

Reproductive and Birth Outcomes: Low Birthweight

Type of EPHT Indicator	Health Outcome
Measures	<ol style="list-style-type: none"> 1. Average annual number of very low birthweight (less than 1500 grams) live singleton births over 5 year period 2. Average annual percent of very low birthweight (less than 1500 grams) live singleton births over 5 year period 3. Number of low birthweight (less than 2500 grams) live term singleton births 4. Percent of low birthweight (less than 2500 grams) live term singleton births
Derivation of measure	<ol style="list-style-type: none"> 1. Number of singleton infants live born at term (at or above 37 completed weeks of gestation) with a birthweight of less than 1,500 grams, divided by the total number of singleton infants live born to resident mothers 2. Number of singleton infants live born at term (at or above 37 completed weeks of gestation) with a birthweight of less than 2,500 grams, divided by the total number of singleton infants live born at term to resident mothers
Unit	<ol style="list-style-type: none"> 1. LBW singleton live term births 2. VLBW live singleton births
Geographic Scope	Iowa
Geographic Scale	County
Time Period	2000-
Time Scale	Calendar year
Rationale	<p>Significance/Background: LBW, a weight of less than 2,500 grams, or 5 pounds, 8 ounces, at birth (regardless of gestational age and plurality), affects about 1 of every 13 babies born each year in the United States. (5). Studies have shown that LBW is an important predictor of future morbidity and mortality. Note however, that the percent of LBW babies among all births (a percentage that is confounded by gestational age and plurality) is not recommended as a population-level measure of perinatal morbidity and mortality (1,9). It is not recommended as a measure because preterm delivery, decreased fetal growth, and genetically determined small body size commonly occur in LBW infants (1). Compared to infants of normal weight, LBW infants may be at increased risk of perinatal morbidity, infections, and the longer-term consequences of impaired development such as delayed motor and social development or learning disabilities. Mortality risk is lowest for infants born weighing 3,500–4,500 grams (6).</p> <p>Nationally, the percentage of LBW infants (regardless of gestational age and plurality) has been increasing steadily; it reached 8.2% of all births in 2005, the highest level reported since 1968 (3). The 2005 rate was 17% higher than the 1970 (7%) rate, which was 22% higher than the 1984 low (6.7%). In addition, this rate is 64% higher than the Healthy People 2010 goal of 5% (4). The percentage of LBW births also increased among singleton births, from 5.9% in 1990 to 6.31% in 2004 (7% increase).</p>

Increases in the multiple birth rate, obstetric interventions (e.g., induction of labor and cesarean delivery), older maternal age at childbearing, and increased use of infertility therapies likely have affected the trends toward lower birthweights (6). Environmental exposures have also been implicated as possible risk factors for LBW, but the magnitude of the contribution to these increased rates remains relatively uncertain. The percentage of LBW increased among each of the largest racial and ethnic groups: non-Hispanic whites (from 7.0% in 2003 to 7.2% in 2004), non-Hispanic blacks (from 13.6% in 2003 to 13.7% in 2004), and Hispanics (from 6.7% in 2003 to 6.8% in 2004) (6).

LBW in singleton births rose between 2003 and 2004 among non-Hispanic white and Hispanic infants; the increase for non-Hispanic black infants was not statistically significant (6). Since 1990, LBW singleton birth rates have risen 8% and 14% for Hispanic and non-Hispanic white infants, respectively; the rates have declined 2% among non-Hispanic black infants.

The youngest and oldest mothers are the most likely to deliver LBW infants. In 2004, the lowest LBW levels were reported for women aged 25–34 years (7.3% for women aged 25–29 years and 7.5% for women 30–34 year old); the highest LBW levels were for teenagers younger than 15 years (13.6%) and women aged 45–54 years (21.2%) (6). However, much of the elevated LBW risk among older mothers can be attributed to their higher multiple birth rates; in fact, the LBW rate declined from 21% to 10% for the oldest mothers of singleton births.

LBW rates also vary widely between states or reporting areas (6). In 2004, more than 10% of all infants born in Alabama, Louisiana, Mississippi, South Carolina, and the District of Columbia were LBW. This compares with less than 6.5% of newborns in Alaska, Maine, Oregon, Vermont, and Washington that were LBW. Different demographic characteristics of these populations, including maternal age, race, or ethnicity, may explain some of these differences.

Rationale:

Birthweight is a multifactorial and heterogeneous birth outcome. Birthweight of an infant is directly related to its gestational age. As noted above, multiple births are usually LBW, even those delivered at term. Therefore, the focus of the measure is restricted to singleton term births. As such, the measure distinguishes between preterm and multiple birth categories and decreased fetal growth that may be affected by other risk factors, including environmental factors.

LBW rate is associated with many modifiable risk factors, and preventing LBW may contribute to the overall reduction in infant illness, disability, and death. Several studies are being conducted that may help understand biological, social, and environmental factors that contribute to LBW births and learn how to prevent them. These studies look at how genes, hormonal changes, maternal stress, racism, occupational and environmental factors, and infections may contribute to prematurity and LBW (5). Specific causes of LBW births must be understood before tailored interventions can be developed.

Neighborhood-level characteristics have proven to be useful predictors of LBW risks (7). Neighborhoods are the geographic units where interventions can be targeted, and those interventions can be

	<p>an effective way to reduce LBW rates, infant mortality, and other adverse birth outcomes. Neighborhood-level characteristics contributing to LBW include social, economic, and environmental risk factors, such as certain aspects of the built environment.</p> <p>The percentage of LBW among term singleton births is a useful and feasible measure of perinatal health. LBW, gestational age, and plurality data are readily available in all state health departments, and can be used to examine trends that occur over time and space. These trends may reflect the contributions of environmental exposures and other modifiable risk factors for LBW.</p> <p>Exposure to air pollution (both indoor and outdoor) and drinking water contaminated with chemical DBP or lead may serve as examples of environmental risk factors. Maternal smoking, alcohol consumption, or inadequate weight gain are associated with an increased risk of intrauterine growth retardation and LBW. Socioeconomic factors, including low income and lack of education, are reported as risk factors for LBW (8).</p> <p>Women younger than 15 years or older than 35 years, unmarried mothers, and women who have had previous preterm birth are at increased risk of having LBW babies. Women who experience excessive stress, domestic violence, or other abuse also may be at increased risk of having a LBW baby (5).</p>
<p>Use of the Measure</p>	<p>This indicator can be used to influence public health prevention actions and interventions and policy makers and inform the public regarding risk factors management and mitigation.</p> <p>The LBW measure can be used to track the perinatal health in states, regions, counties, and smaller geographic areas or communities, as needed. Baseline data can be used to monitor changes or trends.</p> <p>This measure can also be used to evaluate the effectiveness of existing and new prevention programs.</p>
<p>Limitations of the Measure</p>	<p>Difficulties of interpreting LBW birth rates among term singleton births:</p> <p>Using LBW rates alone as a pregnancy outcome measure might not indicate the true health risk associated with LBW.</p> <p>Recommendations:</p> <p>LBW rates should be interpreted with caution. The LBW rate should be only one of the reproductive outcome measures being tracked, and it should be accompanied by the infant mortality rate (neonatal and postneonatal), fetal death rate if reliable, and morbidity measures. If feasible, an infant's anthropometric parameters should also be monitored; this could include a reduced head circumference measure because smaller head size may predict lower IQ and cognitive abilities and may be associated with ADD/ADHD.</p>
<p>Data Sources</p>	<p>Birth certificate data from Vital Statistics state systems (both numerator and denominator)</p> <p>National Vital Statistics System (NVSS), CDC, NCHS; CDC Wonder: Natality Data Request, CDC</p>

	<p>http://wonder.cdc.gov/nativity.html</p> <p>CDC GIS Reproductive Health Atlas: http://cdc.gov/reproductivehealth/gisatlas/index.htm</p>
<p>Limitations of Data Sources</p>	<p>Although vital statistics data are readily available, of high quality, and otherwise useful for various purposes, including public health surveillance, they cannot be correctly interpreted unless various qualifying factors and classification methods are considered (see also "Appropriate Use of the Measure"). The factors to be considered will vary, depending of the intended use of the data; however, most of the limiting factors result from imperfections in the original records, and they should not be ignored. Yet, their existence does not lessen the value of the data for the purpose of calculating this measure. At the minimum, the following data quality attributes should be evaluated: completeness of registration, reporting and quality control procedures, and records geocoding procedures and quality.</p> <p>One important limitation of the data is the speed at which data are available. Due to the normal functioning of the Vital Records system, it can sometimes takes weeks or even months after the end of a particular month before all births that occurred during that month are sent to Vital Records by the hospitals, etc. and processed. This is particularly true in the case of resident births that occur out of state. These process issues, along with the need to close off national statistics at specified intervals following a reporting period, may lead to small discrepancies between national data compiled by NCHS and data maintained by state vital statistics registries.</p>
<p>Related Indicators</p>	<ol style="list-style-type: none"> 1. Prematurity among live singleton births 2. Percent VLBW among live singleton births
<p>Recommendations for Future Development of the Indicator and Measures</p>	<p>The measure can be used as a screening indicator to determine if, when, and where changes to baseline values for LBW among term singleton infants have occurred. The measure can be used to examine geographic areas that are smaller than states and counties. Geographic resolution should be selected depending on how the LBW rate is used. Monitoring results can indicate the national LBW baseline value and the extent states and counties differ from each other. With appropriate role-based access to the data, this measure can be used to carry out screening analyses in neighborhoods, census tracts, or block groups, provided that examined polygons include enough total term singleton births to produce stable LBW values. The advantage of using LBW screening in neighborhoods, census tracts, or census blocks is that obtained results, if usable, could reveal the extent to which exposure to an environmental contaminant/hazard, a hazard point source, or exposure through diet or other source or pathway can result in an increase in the measure level over time. The LBW can be used to screen special populations, such as children with developmental deficits or birth defects. However, the possible impact of environmental hazards and other risk factors revealed by LBW screening of infants with developmental deficits or birth anomalies should be confirmed through subsequent case-control studies.</p> <p>Additional measures of frequency could include the monthly number of LBW term singleton births processed during the month and the monthly proportion/percentage of LBW term singleton births</p>

processed during the month.