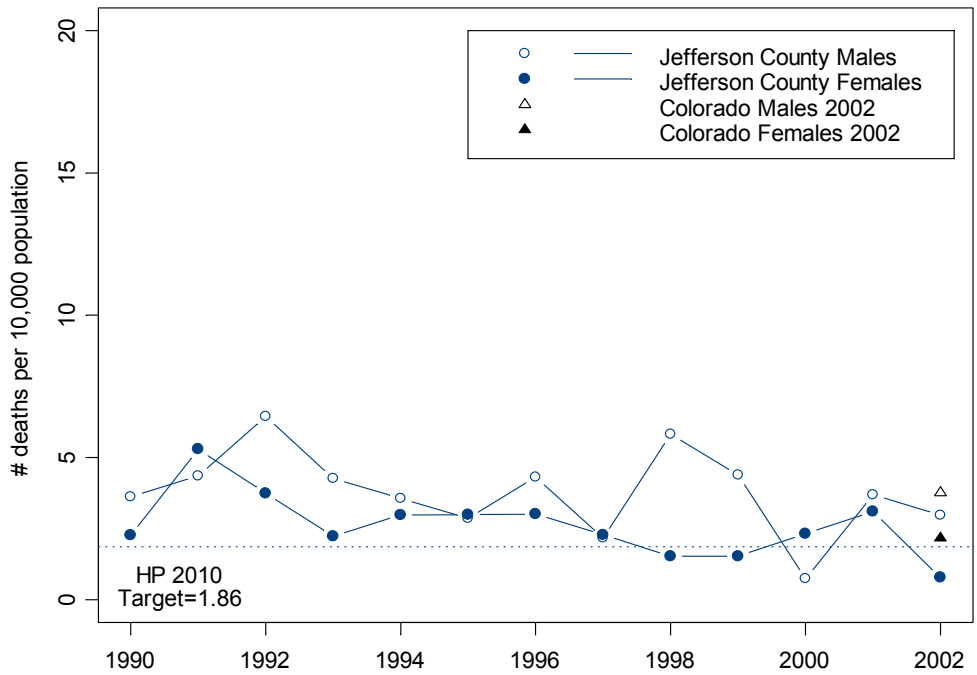
- among children aged 1 – 4 years, the number of deaths was 2.70,
- among children aged 5 – 9 years, the number of deaths was 1.62,
- among children aged 10 – 14 years, the number of deaths was 1.84, and
- among children aged 15 – 19 years, the number of deaths was 6.48.

The deaths of children after infancy reveal significant information about the economic, social, and political health of a population and present opportunities for prevention. The leading cause of death in the U.S. for children of all ages is injury. Approximately one-third of all deaths among Colorado children aged 1 – 14 years are attributable to injury, and 75% of injury-related childhood deaths are due to motor vehicle crashes.

#### **Jefferson County Findings**

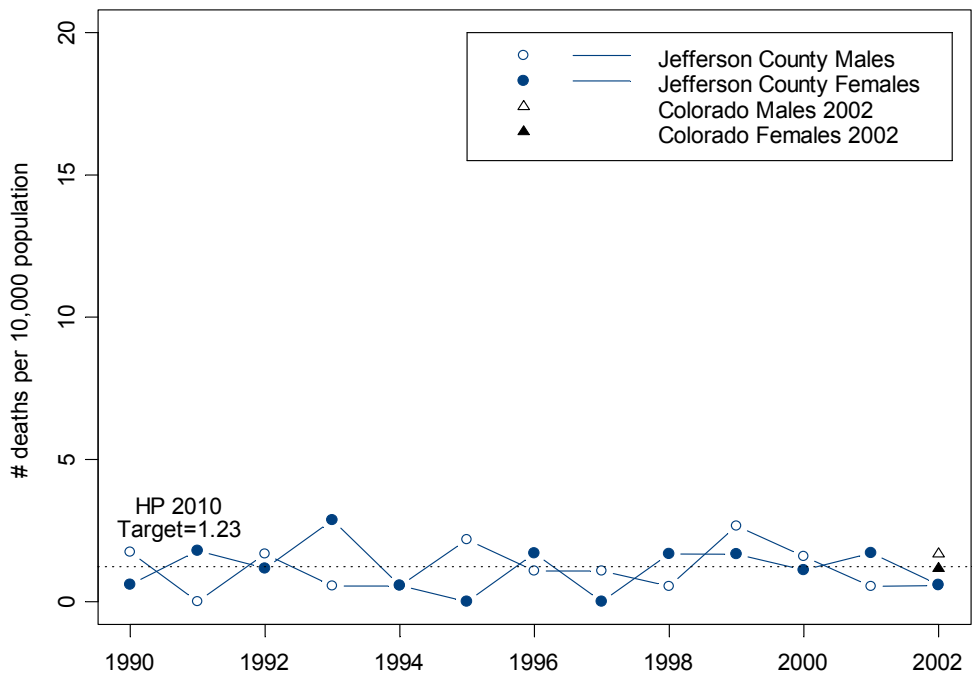
- Among children aged 1 – 4 years, death rates declined, and approached the HP 2010 target (Figure 3.18).
- Trends in deaths rates among children aged 5 – 9 years show that the county rates have been very close to the HP 2010 goal (Figure 3.19).
- Among youths aged 10 – 14 years, a gender differential became apparent: death rates for females in this age group were predominantly at or below the HP 2010 target, but male death rates remained higher (Figure 3.20).
- Mortality among young adults aged 15 – 19 years showed a widening gap between males and females. Rates among females met the HP 2010 target and rates among males were substantially higher (Figure 3.21). This figure clearly shows the impact of the Columbine tragedy in 1999 on mortality rates among young adults.
- The leading causes of death among Jefferson County children through young adults between 1990 and 2002 were unintentional and intentional injury and cancer (Figure 3.22).

Figure 3.18 Mortality in Jefferson County and Colorado among children aged 1 – 4 years, by gender and year, 1990 -2002



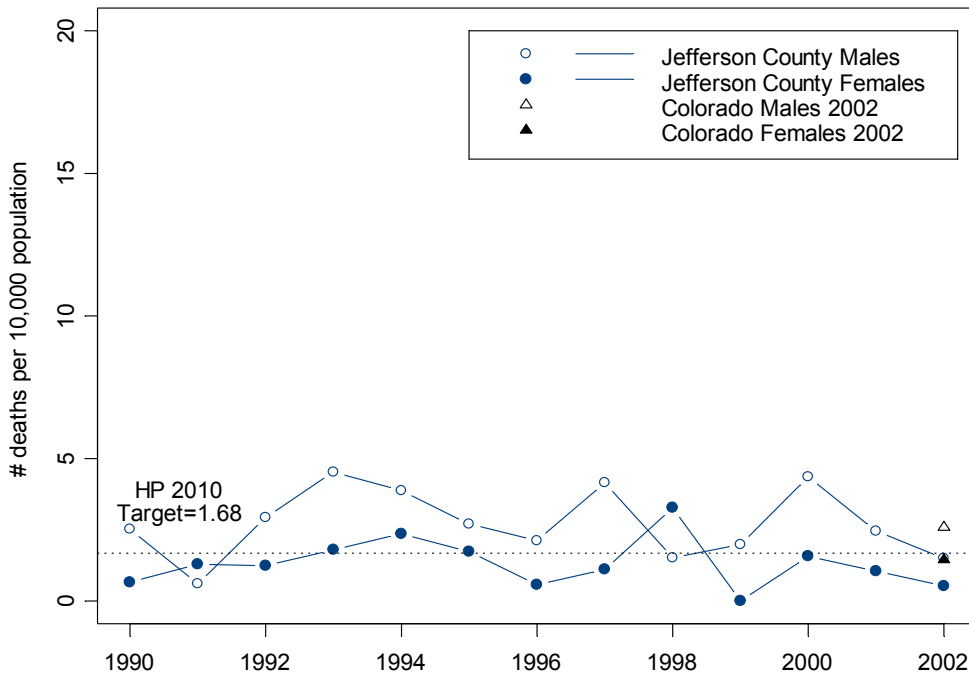
Source: JCDHE-Epidemiology and CDPHE-HSVRD

Figure 3.19 Mortality in Jefferson County and Colorado among children aged 5 – 9 years, by gender and year, 1990 - 2002



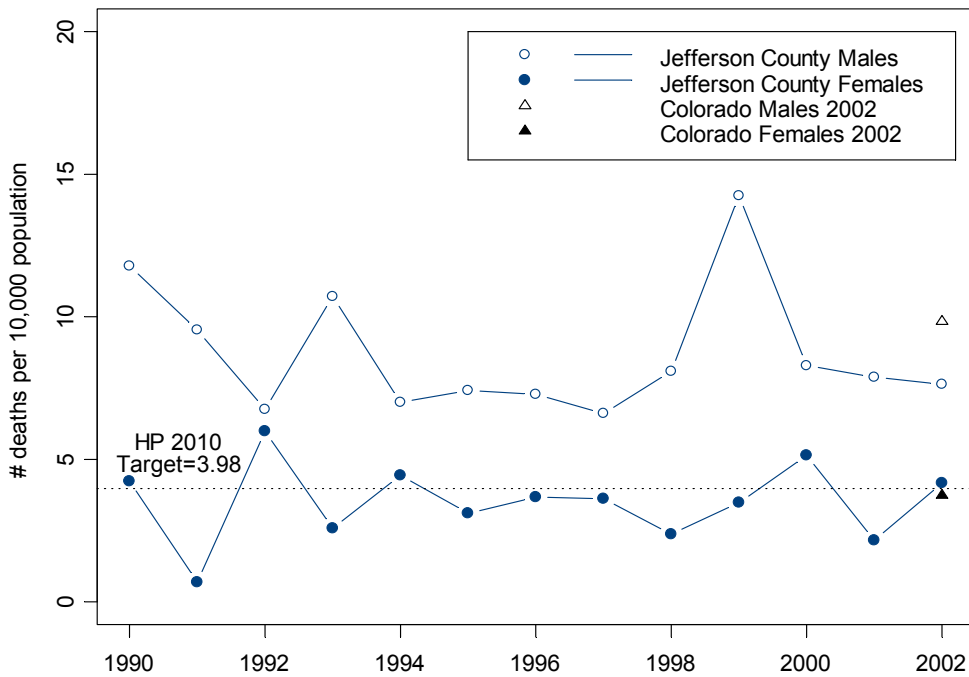
Source: JCDHE-Epidemiology and CDPHE-HSVRD

Figure 3.20 Mortality in Jefferson County and Colorado among youths aged 10 – 14 years, by gender and year, 1990 - 2002



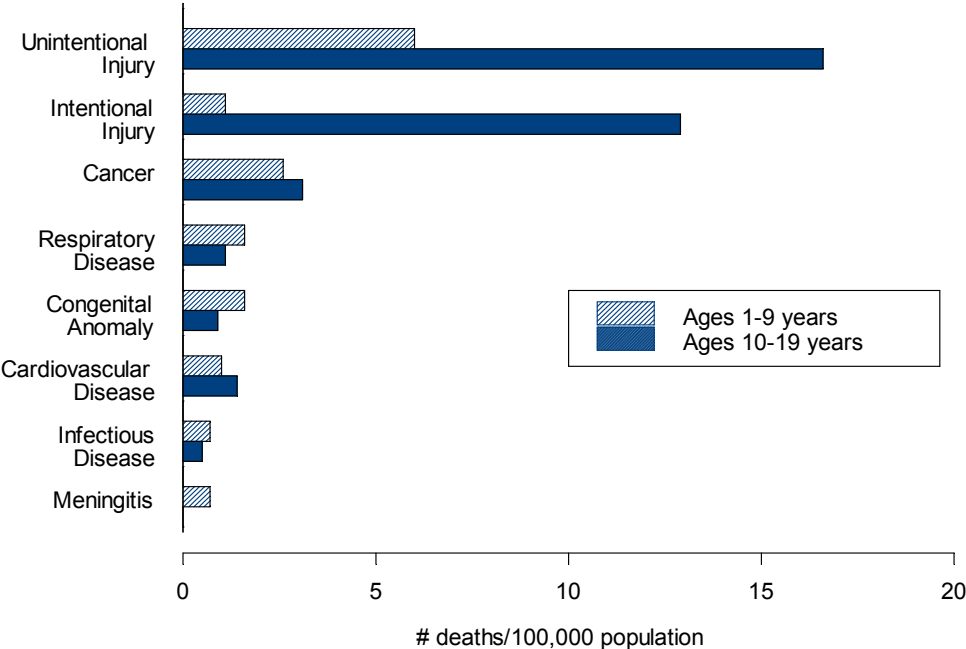
Source: JCDHE-Epidemiology and CDPHE-HSVRD

Figure 3.21 Mortality in Jefferson County and Colorado among young adults aged 15 – 19 years, by gender and year, 1990 - 2002



Source: JCDHE-Epidemiology and CDPHE-HSVRD

Figure 3.22 Leading causes of death of children and youths in Jefferson County by age group, 1990 - 2002



Source: JCDHE-Epidemiology and CDPHE-HSVRD