

Singleton Low Birth Weight

Definition: Low birth weight is newborn weight less than 2,500 grams (5 lbs. 8 oz.) at birth. Low birth weight infants are either preterm (born at less than 37 weeks gestation) or full-term (born at 37 or more weeks' gestation). A fetus with inadequate fetal growth for gestational age (also known as fetal growth restriction) results in a newborn who is small for gestational age. Most data in this chapter are limited to singleton (one baby) births.

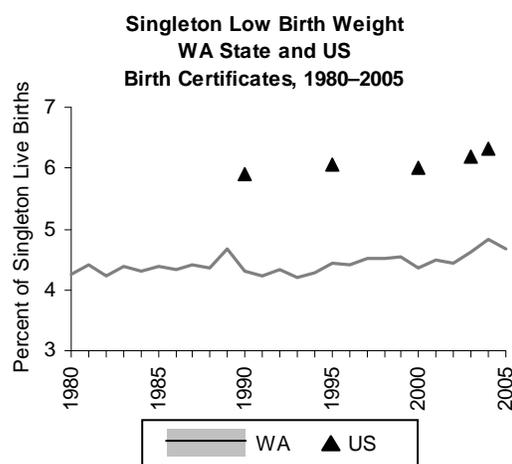
Summary

Low birth weight (LBW) is a major contributor to infant morbidity and mortality. The state LBW rate increased steadily from 5.2% in 1993 to 6.1% in 2005. The increase is partially due to the rise in multiple births (such as twins and triplets), but the singleton LBW rate has also increased in Washington and the nation. In 2005, the Washington singleton LBW rate was 4.7%. Most data presented in this chapter are limited to singleton births to highlight factors related to LBW other than multiple births. LBW infants include those who experience normal growth but are born too early (preterm) and those who are born either preterm or full-term but have inadequate fetal growth. In Washington from 2003–2005, black singleton infants experienced more than twice the LBW rates of white singleton infants, regardless of maternal age or socioeconomic status. This disparity is longstanding and exists nationally. Access to prenatal care has typically been recommended to reduce LBW. While prenatal care is important, it might begin too late to influence birth outcome. Recently, medical experts have promoted preconception care with services provided across women's reproductive lives as a way to reduce adverse pregnancy outcomes including LBW.

Time Trends

The total LBW rate in Washington State increased 17% during 1993–2005, from 5.2% to 6.1%. While the rise in multiple births (twins, triplets, etc.) has influenced this increase, the singleton (one-baby) LBW rate in Washington increased about 9% during 1980–2005, from 4.3% to 4.7%. This increase is similar to national trends, although Washington rates have consistently been lower than U.S. LBW rates. In

2004, the U.S. total LBW rate was 8.1% and the singleton LBW rate was 6.3%.¹



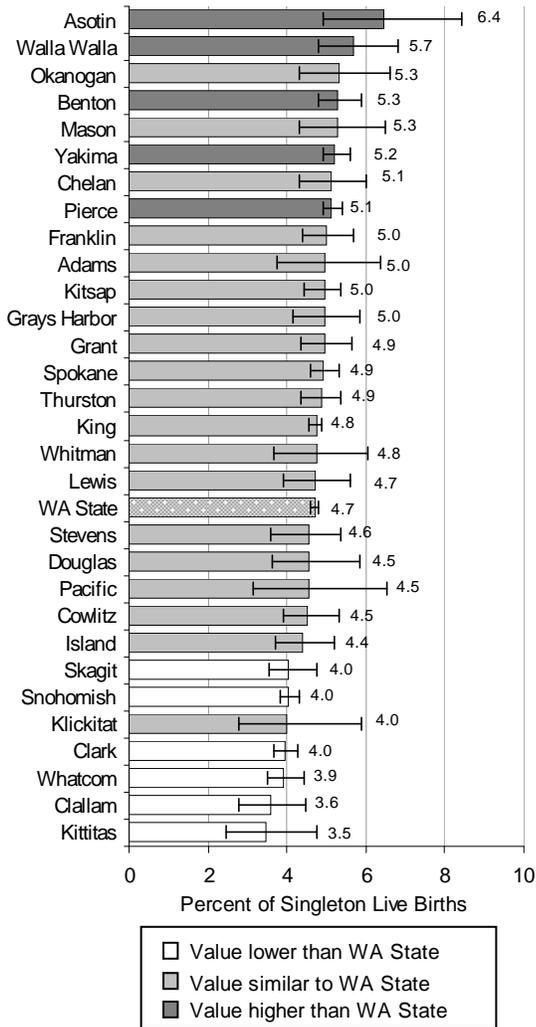
Year 2010 Goals

The *Healthy People 2010* objectives are to reduce the total LBW rate to 5% and the very low birth weight (VLBW) rate (<1,500 grams or 3 pounds, 5 ounces) to 0.9%. There are no objectives for singleton LBW. Neither Washington nor the nation is on target to meet the *Healthy People 2010* goals.

Geographic Variation

In Washington, county-specific singleton LBW rates for 2003–2005 ranged from 3.5% to 6.4%. (These rates are based on the mother's county of residence at birth.) Babies born to mothers living in Asotin, Walla Walla, Benton, Yakima, and Pierce counties had singleton LBW rates statistically significantly higher than the state as a whole, while those born to mothers living in Skagit, Snohomish, Clark, Whatcom, Clallam, and Kittitas counties had singleton LBW rates lower than the state. These rates are not adjusted for county differences in maternal age, race, Hispanic origin, or socioeconomic status.

**Singleton Low Birth Weight
County Data
Birth Certificates, 2003-2005**

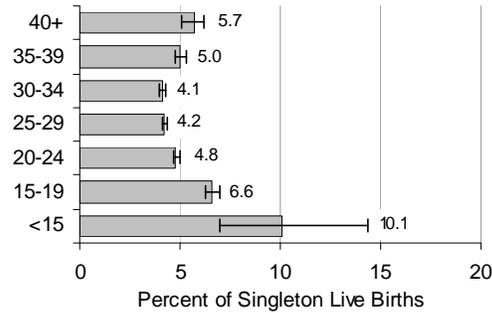


Note: Data are not presented for nine counties with less than 20 singleton low birth weight births during 2003–2005.

Age

During 2003–2005 in Washington, babies born to mothers younger than 25 or older than 34 had higher singleton LBW rates than those born to 25–29 year-old mothers. Babies whose mothers were younger than 20 had the highest rate of singleton LBW. This pattern is seen among all racial groups but is affected by socioeconomic status. Babies born to low-income mothers on Medicaid who were ages 35 and older had the highest singleton LBW rates among all racial and ethnic groups, except for Asians and Pacific Islanders.²

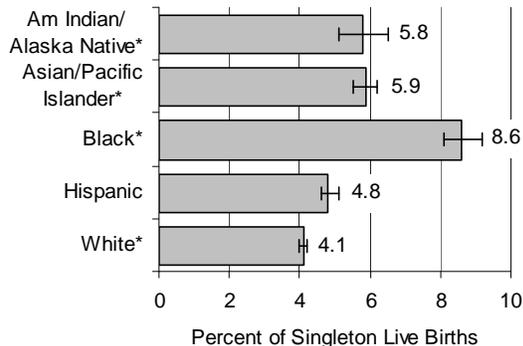
**Singleton Low Birth Weight
Maternal Age
Birth Certificates, 2003-2005**



Race and Hispanic Origin

The highest singleton LBW rate was among black infants, who experienced more than twice the singleton LBW rate of white babies. The black-white disparity exists for all maternal ages and socioeconomic groups. Moreover, this disparity is longstanding and similar to that seen across the United States.¹

**Singleton Low Birth Weight
Race and Hispanic Origin
Birth Certificates, 2003-2005**

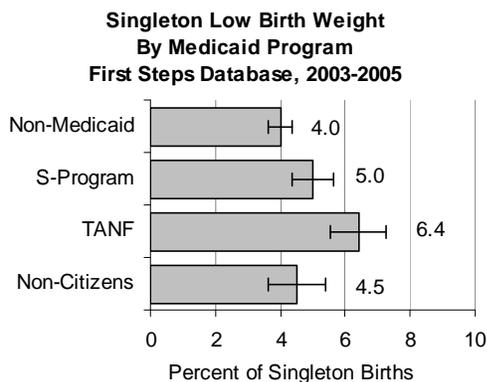


* Non-Hispanic

Income

Receipt of Medicaid-paid health services is one measure of low income. In Washington from 2003–2005, babies whose mothers received Medicaid-paid prenatal or delivery services had significantly higher singleton LBW rates than babies with mothers not receiving Medicaid. Babies born to mothers receiving Medicaid and cash assistance (Temporary Assistance to Needy Families Program or TANF) had the highest singleton low birth weight rate (6.4%). These women generally have household incomes of less than 50% of the federal poverty level (FPL). The singleton low birth weight rate among babies whose mothers received Medicaid but

not cash assistance (S-Program) was 5%. These women have household incomes up to 185% of FPL. Babies whose mothers did not receive Medicaid-covered care have the highest incomes and the lowest singleton LBW rate (4%). Mothers who were non-citizens have incomes lower than women on TANF, but their babies had the lowest rates of low birth weight rates (4.5%) of women on Medicaid.³ These are predominantly Hispanic-origin women from Mexico. Better reproductive outcomes among Mexican women not born in the United States have often been reported.⁴



Other Measures of Impact and Burden

The outcomes discussed below include both singleton and multiple births.

Preterm delivery. Gestational age is calculated from the onset of the last menstrual period. A full-term newborn is born after 37 completed weeks of gestation. A baby born before this time is considered preterm regardless of birth weight. In 2005, 10.3% of Washington births were preterm, compared with a national rate of 12.5% in 2004. In the United States, preterm birth accounts for more than two-thirds of infant mortality and half of long-term neurologic morbidity.¹

In Washington from 2003–2005, babies born to American Indian and Alaska Native mothers had higher preterm birth rates than other race or Hispanic origin groups. From 2003–2005, 14.2% of American Indian and Alaska Native babies were born preterm compared to 13.2% of black babies and 9.5% of white babies.

Very low birth weight. VLBW (less than 1,500 grams at birth) is primarily associated with preterm delivery. Consistent with national

statistics, VLBW infants in Washington comprise less than 1% of births but account for 48% of infant deaths.⁵ While the majority of VLBW infants do not experience neurodevelopmental problems, they are at increased risk for major physical or neurologic disability compared to normal birth weight infants.⁶ Infants weighing less than 1,000 grams at birth are at highest risk.

Small for gestational age (SGA). The SGA infant is term or preterm but has not grown to its expected size or weight in relation to its gestational age (i.e., the fetus is growth-restricted at birth). Fetal growth restriction can be due to maternal medical conditions (such as hypertension or a problem with placental function) or an external influence (such as maternal smoking or alcohol abuse). The rates of both complications and death increase when the infant is both LBW and SGA.⁷

In summary, a LBW infant can be term or preterm in addition to being appropriately grown or small for gestational age. For example, an infant of 34 weeks gestation who weighs 2,000 grams (4 pounds 7 ounces) at birth is both low birth weight and preterm but is also appropriately grown. But if the infant of 34 weeks gestation weighs 1,250 grams (2 pounds 12 ounces) at birth, the infant is not only VLBW and preterm but has also experienced growth restriction as a fetus and is small for gestational age at birth.

Outcomes. Low birth weight and preterm birth combined are the second leading cause of infant mortality in the United States, after congenital malformations.⁵

In Washington from 2003–2005, the infant mortality rate for singleton LBW infants was 55.8 deaths per 1,000 live births compared with an infant mortality rate of 2.2 deaths per 1,000 live births among non-LBW singleton infants.

Because LBW has multiple causes, it is unwise to group outcomes as a whole. Birth weight alone is not a complication. There might be no consequences of LBW for some infants, but for others, the outcome can be devastating.⁷

Most of the excess morbidity and mortality for LBW babies is experienced by the small percentage of infants born preterm at gestations less than 32 weeks (1.5% of Washington births from 2003–2005). Risk increases with decreasing gestational age. A preterm infant is at risk for respiratory, gastrointestinal, immunologic, and neurologic problems.⁸ Long-term complications of prematurity can include chronic respiratory problems; vision and hearing impairment; motor, cognitive, and behavioral

problems; and growth impairment. Prematurity is a key factor in long-term neurologic impairment.⁸

Initial problems of SGA infants depend in part on the cause of the growth restriction. Overall, SGA newborns are prone to birth asphyxia, hypoglycemia, temperature instability, infection, and circulatory problems.⁹

Long-term development of infants born SGA also depends on the cause of the growth failure. The outcome of infants born SGA because of genetic abnormalities or congenital viral infection depends on the course of the underlying condition.

Overall, SGA infants are more prone to develop adult-onset hypertension and cardiovascular complications.⁷ Some studies show a two-fold incidence of major neurologic problems among SGA infants.⁷ Adults who were born SGA can exhibit disparities in academic achievement and professional attainment relative to their appropriately grown counterparts.¹⁰

Costs. About two-thirds of LBW babies are preterm, and a recent report estimated the lifetime annual costs to society for each preterm baby as \$51,600.⁸ The costs of preterm birth include medical care, special education, early intervention, other support services, and additional expenses such as the time parents devote to the care of sick babies.

Risk and Protective Factors

Maternal medical risks. While this chapter focuses on singleton low birth weight, it is important to note that the rising proportion of multiple births has contributed significantly to the overall increase in low birth weight rates.¹ Since 1990, the rate of multiple births has increased by 28% in Washington State and accounted for 3% of live births in 2005. Increasing use of fertility treatments and women being older when they get pregnant are leading causes of this change.¹

The literature referenced below on risks for LBW does not address exclusively singletons. It refers to all LBW or all preterm deliveries unless specified.

Risks for LBW can exist before pregnancy. These risks include delivering a previous LBW baby, low pre-pregnancy weight, and possibly, maternal LBW.^{6,11} Maternal risk factors for preterm delivery include having had a previous preterm birth, low socioeconomic status, age younger than 15 or older than 35, uterine

malformations, chronic diseases, genetic factors, and perinatal infections.^{6,11} Risk factors during pregnancy include inadequate pregnancy weight gain and perinatal infections such as HIV, Hepatitis B, sexually transmitted diseases, and bacterial vaginosis.⁶ The strongest risk factors for preterm birth in all ethnic groups are multiple gestation, a history of preterm delivery, and vaginal bleeding.⁸ Current research shows a link between periodontal disease in pregnancy and preterm and LBW infants.¹² Risk factors for fetal growth restriction include maternal medical conditions such as hypertension, renal disease, and diabetes; and fetal/placental factors such as placental disease, multiple gestation, infection, and genetic disorders.⁹

Bacterial vaginosis is an alteration of the normal vaginal flora and is associated with preterm delivery. Bacterial vaginosis is more common in African American women (22%) than white women (8%).¹³

Assisted reproductive technology, such as in vitro fertilization, is more likely to result in preterm delivery and LBW, including for singleton gestations.^{11,33}

Behavioral and environmental risks. Use of illegal substances, alcohol, and tobacco are major risk factors for LBW, VLBW, and preterm birth.¹¹

Illicit drug use increases the incidence of fetal growth restriction and preterm birth. Behaviors associated with drug use, including smoking, alcohol use, and domestic violence, are additional risk factors.¹⁴

In the United States, eliminating smoking during pregnancy could reduce the incidence of singleton LBW infants by 10%.¹⁵

Interpregnancy intervals shorter than 18 months and longer than 59 months increase the risk of adverse perinatal outcomes, including LBW and preterm birth.¹⁶

Nutrient restriction during pregnancy can adversely affect birth outcomes depending on the type and duration of the restriction and its timing during pregnancy. Nutrient restriction can occur in every socioeconomic group and has multiple causes including the inability to acquire and prepare food as well as eating disorders.¹⁴ One indicator of nutrient restriction is low maternal weight gain, which has been associated with fetal growth restriction. Poor weight gain can also be associated with substance abuse, domestic violence, and depression, all of which also can contribute to poor pregnancy outcome.¹⁴

Domestic violence places women at increased risk of delivering a LBW baby. Domestic violence is also related to poor obstetrical history, substance use, and smoking, all of which can affect LBW.^{17, 18}

Over the past decade, prenatal exposure to air pollution has been associated with LBW. Some studies have found associations with preterm delivery and others with SGA, but more research is needed.¹⁹

Physical exertion at work has been studied as a risk factor for preterm birth and SGA. Findings are mixed.²⁰ One large study demonstrated no significant risk for pregnant women who lifted repeatedly or stood at least 30 hours per week. But an increased risk was observed among women working at night under similar conditions.²⁰ More studies are needed to determine any causal effect.

Recent research has examined the role of stress on LBW and preterm delivery. This research explores race and Hispanic origin disparities in LBW and preterm rates that cannot be fully explained by maternal age, education, lifestyle, and socioeconomic status.²¹ One theory is that the disproportionately high rate of preterm birth among well-educated black women might be due to women's cumulative exposures to physiological and psychosocial stressors, including the stresses of racism.²²

Intervention Strategies

The overlapping influences of socioeconomic, behavioral, and biologic factors in causing LBW and preterm birth prevent any single intervention from reducing all LBW or preterm birth.

Prenatal care. The 1985 Institute of Medicine Report on LBW concluded that prenatal care reduces low birth weight.²³ Since then, many states, including Washington, have expanded Medicaid eligibility for low-income pregnant women and children. Prenatal care serves to identify and treat risk factors influencing pregnancy outcomes.

Prenatal care, in its current form, can reduce maternal, fetal, and infant morbidities and mortality.²⁴ But despite improvements in the provision of prenatal care for Washington women, rates of low birth weight and preterm delivery have been rising. Prenatal care, even when accessed early in pregnancy, might come too late to address preexisting medical and behavioral factors that influence LBW and

preterm birth. Preconception care might be more effective in addressing known risk factors for LBW and preterm delivery. To be effective, this care should be delivered over the entire course of a woman's childbearing years.²⁴

An evaluation of Washington's maternity support services (First Steps) demonstrated decreased LBW rates among babies born to medically high-risk women, especially those with pre-existing medical conditions, after implementation of the program.²⁵ First Steps services are provided by a team of nutritionists, nurses, and behavioral health specialists who screen pregnant women for intimate partner violence, smoking, nutritional risk, substance use, mental health needs, and other pregnancy risks. When these factors are identified, women are treated or referred for appropriate interventions.

WIC. Research has shown that prenatal participation in the Supplemental Nutrition Program for Women, Infants, and Children can increase infant birth weight.^{26,27} Washington WIC provides nutrition education, referrals to health and social services, and money to buy WIC-approved groceries.

Regionalized perinatal care. High-risk newborns, especially VLBW newborns, have better outcomes when delivered at tertiary care facilities or perinatal regional centers.^{11,28,29} The Washington State Perinatal Advisory Committee created Perinatal Level of Care Guidelines and recommends that babies less than 32 weeks gestational age be delivered at hospitals with Level III perinatal and neonatal services.³⁰ Nearly 87% of VLBW babies in Washington State were born in tertiary level facilities in 2004–2005.

Dental care. Pregnant women with periodontal disease have a high risk of preterm birth, perhaps due to a systemic inflammatory response that initiates uterine contractions.¹² While good oral hygiene and dental health is important during pregnancy, evidence is not conclusive that treating periodontal disease during pregnancy reduces the risk of preterm birth, low birth weight, or fetal growth restriction.³¹ There are no studies exploring the treatment of periodontal disease prior to pregnancy and its impact on birth outcome.

Bacterial vaginosis screening. Studies to determine the efficacy of universal screening and treatment of bacterial vaginosis in pregnant women to prevent preterm delivery have found inconsistent results.¹³ But there might be a benefit for women with previous preterm delivery.³²

Assistive reproductive technology. While assistive reproductive technology has helped many infertile couples conceive, it often results in multifetal pregnancies, many of which result in preterm birth. It has been recommended that the goal of this technology should be to maximize pregnancy rates while minimizing the rate of multiple gestations.³³

Progestational agents. A systematic review of randomized trials studying the use of progestational agents to prevent recurrent preterm birth demonstrates significant protection. In addition, pregnant women who received progesterone have lower rates of hospital admission for threatened preterm labor.³⁴ In Washington, high-risk women receiving Medicaid services can receive progestational agents.

Smoking. Pregnant women can be especially motivated to quit smoking.³⁵ Brief prenatal intervention by a trained provider increases smoking cessation rates overall and in all racial and ethnic groups.^{15,36} The effectiveness of counseling is increased by referring the patient to a pregnancy-specific quitline.¹⁵ Cessation in early pregnancy eliminates much of the fetal growth restriction caused by maternal smoking.³⁷

In Washington, First Steps providers are required to ask clients about tobacco use and secondhand smoke exposure throughout pregnancy and postpartum. Each client is offered an individualized intervention. The Department of Health funds the toll-free Washington Tobacco QuitLine—(877) 270-STOP—which has a specialized intervention protocol for pregnant women.

Safe Babies Safe Moms is a Washington State comprehensive program for substance-using pregnant women that includes case management, residential treatment, and housing support services. This program for mothers and their babies was shown to reduce LBW rates by more than 60% among women served during 2000–2003.³⁸ In addition, Washington State provides intensive case management and housing services to pregnant and parenting substance users through the Parent Child Assistance Program. Evaluation of this program suggested that at program exit, at least 60% of participating mothers were no longer at risk of having an alcohol- or drug-exposed

pregnancy.³⁹ But the long-term effectiveness is not known.

See Related Chapters: [Adolescent Pregnancy and Childbearing](#), [Access to Prenatal and Preconception Care](#), [Infant Mortality](#) and [Oral Health](#)

Data Sources (For additional detail, see [Appendix B.](#))

Washington State Birth Certificate Data: Washington State Department of Health, Vital Registration System Annual Statistical Files, Births 1980–2005, released December 2006.

Washington State Linked Infant Birth-Death Certificate Data: Washington State Department of Health, Vital Registration System Annual Statistical Files, 1980–2005, released December 2006.

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For More Information

Washington Department of Health, Division of Community and Family Health, Maternal and Infant Health Program. (360) 236-3505.

Endnotes

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