# Maternal, Infant, and Child Health

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**Co-Lead Agencies:** **Centers for Disease Control and Prevention**
**Health Resources and Services Administration**

## Contents

## Goal

**Improve the health and well-being of women, infants, children, and families.**

## Overview

The health of mothers, infants, and children is of critical importance, both as a reflection of the current health status of a large segment of the U.S. population and as a predictor of the health of the next generation. This focus area addresses a range of indicators of maternal, infant, and child health—those primarily affecting pregnant and postpartum women (including indicators of maternal illness and death) and those that affect infants' health and survival (including infant mortality rates; birth outcomes; prevention of birth defects; access to preventive care; and fetal, perinatal, and other infant deaths).

Infant mortality is an important measure of a nation's health and a worldwide indicator of health status and social well-being. As of 1995, the U.S. infant mortality rates ranked 25th among industrialized nations.[1] In the past decade, critical measures of increased risk of infant death, such as new cases of low birth weight (LBW) and very low birth weight (VLBW), actually have increased in the United States. In addition, the disparity in infant mortality rates between whites and specific racial and ethnic groups (especially African Americans, American Indians or Alaska Natives, Native Hawaiians, and Puerto Ricans) persists. Although the overall infant mortality rate has reached record low levels, the rate for African Americans remains twice that of whites.[2]

### Issues and Trends

In 1997, 28,045 infants died before their first birthday, for an overall rate of 7.2 deaths per 1,000 live births. This rate has declined steadily over the past 20 years; in 1975, the infant mortality rate was over 15 per 1,000 live births.[2] In 1997, two-thirds of all infant deaths took place during the first 28 days of life (the neonatal period). The overall neonatal mortality rate in 1997 was 4.8 per 1,000 live births.[2] The remaining one-third of infant deaths took place during the postneonatal period from an infant's 29th day of life until the first birthday. The U.S. postneonatal mortality rate in 1997 was 2.4 deaths per 1,000 live births.[2]

Four causes account for more than half of all infant deaths: birth defects, disorders relating to short gestation and unspecified LBW, sudden infant death syndrome (SIDS), and respiratory distress syndrome. The leading causes of neonatal death in 1997 were birth defects, disorders related to short gestation and LBW, respiratory distress syndrome, and maternal complications of pregnancy. After the first month of life, SIDS is the leading cause of infant death, accounting for about one-third of all deaths during this period. Maternal age also is a risk factor for infant death. Mortality rates are highest among infants born to young teenagers (aged 16 years and under) and to mothers aged 44 years and older.

Short gestation and LBW are among the leading causes of neonatal death, accounting for 20 percent of neonatal deaths. In 1998, a total of 11.6 percent of births were preterm, and 7.6 percent were LBW.[3] Included in these statistics were VLBW infants weighing less than 1,500 grams (3.3 pounds). The rate of VLBW births was 1.4 percent in 1998. The VLBW rate has increased slightly since 1990 among whites and other population groups including African Americans, Puerto Ricans, and American Indians.[1]

The use of alcohol, tobacco, and illegal substances during pregnancy is a major risk factor for LBW and other poor infant outcomes. Alcohol use is linked to fetal death, LBW, growth abnormalities, mental retardation, and fetal alcohol syndrome (FAS).[4] Overall rates of alcohol use during pregnancy have increased during the 1990s, and the proportion of pregnant women using alcohol at higher and more hazardous levels has increased substan-

tially. Smoking during pregnancy is linked to LBW, preterm delivery, SIDS, and respiratory problems in newborns. In addition to the human cost of these conditions, the economic cost of services to substance-exposed infants is great: health expenditures related to FAS are estimated to be from $75 million to $9.7 billion each year.[4] Over $500 million a year has been spent on medical expenses for infants exposed to cocaine in utero.[5] Smoking-attributable costs of complicated births in 1995 were estimated at $1.4 billion (11 percent of costs for all complicated births, based on smoking prevalence during pregnancy of 19 percent) and $2.0 billion (15 percent for all complicated births, based on smoking prevalence during pregnancy of 27 percent).[6]

The objectives in this focus area cover the broad array of childhood conditions and genetic disorders. Examples of preventable birth defects are spina bifida and other neural tube defects (NTDs). The occurrence of these disorders could be reduced by more than half if women consumed adequate folic acid before and during pregnancy.[7]

In addition to infant deaths and health conditions, the effect of pregnancy and childbirth on women is an important indicator of women's health. In 1997, a total of 327 maternal deaths were reported by vital statistics.[8] While this number is small, maternal death remains significant because a high proportion of these deaths are preventable and because of the impact of women's premature death on families. The maternal mortality ratio among African American women consistently has been three to four times that of white women. Ectopic pregnancy is an important cause of pregnancy-related illness and disability in the United States and the leading cause of maternal death in the first trimester. The risk of ectopic pregnancy increases with age; women of all races aged 35 to 44 years are at more than three times the risk of ectopic pregnancy than are women aged 15 to 24 years.[9]

The rates of many of these indicators have shown improvement over the past decade. The rate of infant mortality declined more than 27 percent between 1987 and 1997. The rate of fetal mortality declined 8 percent between 1987 and 1995.[1] Other indicators show less progress. The LBW rate increased 10 percent between 1987 and 1998.[1] The rate of FAS has risen steeply, especially among African Americans.[10] In addition, the maternal mortality rate has not declined since 1982, nor has the disparity between African American and white women.[2, 11]

Despite these unfavorable trends, evidence is encouraging about increases in women's use of health practices that can help their own health and that of their infants. The percentage of pregnant women who start prenatal care early increased 9.2 percent between 1987 and 1998. The percentage of mothers who breastfeed their newborns also went up 18.5 percent between 1988 and 1998, with greater gains among African American and Hispanic women. Other maternal health practices have shown less improvement: in 1992–94, the proportion of women of childbearing age reporting consumption of the recommended level of folic acid (400 micrograms) was 21 percent.

### Disparities

Many of these conditions and risk factors disproportionately affect certain racial and ethnic groups. The disparities between white and nonwhite groups in infant death, maternal death, and LBW are wide and, in many cases, are growing. Specifically:

- The 1997 infant mortality rate among African American infants was 2.3 times that of white infants. Although infant mortality rates have declined within both racial groups, the proportional discrepancy between African Americans and whites remains largely unchanged.[8]

- The rate of maternal mortality among African Americans is 20.3 per 100,000 live births, nearly four times the white rate of 5.1 per 100,000. African American women continue to be three to four times more likely than white women to die of pregnancy and its complications. The maternal death differential between African Americans and whites is highest for pregnancies that did not end in live birth (ectopic pregnancy, spontaneous and induced abortions, and gestational trophoblastic disease).[11]
- Rates of LBW for white women have risen from 5.7 percent of births in 1990 to 6.5 percent in 1998. Among African Americans, the LBW rate has declined slightly in the 1990s but remains twice as high as that of whites—13 percent in 1998. African Americans also are more likely to have other risk factors, such as young maternal age, high birth order (that is, having many live births), less education, and inadequate prenatal care. Puerto Ricans also are especially likely to have LBW infants.[3]
- American Indians or Alaska Natives and African Americans account for a disproportionate share of FAS deaths. In 1990, the rates of FAS among American Indians or Alaska Natives and African Americans were 5.2 and 1.4 per 1,000 live births, respectively, compared with 0.4 per 1,000 among the population as a whole.[10]

African American and Hispanic women also are less likely than whites to enter prenatal care early. For both African American and white women, the proportion entering prenatal care in the first trimester rises with maternal age until the late thirties, then begins to decline. For example, in 1998, 57 percent of African American women under age 18 years began care early, compared with 66 percent of white women of the same age. Among women aged 18 to 24 years, 68 percent of African Americans received care in their first trimester, compared to 76 percent of white women. Among women aged 25 to 39 years, 79 percent of African American women entered care early, compared with 89 percent of white women.[3]

### Opportunities

Many of the risk factors mentioned can be mitigated or prevented with good preconception and prenatal care. First, preconception screening and counseling offer an opportunity to identify and mitigate maternal risk factors before pregnancy begins. Examples include daily folic acid consumption (a protective factor) and alcohol use (a risk factor). During preconceptional counseling, healthcare providers also can refer women for medical and psychosocial or support services for any risk factors identified. Counseling needs to be culturally appropriate and linguistically competent. Prenatal visits offer an opportunity to provide information about the adverse effects of substance use, including alcohol and tobacco during pregnancy, and serve as a vehicle for referrals to treatment services. The use of timely, high-quality prenatal care can help to prevent poor birth outcomes and improve maternal health by identifying women who are at particularly high risk and taking steps to mitigate risks, such as the risk of high blood pressure or other maternal complications. Interventions targeted at prevention and cessation of substance use during pregnancy may be helpful in further reducing the rate of preterm delivery and low birth weight.[12,13,14] Further promotion of folic acid intake can help to reduce the rate of neural tube defects.[15,16]

# REPRODUCTIVE HEALTH–RELATED OBJECTIVES

## Maternal, Infant, and Child Health

**Goal:**

Improve the health and well-being of women, infants, children, and families.

**Number Objective Short Title**

**Fetal, Infant, Child, and Adolescent Deaths**

**16-3.** Adolescent and young adult deaths

**Maternal Deaths and Illnesses**

**16-4.** Maternal deaths

**16-5.** Maternal illness and complications due to pregnancy

**Prenatal Care**

**16-6.** Prenatal care

**Developmental Disabilities and Neural Tube Defects**

**16-16.** Optimum folic acid levels

**Prenatal Substance Exposure**

**16-17.** Prenatal substance exposure

### HEALTHY PEOPLE 2010 OBJECTIVES

**Fetal, Infant, Child, and Adolescent Deaths**

**16-3.** Reduce deaths of adolescents and young adults.

**Target and baseline:**

| Objective | Reduction in Deaths of Adolescents and Young Adults | 1998 Baseline | 2010 Target |
|---|---|---|---|
| | | Rate per 100,000 | |
| **16-3a.** | Adolescents aged 10 to 14 years | 22.1 | 16.8 |
| **16-3b.** | Adolescents aged 15 to 19 years | 70.6 | 39.8 |
| **16-3c.** | Young adults aged 20 to 24 years | 95.3 | 49.0 |

**Target setting method:** Better than the best.

**Data source:** National Vital Statistics System (NVSS), CDC, NCHS.

| Adolescents and Young Adults, 1998 | 16.3a. Deaths of Adolescents Aged 10 to 14 Years | 16-3b. Deaths of Adolescents Aged 15 to 19 Years | 16-3c. Deaths of Young Adults Aged 20 to 24 Years |
|---|---|---|---|
| | Rate per 100,000 | | |
| **TOTAL** | 22.1 | 70.6 | 95.3 |
| **Race and ethnicity** | | | |
| American Indian or Alaska Native | 26.7 | 90.5 | 146.1 |
| Asian or Pacific Islander | 17.9 | 39.9 | 49.1 |
| Asian | DNC | DNC | DNC |
| Native Hawaiian and other Pacific Islander | DNC | DNC | DNC |
| Black or African American | 29.9 | 97.2 | 160.3 |
| White | 20.8 | 66.6 | 84.9 |
| Hispanic or Latino | 19.1 | 67.6 | 99.6 |
| Not Hispanic or Latino | 22.6 | 70.7 | 94.0 |
| Black or African American | 31.3 | 100.8 | 165.8 |
| White | 20.8 | 65.3 | 80.2 |
| **Gender** | | | |
| Female | 17.2 | 40.8 | 46.5 |
| Male | 26.9 | 98.7 | 142.3 |
| **Family income level** | | | |
| Poor | DNC | DNC | DNC |
| Near poor | DNC | DNC | DNC |
| Middle/high income | DNC | DNC | DNC |
| **Disability Status** | | | |
| Persons with disabilities | DNC | DNC | DNC |
| Persons without disabilities | DNC | DNC | DNC |

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.

The deaths of young adolescents, older adolescents, and young adults are more likely to be due to external causes than to congenital diseases. There were 4,261 deaths among adolescents aged 10 to 14 years in 1998, for a mortality rate of 22.1 per 100,000. The leading cause of death for adolescents in this age group was motor vehicle crashes at 5.4 deaths per 100,000 or 24.3 percent of the total mortality. Other unintentional injuries (such as falls, drownings, and poisonings) caused 3.5 deaths per 100,000 (15.9 percent); homicides caused 1.5 deaths per 100,000 (6.8 percent); suicides caused 1.6 deaths per 100,000 (7.4 percent); and AIDS caused 0.1 deaths per 100,000 (0.6 percent). Fifty-five percent of the total deaths in this age group, therefore, can be attributed to unnecessary (that is, preventable) causes. Other causes of death for this age group that are less amenable to prevention strategies given current scientific knowledge include malignant neoplasms, birth defects, diseases of the heart, and a combination of other causes.[8, 17]

There were 13,788 deaths in 1998 among adolescents aged 15 to 19 years, for a death rate of 70.6 per 100,000. The leading cause of death for adolescents in this age group was motor vehicle crashes at 28.4 deaths per 100,000 or 37.4 percent of total deaths. Other unintentional injuries (such as falls, drownings, and poisonings) caused 7.3 deaths per 100,000 (10.4 percent); homicides caused 11.8 deaths per 100,000 (16.8 percent); suicides caused 8.9 deaths per 100,000 (12.6 percent); and AIDS caused 0.1 deaths per 100,000 (0.2 percent). Consequently, a majority (77 percent) of the total deaths in this age group can be attributed to unnecessary (that is, preventable) causes. The remaining 23 percent of deaths among adolescents aged 15 to 19 years resulted mostly from malignant neoplasms, diseases of the heart, birth defects, and a combination of other causes.

Young adults aged 20 to 24 years had a death rate of 95.3 per 100,000 in 1998—a rate 331 percent higher than adolescents aged 10 to 14 years and 35 percent higher than adolescents aged 15 to 19 years. The leading cause of death for persons aged 20 to 24 years was motor vehicle crashes at 27.5 deaths per 100,000 or 28.9 percent of the total deaths. Other unintentional injuries (such as falls, drownings, and poisonings) caused 10.7 deaths per 100,000 (11.2 percent); homicides caused 18.1 deaths per 100,000 (19 percent); suicides caused 13.6 deaths per 100,000 (14.2 percent); and AIDS caused 1.0 deaths per 100,000 (1.4 percent). Consequently, a majority (74 percent) of the total deaths in this age group can be attributed to unnecessary (that is, preventable) causes. The remaining 26 percent of deaths among young adults aged 20 to 24 years resulted mostly from malignant neoplasms, diseases of the heart, birth defects, and a combination of other causes.

The data on deaths, however, do not adequately reflect consequences of sexual behaviors established as individuals in this age group become sexually mature. Illustratively, it is likely that most of the new HIV infections that are diagnosed each year occur among those between age 13 and 21 years. Further, about 3 million new and sexually transmitted disease infections (STDs) in addition to HIV occur among teenagers each year. In addition, about 1 million teenagers become pregnant each year. (See Focus Area 13. HIV and Focus Area 25. Sexually Transmitted Diseases.)

## Maternal Deaths and Illnesses

**16-4.** Reduce maternal deaths.

**Target:** 3.3 maternal deaths per 100,000 live births.

**Baseline:** 7.1 maternal deaths per 100,000 live births occurred in 1998.

**Target setting method:** Better than the best.

**Data source:** National Vital Statistics System (NVSS), CDC, NCHS.

| Live Births, 1998 | Maternal Deaths<br>Rate per 100,000 |
|---|---|
| **TOTAL** | 7.1 |
| **Mother's race and ethnicity** | |
| American Indian or Alaska Native | DSU |
| Asian or Pacific Islander | DSU |
| Asian | DSU |
| Native Hawaiian and other Pacific Islander | DSU |
| Black or African American | 17.1 |
| White | 5.1 |
| Hispanic or Latino | 5.7 |
| Not Hispanic or Latino | 7.5 |
| Black or African American | 17.4 |
| White | 4.9 |
| **Mother's education level** | |
| Less than high school | DNA |
| High school graduate | DNA |
| At least some college | DNA |
| **Mother's disability status** | |
| Mothers with disabilities | DNC |
| Mothers without disabilities | DNC |
| **Select populations** | |
| Mother's age groups | |
| Under 20 years | DSU |
| 20 to 24 years | 5.0 |
| 25 to 29 years | 6.7 |
| 30 to 34 years | 7.5 |
| 35 years and older | 14.5 |

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## 16-5. Reduce maternal illness and complications due to pregnancy.

**Target and baseline:**

| Objective | Reduction in Maternal Illness and Complications | 1998 Baseline | 2010 Target |
|---|---|---|---|
| | | Per 100 Deliveries | |
| **16-5a.** | Maternal complications during hospitalized labor and delivery | 31.2 | 24 |
| **16-5b.** | Ectopic pregnancies | Developmental | |
| **16-5c.** | Postpartum complications, including postpartum depression | Developmental | |

**Target setting method:** Better than the best.

**Data source:** National Hospital Discharge Survey, CDC, NCHS.

**Potential data source:** National Hospital Discharge Survey (NHDS), CDC, NCHS.

Note: The table below may continue to the following page.

| Deliveries, 1998 | 16-5a. Maternal Complications During Hospitalized Labor and Delivery<br><br>Rate per 100 Deliveries |
|---|---|
| **TOTAL** | 31.2 |
| **Race and ethnicity** | |
| American Indian or Alaska Native | DSU |
| Asian or Pacific Islander | DSU |
| Asian | DNC |
| Native Hawaiian and other Pacific Islander | DNC |
| Black or African American | 37.7 |
| White | 30.3 |
| Hispanic or Latino | DSU |
| Not Hispanic or Latino | DSU |
| Black or African American | DSU |
| White | DSU |

| Deliveries, 1998 | 16-5a. Maternal Complications During Hospitalized Labor and Delivery<br><br>Rate per 100 Deliveries |
|---|---|
| **Family income level** | |
| Poor | DNC |
| Nearly poor | DNC |
| Middle/high income | DNC |
| **Select populations** | |
| Mother's age group | |
| Under 15 years | DSU |
| 15 to 19 years | 34.4 |
| 20 to 24 years | 30.4 |
| 25 to 29 years | 29.7 |
| 30 to 34 years | 31.1 |
| 35 years and older | 32.7 |

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.

Note: The table above may have continued from the previous page.

In 1997, 327 maternal deaths were reported by vital statistics, the major causes of which were hemorrhage, ectopic pregnancy, pregnancy-induced hypertension, embolism, infection, and other complications of pregnancy and childbirth.[18] The overall maternal mortality rate has fluctuated between approximately 7 and 8 per 100,000 live births since 1982.[19] Moreover, the gap between African Americans and whites remains, with the maternal mortality rate among African Americans 3.6 times that of whites in 1997. The rates among African Americans have been at least three to four times higher than those of whites since 1940. The rate among African Americans also has not declined, fluctuating between about 18 and 22 per 100,000 live births.[19]

Pregnancy and delivery can lead to serious physical and mental health problems for women. In the past, maternal illness and complications were monitored through objectives relating to the ratio of antenatal hospitalizations for pregnancy complications to the total number of deliveries. This ratio has become a less useful measure, however, as rates of antenatal hospitalization in general have declined due to managed care and its emphasis on outpatient treatment.[20] Therefore, attention should be focused on the major causes of maternal illness and complications, particularly those most likely to be associated with maternal death, such as ectopic pregnancy. Pelvic inflammatory disease caused by chlamydia and gonorrhea is the leading cause of preventable tubal scarring that can result in ectopic pregnancy. (See Focus Area 25. Sexually Transmitted Diseases.) The outcomes of

interest should include not only prenatal illness and complications and complications during labor and delivery but also postpartum complications. Postpartum depression, for example, is disabling for a new mother and can compromise her ability to care for her infant.

### Prenatal Care

**16-6.** Increase the proportion of pregnant women who receive early and adequate prenatal care.

**Target and baseline:**

| Objective | Increase in Maternal Prenatal Care | 1998 Baseline | 2010 Target |
|---|---|---|---|
| | | Percent of Live Births | |
| **16-6a.** | Care beginning in first trimester of pregnancy | 83 | 90 |
| **16-6b.** | Early and adequate prenatal care | 74 | 90 |

**Target setting method:** Better than the best.

**Data source:** National Vital Statistics System (NVSS), CDC, NCHS.

Note: The table below may continue to the following page.

| Live Births, 1998 | Maternal Prenatal Care | |
|---|---|---|
| | 16-6a. First Trimester | 16-6b. Early and Adequate |
| | Percent | |
| **TOTAL** | 83 | 74 |
| **Mother's race and ethnicity** | | |
| American Indian or Alaska Native | 69 | 57 |
| Asian or Pacific Islander | 83 | 74 |
| Asian | 86 | 76 |
| Native Hawaiian and other Pacific Islander | 75 | 67 |
| Black or African American | 73 | 67 |
| White | 85 | 76 |
| Hispanic or Latino | 74 | 66 |
| Not Hispanic or Latino | 85 | 76 |
| Black or African American | 73 | 67 |
| White | 88 | 79 |

| Live Births, 1998 | Maternal Prenatal Care | |
|---|---|---|
| | 16-6a. First Trimester | 16-6b. Early and Adequate |
| | Percent | |
| **Mother's education level** | | |
| Less than high school | 68 | 61 |
| High school graduate | 81 | 74 |
| At least some college | 91 | 82 |
| **Mother's disability status** | | |
| Mothers with disabilities | DNC | DNC |
| Mothers without disabilities | DNC | DNC |
| **Select populations** | | |
| Mother's age groups | | |
| Under 15 years | 48 | 48 |
| 15 to 19 years | 69 | 64 |
| 20 to 24 years | 78 | 70 |
| 25 to 29 years | 86 | 77 |
| 30 to 34 years | 89 | 79 |
| 35 years and older | 88 | 79 |

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.

Note: The table above may have continued from the previous page.

Prenatal care includes three major components: risk assessment, treatment for medical conditions or risk reduction, and education. Each component can contribute to reductions in perinatal illness, disability, and death by identifying and mitigating potential risks and helping women to address behavioral factors, such as smoking and alcohol use, that contribute to poor outcomes. Prenatal care is more likely to be effective if women begin receiving care early in pregnancy. Since 1990, the proportion of infants whose mothers entered prenatal care in the first trimester increased 8.8 percent, from 76 percent to 83 percent. Among African Americans, this proportion grew 19 percent and among Hispanics, 22 percent.[1] Thus, increases in early entry into prenatal care have been concentrated in those populations whose perinatal illness and disability rates and mortality rates are highest and who are most likely to have low incomes. These increases are likely due, in part, to increased access to Medicaid coverage for pregnancy-related services and improved outreach by Medicaid programs.[21] In addition, the likelihood of early entry into prenatal care rises with age. The risk of poor birth outcomes is greatest among the youngest mothers (aged 15 years and under). Clearly, therefore, continued work is needed to educate women, particularly young women, about the need to begin prenatal care early in pregnancy.

Prenatal care should begin early and continue throughout pregnancy, according to accepted standards of periodicity. For example, the American College of Obstetricians and Gynecologists recommends that women receive at least 13 prenatal visits during a full-term pregnancy.[22] Therefore, assessment of the adequacy of the care pregnant women receive must include monitoring not only the month of initiation of prenatal care but also the adequacy of the care they receive throughout pregnancy. The Adequacy of Prenatal Care Utilization Index (APNCU) measures two dimensions of care: the adequacy of initiation of care and the adequacy of the use of prenatal services once care has begun (by comparing actual use to the recommended number of visits based on the month of initiation of care and the length of the pregnancy).[23] These dimensions are combined to classify each woman's prenatal care history as inadequate, intermediate, adequate, or adequate-plus. The baseline rates presented above include all women who received either adequate or adequate-plus care.

Overall, nearly three-quarters of women receive adequate prenatal care. However, this proportion varies across racial and ethnic groups. Certain groups, such as American Indians or Alaska Natives and Samoans, are particularly likely to receive less-than-adequate prenatal care. The likelihood of receipt of adequate prenatal care rises with maternal age, with fewer than half of pregnant women aged 15 years and under receiving adequate care.[17] Prevention of unwanted pregnancy in adolescents and education of women about the need for early, continuous prenatal care are essential.

**16-16.** Increase the proportion of pregnancies begun with an optimum folic acid level.

**Target and baseline:**

| Objective | Increase in Pregnancies Begun With Optimum Folic Acid Level | 1991-94 Baseline | 2010 Target |
|---|---|---|---|
| | | Percent | |
| **16-16a.** | Consumption of at least 400 µg of folic acid each day from fortified food or dietary supplements by nonpregnant women aged 15 to 44 years | 21 | 80 |
| **16-16b.** | Median RBC folate level among nonpregnant women aged 15 to 44 years | 160 ng/ml | 220 ng/ml |

**Target setting method:** Better than the best.

**Data source:** National Health and Nutrition Examination Survey (NHANES), CDC, NCHS.

| Nonpregnant Women Aged 15 to 44 Years, 1991-94 | 16-16a. Adequate Folic Acid<br>Percent | 16-16b. Median RBC Folate Level<br>ng/ml |
|---|---|---|
| **TOTAL** | 21 | 160 |
| **Race and ethnicity** | | |
| American Indian or Alaska Native | DSU | DSU |
| Asian or Pacific Islander | DSU | DSU |
| Asian | DNC | DNC |
| Native Hawaiian and other Pacific Islander | DNC | DNC |
| Black or African American | 17 | 125 |
| White | 22 | 169 |
| Hispanic or Latino | DSU | DSU |
| Mexican American | 13 | 158 |
| Not Hispanic or Latino | 22 | 159 |
| Black or African American | 18 | 123 |
| White | 23 | 170 |
| **Education level** | | |
| Less than high school | 12 | 145 |
| High school graduate | 19 | 148 |
| At least some college | 28 | 179 |
| **Disability status** | | |
| Persons with disabilities | 20 | 169 |
| Persons without disabilities | 23 | 159 |

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Neural tube defects (NTDs), including spina bifida, occur when the fetal neural tube fails to close fully, interrupting development of the central nervous system. Approximately 50 percent of pregnancies affected with NTDs may be prevented with adequate consumption of folic acid from 1 month before conception through the first 3 months of pregnancy.[15] In 1992, the U.S. Public Health Service (PHS) recommended that all women of childbearing age consume 400 micrograms of folic acid daily.[16] For women who already have had an NTD-affected pregnancy, PHS recommends that women consult with a health care professional about taking a much larger amount of folic acid—4,000 micrograms (4.0 milligrams)—when planning a pregnancy.[16] In 1998, the Institute of Medicine further recommended that to reduce the risk of an NTD-affected pregnancy, all women capable of becoming pregnant should consume 400 micrograms of folic acid daily, from fortified foods or supplements or a combination of the two, in addition to consuming folate-rich foods, such as orange juice, green vegetables, and beans.[24]

Most grain products (including enriched flour, breads, breakfast cereals, rice, and pasta) now are fortified with folic acid. However, the amount of folic acid that some segments of the reproductive-aged population might receive through their diet may not adequately meet the PHS recommendation of 400 micrograms daily. Thus, women capable of becoming pregnant need to review their dietary options, eat a diet that includes folate-rich foods, and target consumption of folic acid-fortified food as well as take a folic acid-containing supplement.

### Prenatal Substance Exposure

**16-17.** Increase abstinence from alcohol, cigarettes, and illicit drugs among pregnant women.

**Target and baseline:**

| Objective | Increase in Reported Abstinence in Past Month From Substances by Pregnant Women* | 1996-97 Baseline (unless noted) | 2010 Target |
|---|---|---|---|
| | | Percent | |
| **16-17a.** | Alcohol | 86 | 94 |
| **16-17b.** | Binge drinking | 99 | 100 |
| **16-17c.** | Cigarette smoking† | 87(1998) | 99 |
| **16-17d.** | Illicit drugs | 98 | 100 |

*Pregnant women aged 15 to 44 years.
†Smoking during pregnancy for all women giving birth in 1998 in 46 States, the District of Columbia, and New York City.

**Target setting method:** Better than the best for 16-17a and 16-17c; complete elimination for 16-17b and 16-17d.

**Data sources:** National Household Survey on Drug Abuse, SAMHSA for 16-17a, 16-17b, and 16-17d; National Vital Statistics System, CDC, NCHS for 16-17c.

| Pregnant Women Aged 15 to 44 Years, 1996-97 (unless noted) | 16-17a. Alcohol Abstinence, Past Month | 16-17b. No Binge Drinking, Past Month | 16-17c. No Cigarette Smoking During Pregnancy, 1998* | 16-17d. No Drugs, Past Month |
|---|---|---|---|---|
| | Percent | | | |
| **TOTAL** | 86 | 99 | 87 | 98 |
| **Race and ethnicity** | | | | |
| American Indian or Alaska Native | DNA | DNA | 80 | DNA |
| Asian or Pacific Islander | DNA | DNA | 97 | DNA |
| Asian | DNC | DNC | 98 | DNC |
| Native Hawaiian and other Pacific Islander | DNC | DNC | 84 | DNC |
| Black or African American | DNA | DNA | 91 | DNA |
| White | DNA | DNA | 86 | DNA |
| Hispanic or Latino | 93 | 99 | 96 | 99 |
| Not Hispanic or Latino | DNA | DNA | 86 | DNA |
| Black or African American | 83 | 99 | 90 | 95 |
| White | 85 | 99 | 84 | 98 |
| **Education level** (aged 18 to 44 years) | | | | |
| Less than high school | 79 | 99 | 78 | 92 |
| High school graduate | 91 | 99 | 83 | 100 |
| At least some college | DNA | 98 | 94 | DNA |
| College graduate | DNA | DNA | DNA | DNA |
| **Disability status** | | | | |
| Persons with disabilities | DNC | DNC | DNC | DNC |
| Persons without disabilities | DSU | DNC | DNC | DNC |

DNA = Data have not been analyzed. DNC = Data are not collected. DSU = Data are statistically unreliable.
*Smoking during pregnancy for all women giving birth in 1998 in 46 States, the District of Columbia, and New York City.

A range of effects, including spontaneous abortion, LBW, and preterm delivery, have been associated with prenatal use of licit and illicit drugs, including alcohol, tobacco, cocaine, and marijuana.[25, 26, 27, 12, 13, 14] As discussed above, tobacco is associated with LBW and spontaneous abortion.[25] Heavy alcohol use is associated with FAS,[26] and even moderate alcohol use has demonstrated effects on preterm delivery.[27] The use of cocaine during pregnancy is associated with premature birth and impaired fetal growth.[5, 12, 13, 14] In addition, women who use cocaine are at especially high risk of infectious diseases, including hepatitis B and HIV. Exposure to marijuana in utero may be associated with LBW, preterm birth, and neurobehavioral functioning. However, isolating the effects of marijuana use on newborns is difficult because users of the drug often use alcohol and tobacco as well.[25]

Self-reported use of illicit drugs, such as cocaine and marijuana, is quite rare, with 98 percent of pregnant women reporting abstaining from these drugs. Rates of abstinence from harmful substances during pregnancy appear to be declining slowly. The use of alcohol during pregnancy, despite the established health risk, exemplifies this trend. In 1996–97, 86 percent of pregnant women abstained from alcohol use, an increase of 9 percent from the 1988 baseline. Rates of frequent drinking (at least seven drinks per week or at least five drinks on any occasion in the past month) among pregnant women have begun to decline, with only 1.3 percent of pregnant women reporting recent binge drinking in 1996–97, compared to 2.9 percent in 1994–95.[28] Unintentional alcohol exposure is particularly likely to occur early in pregnancy, before a woman knows she is pregnant. In addition to the objectives presented here, objectives in Focus Area 26. Substance Abuse, address alcohol consumption among women of reproductive age and tobacco use by pregnant women.

## Terminology

**Birth defect:** An abnormality in structure, function, or body metabolism that is present at birth, such as cleft lip or palate, phenylketonuria, or sickle cell disease.

**Developmental disabilities:** A broad spectrum of impairments characterized by developmental delay or limitation or both in personal activity, such as mental retardation, cerebral palsy, epilepsy, hearing and other communication disorders, and vision impairment. The more severe developmental disabilities require special interdisciplinary care.

**Ectopic pregnancy:** A gestation elsewhere than in the uterus, often occurring in the fallopian tube. An ectopic pregnancy cannot develop normally and causes fainting, abdominal pain, and vaginal bleeding.

**Fetal alcohol syndrome (FAS):** A cluster of structural and functional abnormalities found in infants and children as a result of alcohol consumption by the mother during pregnancy and characterized by growth retardation, facial malformations, and central nervous system dysfunction.

**Fetal death:** The death of a fetus in utero after 20 weeks or more of gestation. The fetal death rate is the number of fetal deaths in a population divided by the total number of live births and fetal deaths in the same population during the same time period.

**Genetic disorders:** The group of health conditions that result primarily from alterations in a gene or combination of genes.

**Gestational trophoblastic disease:** A type of cancer associated with pregnancy in which a grape-like mole develops in the womb.

**Infant death:** Death of an infant less than 1 year old. Neonatal death is the death of an infant less than 28 days after birth; postneonatal death is the death of an infant between 28 days and 1 year after birth.

**Infant mortality rate:** The number of deaths of infants less than 1 year old (obtained from death certificates) per 1,000 live births in a population (obtained from birth certificates).

**Intrauterine growth retardation (IUGR):** The failure of a fetus to maintain its expected growth potential at any stage of gestation. Infants with IUGR may be born at full term but are smaller than expected.

**Live birth:** The complete expulsion or extraction from its mother of an infant, irrespective of the duration of pregnancy, which after such separation, breathes or shows any other evidence of life, such as the beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached. Each infant from such a birth is considered live born.

**Low birth weight (LBW):** Weight at birth of less than 2,500 grams (about 5.5 pounds).

**Maternal death:** Death of a woman while pregnant or within 42 days of the end of pregnancy, irrespective of the duration or site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

**Maternal mortality rate:** (also referred to as the maternal mortality ratio) Represents the number of maternal deaths for every 100,000 live births.

**Neonatal period:** The first 28 days of life.

**Neural tube defects (NTDs):** A set of birth defects that result from failure of the neural tube to close in utero. Two of the most common NTDs are anencephaly (absence of the majority of the brain) and spina bifida (incomplete development of the back and spine).

**Occurrence:** As the term is used in this chapter, occurrence is the incidence of new cases among live births per year that are caused primarily by prenatal factors. In the spina bifida and other neural tube defects objective, identification is in the first year of life, and occurrence is reported as the number of cases per 10,000 live births per year. In the fetal alcohol syndrome objective, some children who have the condition at birth are not identified until age 4 or 5 years; occurrence is reported as a number per 10,000 live births.

**Perinatal death:** Includes fetal deaths after 28 weeks of gestation and infant deaths within the first 7 days of birth.

**Postneonatal period:** The period from an infant's 29th day of life until the first birthday.

**Postpartum period:** The 6-week period immediately following birth.

**Prenatal care:** Pregnancy-related health care services provided to a woman between conception and delivery. The American College of Obstetricians and Gynecologists recommends at least 13 prenatal visits in a normal 9-month pregnancy: one each month for the first 28 weeks of pregnancy, one every 2 weeks until 36 weeks, and then weekly until birth.

**Preterm birth:** Birth occurring before 37 weeks of pregnancy.

**Sudden infant death syndrome (SIDS):** Sudden, unexplained death of an infant from an unknown cause.

**Teratogenic:** Causing malformations of an embryo or fetus.

**Very low birth weight (VLBW):** Weight at birth of less than 1,500 grams (about 3.3 pounds).

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