Long-term implications of being born Low Birth Weight (LBW)

The months a baby spends in the womb, along with the first 12 months after birth, are arguably the most important time of all for brain development. During this period, brain cells called neurons are forming connections with each other, creating the networks that underlie thinking, learning, and feeling. Low birth weight can disrupt early brain development. Low birth weight babies are at increased risk for developmental problems related to physical health, psychological adjustment, and intellectual functioning.

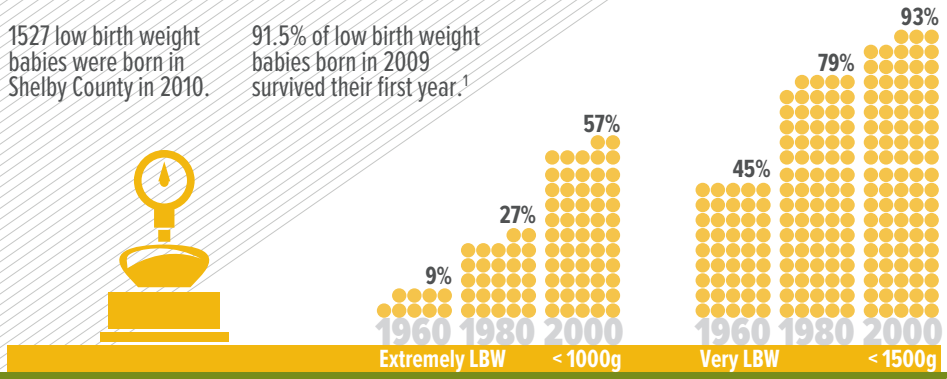
More low birth weight babies are surviving.

< 2500g / 5lb 8oz
Low Birth Weight

Medical advancements are succeeding in reducing infant mortality. Fragile infants are now more likely to survive.

1527 low birth weight babies were born in Shelby County in 2010.

91.5% of low birth weight babies born in 2009 survived their first year.[1]



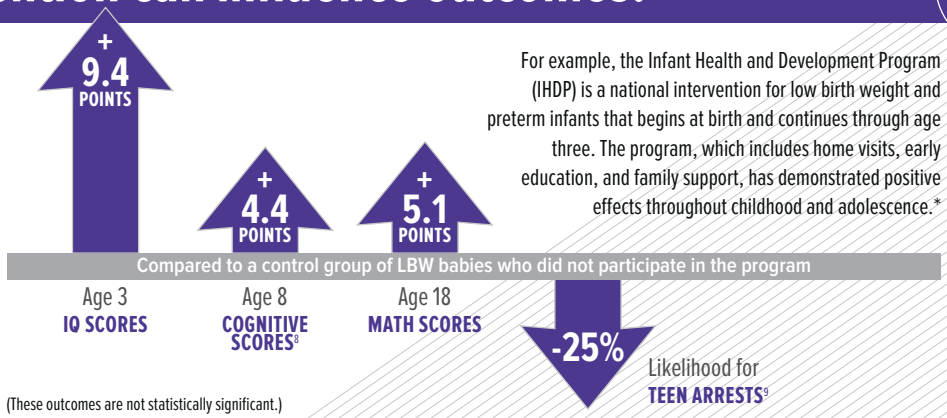
Nationwide, low birth weight survival rates have continuously increased.[2]

Low birth weight places infants at risk.

Long-term difficulties related to low birth weight have remained relatively unchanged.

6x LONGER INITIAL HOSPITAL STAYS	**≥ 15%** NEUROLOGICAL IMPAIRMENTS[4] i.e. cerebral palsy	**≈ 20%** LOW IQ SCORES[6] 20% of LBW children have scores below the average range
25x HIGHER INITIAL HOSPITAL COSTS[3] 42% covered by Medicaid	**≤ 60%** HEALTH COMPLICATIONS[5] i.e. chronic lung disease or brain hemorrhaging	**≥ 40%** DEVELOPMENTAL PROBLEMS[7] i.e. language delays, attention disorders, emotional disorders

Early intervention can influence outcomes.



(These outcomes are not statistically significant.)

For example, the Infant Health and Development Program (IHDP) is a national intervention for low birth weight and preterm infants that begins at birth and continues through age three. The program, which includes home visits, early education, and family support, has demonstrated positive effects throughout childhood and adolescence.*

*The effects of low birth weight are not uniform. Generally, the lower the birthweight, the greater the risk of negative outcomes. Some of the specific health outcomes and intervention effects discussed here may apply only to certain subgroups.

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THE URBAN CHILD INSTITUTE®

THE URBAN CHILD INSTITUTE IS A NON-PROFIT ORGANIZATION DEDICATED TO THE HEALTH AND WELL-BEING OF CHILDREN FROM CONCEPTION TO AGE THREE IN MEMPHIS AND SHELBY COUNTY, TN.

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PRETERM BIRTH AND LOW BIRTH WEIGHT

Prematurity and low birth weight can disrupt children's development.

The first three years of life are critically important for a child's brain development. Experiences during this time can have life-long effects on intellectual, emotional, and social functioning. The months a baby spends in the womb, along with the first 12 months after birth, are arguably the most important time of all.[1]

During this period, specialized brain cells called neurons are forming connections with each other, creating the networks that underlie thinking, learning, and feeling. The creation and organization of these connections are well underway in the last trimester. In the last weeks of pregnancy, as many as 40,000 new synapses are being formed every second.[2]

Preterm birth (less than 37 weeks gestational age) and low birth weight (less than 2500g) are well-documented risk factors. The majority of low birth weight infants are also premature but other in utero factors can result in term infants who weigh less than 2500g. In addition to threatening healthy overall growth and maturation, premature infants and low birth weight term infants may experience a disruption of important processes involved in early brain development.[3,4] As a result, preterm and low birth weight children—even those at the lower-risk end of the spectrum—are at increased risk for a variety of developmental problems related to health, psychological adjustment, and intellectual functioning.[5-7]

The prevalence of low birth weight is slightly higher in Shelby County than across Tennessee.

Each year, about 11 percent of all babies born in Shelby County are low birth weight (LBW). Across Tennessee, the percentage is around 9 percent. In 2010, 1,527 of the 13,781 live births in Shelby County were low birth weight and 7,166 of the 79,345 births in Tennessee were LBW.[8]

Infants born weighing less than 1,500g are classified as Very Low Birth Weight (VLBW). VLBW babies account for more than 2 percent of all births in Shelby County and around 1.5 percent of total births throughout the state. Both Shelby County and Tennessee had fewer VLBW births in 2010 than in the previous five years, with 311 and 1,245 respectively.

Medical advances and access to neonatal care are helping more at-risk babies survive.

Low birth weight and preterm birth increase the risk of infant mortality (death during the first year of life). Across the U.S., however, preterm and LBW babies are more likely to survive today than in previous decades. For VLBW babies and extremely low birth weight babies (less than 1000g), survival rates have increased dramatically.[9]

Similarly, a growing percentage of LBW and VLBW babies in Shelby County and throughout Tennessee are surviving their first year of life. In 2009, more than 90 percent (1,457) of LBW babies in Shelby County and 94 percent (7,082) of LBW infants across Tennessee survived infancy. In the same year, nearly 69 percent (265) of VLBW babies in Shelby County and around 75 percent (1,026) of VLBW babies in Tennessee celebrated their first birthday.[8]

Preterm birth and low birth weight can have serious and long-term negative consequences.

Increased rates of survival for low birth weight and very low birth weight infants are good news for our county and state. They also have important implications for public policy related to children's health and well-being. To meet these new challenges, we need a better understanding of the long-term risks associated with preterm birth and low birth weight.

Preterm birth increases a child's risk for health and developmental problems:

A meta-review of 15 research studies concluded that premature birth (less than 37 weeks gestational age) is associated with poorer health and social/emotional functioning measured at preschool age, in adolescence, and in young adulthood.[10]

Extremely preterm infants (less than 29 weeks gestational age) are at increased risk for childhood impairments in brain function due to brain injury and disruptions in early brain development.[4]

Extremely preterm infants have a high risk (30-50%) of moderate to severe neurodevelopmental disabilities.[11]

Low birth weight has also been linked to a wide range of negative outcomes:

- Children born at moderately low birth weight (1500-2499g) are more likely than normal birth weight children to have special healthcare needs, including regular use of medication, above-average use of health services, and limitations on activity.[12]
- Very low birth weight babies (less than 1500g) are at increased risk for chronic conditions such as respiratory problems, poor postnatal growth, cerebral palsy, and infections.13,14 These conditions increase the need for special education and services.[15]
- Very low birth weight has been linked to long-term abnormalities in brain development, as measured by MRI at age 8 and 12.[16]
- About 14% of very low birth weight children and 19% of extremely low birth weight children (less than 1000g) have below-average IQs.[17,18]
- Some effects of low birth weight have been shown to persist into adulthood. Research suggests that very low birth weight is associated with poorer educational achievement, lower college attendance, and a higher incidence of health problems like high blood pressure and respiratory disorders.[19]

- Some research has found that low birth weight is a significant predictor of future socioeconomic status.[20]

The effects of low birth weight and prematurity are costly for families and for our community as a whole.

In 2001, hospital costs for preterm birth/low birth weight births, during the first year of life, totaled $5.8 billion, representing 47 percent of all infant hospitalization costs and 27 percent of all pediatric hospital costs. Preterm/low birth weight infant hospital stays have an average cost of $15,000 and an average length of 12 days, versus $600 and 1.9 days for full-term, normal birth weight babies. In 50 percent of cases, private/commercial insurance is the designated payer. Medicaid is the designated payer in 42 percent of cases.[21]

National research estimates that the per-child cost of a preterm or low birth weight birth, throughout the child's life, is about $51,000. The total cost of all such births is believed to be $26 billion or more (2005 dollars). Moreover, these are conservative estimates based on just five categories:

- Medical care costs through age five are estimated at $31,000 per preterm/LBW child and $16 billion dollars for all preterm/LBW births. Medical expenses beyond age five are more difficult to track, but even when costs for only four developmental outcomes are included in the calculation (cerebral palsy, cognitive delays, and hearing and vision impairments), the resulting estimate is $2,000 per child and $1 billion total.[22]
- Costs associated with maternal delivery are approximately $4,000 per child, or $2 billion total.[22]
- Special education costs resulting from the four developmental disabilities listed above are $2,000 per child and $1 billion dollars total.[22]
- Labor market productivity loss, again associated only with the four developmental disabilities, exceed $11,000 per case (nearly $6 billion total).[22]
- Early intervention costs are $1,200 per child ($611 million total).[22]

Intervention Strategies to Combat the Adverse Outcomes of Prematurity and Low Birth Weight

Effective intervention during children's first years can buffer them from the negative effects of preterm birth and low birth weight. The most common types of interventions for preterm and low birth weight children are parent-based interventions and early education programs.[23]

Parenting interventions are effective at increasing responsiveness and warmth, which promote children's development and well-being. In one widely studied program, participating mothers received 10 home

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** Some of the effects of the IHDP program varied according to birth weight. The figures reported here may apply only to certain subgroups.*

visits from trained facilitators over the course of their children's first year. The curriculum was designed to counsel mothers about positive parenting behaviors, increase their awareness of their babies' signals and needs, and help them incorporate effective strategies into their daily routines. Follow-up studies found that the program increased responsive and sensitive caregiving, which in turn improved infant's social and cognitive outcomes, especially among very low birth weight babies.[24]

Early education programs can also lessen the negative effects of prematurity and low birth weight. Recent research examines the evidence from the Chicago Child-Parent Centers (CPC) preschool, a half-day program staffed by highly qualified teachers and characterized by high parental involvement. The study finds that low birth weight children who attended CPC preschool were less likely to fail a grade or need special education services in elementary school. The effects of the program were greater for children facing higher levels of economic hardship.[25]

The most comprehensive interventions incorporate both parenting and education elements. For example, the Infant Health and Development Program (IHDP) is a national intervention program for low birth weight preterm infants that begins at birth and continues through age three. The program includes home visits, center-based early education, and family support.

Initial results showed positive effects on cognitive and behavioral measures. Age three IQ scores averaged 9.4 points higher in the intervention group compared to a control group of low birth weight babies who did not participate in the program. At age eight, positive effects on cognitive scores persisted, with children in the intervention group scoring up to 4.4 points higher on IQ measures than children in the control group. [26,27]

At age 18, achievement scores were higher for those who had participated in the intervention. For example, average math scores for the intervention and control group were as high as 94.9 and 89.8 points respectively, for a difference of 5.1 points. 16 to 21 percent of teens in the intervention group had been arrested compared with 20 to 26 percent of the control group.[26,27]

Early Intervention in Tennessee

Tennessee's Early Intervention System (TEIS) is an optional educational plan for families with children up to two years old who have disabilities or developmental delays. TEIS connects families with services to assist them in promoting the social, emotional and cognitive development of their child.

Premature infants are often referred to TEIS, especially if they have additional birth complications. In these cases, families usually learn about TEIS in the Neonatal Intensive Care Unit (NICU) and are typically contacted by a TEIS service coordinator after discharge from the hospital. Eligibility for the program is then determined by health status, medical history, and developmental assessment.

TEIS provides health and developmental resources for eligible infants and toddlers (for example, speech therapy or vision/hearing treatment) and offers social support for their parents and families (for example, parent support groups, parent-infant playgroups, day care). In a statewide survey of TEIS families, parents' feedback was positive. A large majority of parents were satisfied with how their referral was made and reported that they received practical and emotional support from their service coordinators.[28]

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