

What Works for Third Grade Reading

NC Pathways to Grade-Level Reading Working Paper

Healthy Birthweight: Health and Development on Track, Beginning at Birth

Table of Contents

I. Measure of Success

II. Definitions

III. Healthy Birthweight: Why Does It Matter?

IV. Healthy Birthweight: Connections to Other Pathways Measures of Success

V. Context Matters: Healthy Birthweight

VI. Policy Options to Reduce Low Weight Births and Promote Low Birthweight Infants' Healthy Development

- A Focus on Women's General Health
- A Focus on Prenatal and Interconception Care
- A Focus on Groups at High Risk for Low Weight Births
- IDEA Part C Expansion to Include At-Risk Children

VII. Research-Informed Practice Options to Reduce Low Weight Births

- Reducing Unwanted Pregnancies and Improving Birth Spacing
- Reducing Smoking during Pregnancy
- Increasing Access to Group-Based Prenatal Care
- Increasing Access to Doula-Assisted Pregnancy and Birth

VIII. Proven and Promising Program Options to Reduce Low Weight Births and Promote Low Birthweight Infants' Healthy Development

- Cognitive Behavioral Therapy
- Healthy Families
- Healthy Start
- NC Baby Love
- NC Pregnancy Medical Homes and Case Management
- Newborn Individualized Developmental Care and Assessment Program

- Nurse Family Partnership
- Parents as Teachers
- Special Supplemental Nutrition Program for Women, Infants and Children (WIC)

Appendix A. Boston Public Health Commission Low Birthweight Initiative

Appendix B. National Conference of State Legislatures (NCSL) Review of State Policies to Improve Healthy Births and the Health of Babies and their Mothers

Appendix C. North Carolina Maternal and Child Health Title V Block Grant

I. Pathways Measure of Success

Percent of babies born with low birthweight

II. Definitions

The following terms are referenced in this brief:

Allostatic Load is a measurement of “the cumulative burden of chronic physiologic and psychologic stress” and is represented as a score of health risk. Allostatic load is higher among older individuals, African American individuals, and people living with lower socio-economic status.ⁱ Allostatic load is related to pre-term births and babies born with lower birthweight.ⁱⁱ

Low birthweight is defined as less than 2,500 grams or 5 pounds, 8 ounces. In the United States, one in 12 babies are born at low birthweight. While some low birthweight babies are born healthy, others at low birthweights experience serious health problems.ⁱⁱⁱ

Preterm birth, also called “premature birth,” is one that takes place before the start of the 37th week of pregnancy. A normal pregnancy is usually about 40 weeks. Being born prematurely means that the baby has less time to fully develop in the womb. Very preterm babies (born before 32 weeks) often have complicated medical problems.^{iv}

Developmental delay is defined broadly by the federal IDEA Part C program as a delay in one or more of the following five areas of early childhood growth and development relative to age-expected milestones: physical development including vision and hearing, cognitive development, communications, social or emotional development, and adaptive development.^v Each state has its own legal definition of developmental delay.

Developmental disability is an instance in which a child under the age of three needs early intervention services because the child is experiencing development delay as defined above, or has a diagnosed physical or mental condition, which may include genetic abnormalities, severe attachment or nervous system disorders, congenital infections, and secondary impacts from toxic substance exposure, including fetal alcohol syndrome.^{vi}

Elective deliveries are early deliveries with no medical reason. Ten to 15 percent of all U.S. births are early elective deliveries that may result in predictable risks to the infant.^{vii}

EPSDT is the Early and Periodic Screening, Diagnostic, and Treatment program, funded through the federal Medicaid program, for children in lower-income families. This program supports well-child visits and follow-up intervention and treatment programs, as needed, for children living with income-eligible families.^{viii}

Interpregnancy Interval is the time between the end of a pregnancy and the conception of the next child.

Periodontal disease is a chronic, inflammatory disease that attacks the tissues, bones, and ligaments around the teeth. This infection can be connected to other body systems, like the cardiovascular, respiratory, and endocrine systems, making a periodontal infection complex, multiphased, and

sometimes difficult to treat.^{ix} Enzymes associated with maternal periodontal disease pass through the placenta to the fetus and are believed to be a factor in triggering preterm, and thus low weight, births.

Neonatal abstinence syndrome (NAS) is generalized multisystem disorder from opioid or drug withdrawal, which predominantly involves the central and autonomic nervous systems, as well as the gastrointestinal tract. NAS manifests in babies with such symptoms as irritability, excessive or high-pitched crying, tremors, hyperactive reflexes, sleep disturbances, poor feeding and sucking, poor weight gain, stuffy nose, sneezing, vomiting, loose stools, dehydration, increased sweating, temperature instability and fever. In 2000, there were 2,920 NAS births across the United States. By 2012, there were 21,723 NAS births, one every 25 minutes.^x

III. Healthy Birthweight: Why it Matters

Low weight and preterm births are interconnected and put children at higher risk for adverse health outcomes. Preterm births are an indicator of risk for very young children's development, and preterm births account for a majority of all low weight births.^{xi} Preterm and low weight births have been shown to contribute to more health problems later, affecting school and life outcomes.^{xii} Low birthweight is linked to short- and long-term health problems, learning disorders, behavioral problems, grade retention and school failure.^{xiii} Low birthweight babies generally score lower on reading, passage comprehension, and math achievement tests,^{xiv} and are more likely to be enrolled in special education classes.^{xv}

Healthier birthweights contribute to lower health care costs. Infants born at low birthweight are at greater risk for physical and developmental problems than infants of normal weight. The annual national cost of low birthweight and preterm babies is estimated by the U.S. government at \$26 billion.^{xvi}

In 2011, the average cost for a newborn was \$3,200. Higher risk infants cost much more. The average national hospital cost for babies born at low birthweight was \$27,200 per child, and for preterm births, \$21,500 per child.^{xvii} The lower a child's weight at birth, the higher overall costs tend to be. In 2014, the hospital costs for infants born at very low birthweights, i.e., less than 1500 grams, averaged \$131,472. This is more than four times the cost of average births.^{xviii} In 2014, 8.9 percent of all North Carolina births were at low birthweight, a total of 10,720 babies. If the incidence of babies born at low birthweight in North Carolina could be reduced over time by 50 percent, the potential savings (in 2011 dollars) could exceed \$50 million per year.^{xix}

Low birthweight rates highlight race/ethnic and geographic disparities in North Carolina. In 2013, North Carolina's average premature birth rate was 9.7 percent, approximately one in ten babies born. Among African American women, the rate was 13.4 percent and among Native American women, 11.2 percent. The birth rate for white women was 9.2 percent and for Asian women, 8.4 percent. Data from 2014 show that five of North Carolina's major cities had average preterm birth rates above 9.7 percent:

- Charlotte: 10 percent
- Greensboro: 10.4 percent
- Durham: 9.9 percent
- Fayetteville: 10.9 percent

- Winston-Salem: 12 percent.^{xx}

North Carolina’s *Healthy People 2020* strategic plan has a goal to reduce the prevalence of low weight births from 8.2 percent to 6.3 percent by 2020. This is an average overall reduction; it does not address the differential prevalence of low-weight births among racial groups within the state.^{xxi} The plan also aims to reduce the percentage of women who smoke during pregnancy from 10.4 percent to 6.8 percent in 2020.

IV. Healthy Birthweight: Connections to Other Pathways Measures of Success

Just like the domains of child development, the Pathways Measures of Success are highly interconnected. The table and text below outline the measures that *influence* or *are influenced by* Healthy Birthweight.

Health and Development on Track, Beginning at Birth	Supported and Supportive Families and Communities	High Quality Birth-through-age Eight Learning Environments with Regular Attendance
Early Intervention	Formal and Informal Family Supports	High Quality Birth-through-age-Eight Early Care and Education
Physical Health	Positive Parent-Child Interactions	Promotion to Next Grade

Early Intervention

There is a direct relationship between low birthweight and children with subsequent developmental delays and disabilities. Thirty to fifty percent of babies born at very low birthweight have a high risk of moderate to severe neurodevelopmental disabilities.^{xxii} Children who receive early and regular developmental screenings and early access to high quality early intervention services, if needed, demonstrate improved social competence and cognitive abilities in the short-term and often achieve long-term educational benefits, including math and reading skills on par with peers.^{xxiii} The federal IDEA Part C Early Intervention program is available to all families whose children demonstrate delays or disabilities, without regard to income. North Carolina’s IDEA Part C program does not serve children at risk of developmental delay and conditions, and it establishes strict guidelines for the level of delay that makes a child eligible for services.^{xxiv}

Physical Health

Low birthweight is linked to poorer health from infancy and into adulthood.^{xxv} Low birthweight increases the likelihood of a child having a learning disorder and behavioral problems in school.^{xxvi} The presence of chronic health challenges such as hearing^{xxvii} and vision^{xxviii} problems can have a direct negative impact on reading development, while other chronic health problems like asthma^{xxix} and tooth decay^{xxx} can impact young children’s learning, attendance and academic success. Poor physical health later in life impacts workforce participation and earning potential.^{xxxi}

Formal and Informal Family Supports

The prevalence of low weight and preterm births is higher among expectant mothers who live with chronic toxic stress, including poverty. Maternal depression, also correlated with chronic toxic stress conditions, contributes to both low birthweight and preterm births.^{xxxii} Unhealthy weight in early childhood (overweight and obesity) is also higher among those living in families with low income and traumatic circumstances. By addressing basic needs, formal supports including enrollment in such federally-funded and state-operated programs as Temporary Assistance for Needy Families (TANF) and the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) can reduce family stressors. Strengthening informal social networks increases parents' access to resources and social supports.

Positive Parent-Child Interactions

Research shows that there is a reciprocal relationship between vulnerable birth circumstances (early and preterm) and subsequent parent-child interactions. The style and responsiveness of parenting has a profound effect on children's development, and negative parenting behaviors,^{xxxiii} babies' biology, temperament, and behaviors can influence the nature of parent-child interactions. The impact of maternal substance use during pregnancy on the baby can include low levels of infant arousal and poor alertness, newborn tremors, high irritability levels, and decreased behavioral and autonomic regulation.^{xxxiv} These infant behaviors can have an impact on the nature and frequency of interactions between a parent and the baby in the weeks and months following birth.

High Quality Birth-through-age-Eight Early Care and Education

High-quality early learning environments prepare children for the social, cognitive, and behavioral skills necessary for school and life success.^{xxxv} Screening for and detection of developmental delays provides the opportunity for children's needs to be met early on, reducing the need for remedial or special education services later in life.^{xxxvi} Practitioner awareness of IDEA Part C and developmental benchmarks in early care settings can serve as a protective factor for children needing referrals.^{xxxvii}

Promotion to Next Grade

Babies born at low birthweight and/or pre-term are more likely to have learning disorders, special education needs, behavior problems in school, and are more likely to be retained.^{xxxviii} Children with chronic health problems may be retained at higher rates, as they are absent from school more frequently than their healthier peers.^{xxxix}

V. Context Matters: Healthy Birthweight

The following issues are important to consider when planning policy, practice and program strategies to address low birthweight and pre-term births.

Maternal health and availability of prenatal care.^{xl} Both preterm and low weight births are highly correlated with smoking, alcohol, and drug use during pregnancy.^{xli} Adequate, timely prenatal care is essential for a healthy pregnancy, yet enhanced programs and interventions to address low birthweight, on average, have not proven successful in the Southeast, possibly from a lack of addressing risk factors

unique to African-Americans.^{xlii} Common barriers to prenatal care include poverty, the cash flow to pay co-pays, transportation, distance to a clinic or care facility, and knowledge of the pregnancy.^{xliii}

Race/Ethnicity. Population-level prevalences of both low birthweight and obesity in early childhood and later life vary by race, ethnicity, and the presence of trauma and toxic stress. Nationally, 11.4 percent of babies were born preterm in 2013—10 percent of non-Hispanic, white infants, 16 percent of non-Hispanic black infants, and 11 percent of Hispanic infants. Black infants were 60 percent more likely to be born preterm than their non-Hispanic, white peers and 44 percent more likely to be born preterm than their Hispanic peers.^{xliv}

Maternal age. Being younger than 17 or older than 35 increases the likelihood of having a low birthweight baby.^{xlv} Many very low birthweight babies are born preterm to mothers who are under the age of 20 and over the age of 30.^{xlvi} Teen mothers are also more likely to have a second baby quickly after the first, increasing the risk of a low weight birth.^{xlvii}

Poverty and lack of health insurance. Children of homeless mothers are four times more likely to be of low birthweight and require specialized care than their non-homeless infant peers.^{xlviii} Limited parental resources and lack of health insurance can be detrimental during pregnancy, and having no health insurance during childhood intensifies the lasting effects of being born with low birthweight.^{xlix} In fact, large racial differences in adult health status through midlife in the U.S. are said to be fully explained by a few early life factors: birthweight, parental income, and health insurance coverage.^l Together, these create high vulnerability for expectant mothers and parenting families. See the *Pathways Formal and Informal Family Supports* working paper for more information.

Elective deliveries. Ten to 15 percent of births in the U.S. are early elective deliveries. The U.S. Department of Health and Human Services estimates that a 10 percent reduction in deliveries before 39 weeks of gestation could save more than \$75 million in Medicaid associated with birth complications.^{li} Elective delivery increases the likelihood of a low weight birth and maternal depression.^{lii}

Cesarean sections, on average, are more expensive than vaginal deliveries. Studies have shown doctors are more likely to recommend and perform cesarean sections when reimbursement rates are higher. Despite this, recent research found that c-section rates among Medicaid-eligible women are roughly 30 percent lower than the rates for privately insured women. C-sections may be underutilized for Medicaid-eligible women—researchers have found that for this population, infant health is inversely related to c-section rates.^{liii}

VI. Policy Options to Reduce Low Weight Births and Promote Low Birthweight Infants' Healthy Development

A Focus on Women's General Health. *Ensure that health coverage and primary health care are available for women focused on their general, preconception health.*

Women who have access to health insurance have healthier pregnancies and babies. More and better health care pre-pregnancy may prevent risk factors during pregnancy, including maternal smoking or limited prenatal care. Medicaid is the source of insurance for many low-income women; however, women are not eligible for Medicaid unless they are pregnant or a parent. States that have expanded

Medicaid to cover all persons under 135 percent FPL are likely to see increased rates of care and better birth outcomes.^{liv}

Shifting public policy from an exclusive focus on the period of pregnancy to a woman's health status before a pregnancy occurs can help reduce low weight and preterm births.^{lv} This will require attention to such health issues as women's oral health, diabetes, obesity, asthma, high blood pressure, smoking, substance use, depression, and other mental health challenges prior to pregnancy.

A Focus on Prenatal and Interconception Care. *Ensure access to early, high quality prenatal care and include a focus on factors shown to influence birthweight.*

During pregnancy, attention should focus on those elements of women's health associated with low weight births. These include early participation in prenatal health care; depression screening and clinical or home visiting intervention; reducing elective deliveries; reducing or quitting substance use, including smoking cessation; managing weight gain; and treatment for periodontal disease.^{lvi}

The National Conference of State Legislatures (NCSL) has examined state policies across the nation to increase healthy births and improve the health of babies and their mothers. Of ten policies/strategies identified by NCSL, three are directly related to reducing the prevalence of low weight births, including:

Promote early, high quality prenatal care. States have assessed needs and developed improvement plans, educated women about healthy pregnancies through education and outreach, and targeted high-risk Medicaid enrollees.

Reduce early elective deliveries. States have formed perinatal health collaboratives, used incentives for physicians, and passed laws to reduce early elective deliveries. Outcomes for babies improve and costs to the state go down.

Promote evidence-based home visiting. Some states offer home visiting as an enhanced prenatal Medicaid benefit. Evidence-based home visiting programs have been shown to improve expectant mothers' prenatal health. The Nurse Family Partnership, for example, has been shown to reduce tobacco use while pregnant, improve diet and nutrition, and improve cardiovascular and kidney health.^{lvii}

Appendix B includes all ten NCSL-identified policies to increase healthy births, as well as state-specific examples.

North Carolina has made efforts to improve women's access to high quality prenatal care and improve birth outcomes. Some of those efforts are highlighted below.

North Carolina's Perinatal Health Strategic Plan. North Carolina adapted national research to develop a 12 point framework designed to improve prenatal and interconception health care, enhance the coordination of supports and services, and address inequities. The plan is in the implementation phase.^{lviii}

The NC Pregnancy Home Initiative. In North Carolina, Medicaid-enrolled women participating in the Pregnancy Medical Home initiative receive prenatal and postpartum depression screenings. Under the

Affordable Care Act (ACA), preventive screenings including for prenatal and postpartum depression must be covered by insurers at no cost to patients. Community Care of North Carolina (CCNC) requires all contracted providers to use a standardized risk screening assessment to identify patients at high risk for preterm birth. This includes depression screening and could also identify women with high ACEs (adverse childhood experiences) scores. Providers receive \$50 for completing the initial screen during pregnancy and \$150 for completing the postpartum visit.^{lix}

NC Early and Periodic Screening, Diagnostic and Treatment (EPSDT) Screening for Maternal Depression. In May 2016, the federal Centers for Medicare and Medicaid Services (CMS) released *Maternal Depression Screening and Treatment: A Critical Role for Medicaid in the Care of Mothers and Children.*^{lx} The bulletin clarifies that Medicaid agencies can claim reimbursement for maternal depression screening as a child service through EPSDT.^{lxi} According to the 2016 *NC Health Check Program Guide* (as implemented July 1, 2016), North Carolina Medicaid has begun reimbursing providers for up to four maternal depression risk screens administered to mothers during an infant’s first year. The American Academy of Pediatrics (AAP) recommends maternal depression screenings at the one-, two-, four-, and six-month well-child visits.^{lxii}

Improving Community Outcomes for Maternal and Child Health initiative (ICO4MCH) within the North Carolina Department of Health and Human Services will fund a group of evidence-based strategies to improve birth outcomes and reduce infant mortality. These are: (a) the use of long-acting reversible contraceptives, (b) smoking cessation and prevention, and (c) Triple P interventions. See the chart below and the Department’s website for more details.^{lxiii}

Evidence-Based Strategies Selected by ICO4MCH Initiative Project Sites	
Program Aim	Evidence-Based Strategy and Implementation Site
Improved Birth Outcomes	Increase use of long acting reversible contraceptives (LARCs) <ul style="list-style-type: none"> Sites: All Counties
Reduced Infant Mortality	Ten Steps for Successful Breastfeeding ^{lxiv} <ul style="list-style-type: none"> Sites: Mecklenberg/Union; Richmond/ Cumberland, Hoke & Montgomery; Robeson counties Smoking Cessation and Prevention ^{lxv} <ul style="list-style-type: none"> Sites: Appalachian District Health/Avery & Wilkes County Health Departments; Richmond/ Cumberland, Hoke & Montgomery; Robeson counties Triple P (Positive Parenting Program) ^{lxvi} <ul style="list-style-type: none"> Sites: Appalachian District Health/Avery & Wilkes County Health Departments; Durham county; Mecklenberg/Union counties

A Focus on Groups at High Risk for Low Weight Births. *Improve women’s general health among groups at high risk for low weight and preterm births by (a) focusing on socio-economic and environmental factors (e.g., a social determinants framework), and (b) addressing such health conditions as diabetes, asthma, high blood pressure, and depression and other mental health challenges.*

African American women are at particularly high risk for low weight births. When designing a comprehensive approach to address African American women’s general health to prevent low weight births, specific factors should be considered, including:^{lxvii}

- Specific social inequities, including discrimination in the workplace
- Experiences of interpersonal racism and implicit bias
- Low social support during pregnancy
- Other socio-environmental factors, including neighborhood poverty, residential segregation, and neighborhood violence
- Access to health insurance
- Weathering, a condition in which African American women and girls may appear or be considered older than their chronological age due to a lifetime of exposure to social inequities
- Increased allostatic load due to chronic, and repeated, stressful experiences. The stress of racism has been proposed as a cause for racial disparities in birthweight outcomes.^{lxviii}

Promising strategies for reducing racial inequities in low birthweight include:

- Targeting specific social factors that affect black women and men, including stress
- Providing services and policies to make a mother healthy even before she becomes pregnant
- Emphasizing collaboration and involvement of people across different disciplines such as government, health care providers, and community organizers
- Making changes in programs and policies that affect individuals, organizations, and communities
- Measuring and reporting what contributes to successes and challenges.^{lxix}

See Appendix A for some examples of comprehensive, race-informed community approaches to reducing low weight births.

IDEA Part C Expansion to Include At-Risk Children. *Working with the North Carolina Interagency Coordinating Council, explore feasibility and cost for expanding eligibility parameters of IDEA Part C to include children at risk of conditions based on the current science of trauma and toxic stress.*

This policy change would enable the identification of babies and toddlers, including those with low birthterm and preterm birth, at risk of developmental delays. Five states have adopted IDEA Part C eligibility criteria that include at-risk circumstances: Illinois, Massachusetts, New Hampshire, New Mexico and West Virginia.^{lxx} North Carolina used to include an at-risk determination in its IDEA Part C eligibility guidelines but eliminated that determination. In 2015, the North Carolina Infant and Toddler Program (ITP) served just over 10,700 infants and toddlers. In FFY 2016-2017, North Carolina applied for \$12.6 million to manage and deliver services through its IDEA Part C birth-3 program, the North Carolina Infant-Toddler Program. See the Pathways *Early Intervention* working paper for more.

VII. Research-Informed Practice Options to Reduce Low Weight Births

Preventing Unwanted Pregnancies and Improving Birth Spacing

Health outcomes research demonstrates that the ideal minimum interpregnancy interval is between 18-23 months. Shorter interpregnancy intervals increase risk of health concerns for mothers and babies. An interpregnancy interval of less than six months increases the likelihood of low birthweight delivery by 40 percent.^{lxxi} Assistance in long-term pregnancy prevention efforts, especially for women who have elected to be pregnant for the last time, would have a big impact on the number of low

birthweight babies born.^{lxxii} This could include prescribing long-acting, reversible contraception at delivery or immediately after birth. For example, Colorado has offered free and voluntary intrauterine devices for teen mothers and low-income mothers without a high school degree. After the program's inception, subsequent higher-risk births in the state fell by 40 percent from 2009 to 2013.^{lxxiii}

Reducing Smoking during Pregnancy

Evaluation research has identified a set of physician-based smoking cessation practices:

- Routinely screen all adults for tobacco use
- Encourage smokers to quit at every clinical contact
- Provide motivational interventions for patients not yet ready to quit smoking
- Encourage medications when appropriate to treat dependence and improve the quit rate.^{lxxiv}

The 5 A's framework has been widely studied and found to be effective as a brief intervention to promote and support smoking cessation. The elements may be discussed in a flexible order and may involve the entire staff of medical practices.

- Ask: About tobacco use every time
- Advise: Urge tobacco users to quit
- Assess: Determine willingness to make a quit attempt
- Assist: Provide help to move the individual toward a successful quit attempt
- Arrange: Follow-up contact.^{lxxv}

Increasing Access to Group-Based Prenatal Care

CenteringPregnancy is an alternative approach to prenatal care, fostering a group setting for prenatal care over the course of ten prenatal visits. Each visit is 90 minutes to two hours long and includes health assessments, private time with the doctor, and an interactive group discussion or activities addressing relevant and necessary health topics. The group approach allows moms to strengthen social connections with other mothers, regardless of age, race, or socioeconomic status, while learning more about their own health and that of their babies. The extended visit offers moms more time to engage and develop a relationship with their healthcare providers and other moms, and the group setting allows moms to feel more comfortable discussing their health and well-being with their peers.^{lxxvi}

Increasing Access to Doula-Assisted Pregnancy and Birth

A doula is a trained birthing support person that guides a woman through the birthing process. The American College of Obstetrics & Gynecologists asserts that doulas are shown to be highly effective at improving labor and delivery outcomes. They provide medically accurate information to women, help create a birthing plan, and support women physically and emotionally throughout the birthing process. Doula-assisted women are four times less likely to have low weight births.^{lxxvii} This support is also associated with lower NICU rates, fewer Cesarean births, and more positive birth experiences.^{lxxviii}

VIII. Proven and Promising Program Options to Reduce Low Weight Births and Promote Low Birthweight Infants' Healthy Development

Cognitive Behavioral Therapy (CBT)

CBT is a type of mental health treatment with strong evidence of effectiveness in helping individuals to change their cognitive frame—the way we act, feel, think, and deal with problems. Hundreds of studies have shown CBT to be effective in substance use and smoking disorders, depression and anxiety, and post-traumatic stress disorders. CBT therapists focus on the current situation and its solution over a multi-session period.^{lxxxix} Behavioral therapy in pregnant women is understudied; however, a recent study in the *Archives of Womens Mental Health* stated, “Given the high prevalence, limited treatment alternatives, and enduring negative consequences of anxiety disorders during pregnancy, addressing this critical knowledge gap holds the potential to benefit generations of women and their children.”^{lxxx}

Healthy Families

Healthy Families, a community-based home visiting program that improves the health and well-being of children at risk for abuse and neglect by providing intensive home visitation services, has also been shown, through a randomized control trial study, to significantly reduce the risk of low weight births.^{lxxxi} Home visitors provide families with support, education, and referrals to community services aimed at addressing the following goals: promoting positive parenting skills and parent-child interactions, preventing child abuse and neglect, ensuring optimal prenatal care and child health and development, and increasing parents' self-sufficiency. Two North Carolina evaluation studies have found significant positive change in parenting behaviors and children's social emotional competence as well as in a reduction of rapid rebirth and teen rebirth rates.^{lxxxii} Healthy Families operates in 585 sites nationally,^{lxxxiii} and in North Carolina as Healthy Families Durham.

Healthy Start

Healthy Start has a primary goal of reducing infant mortality by 50 percent and generally improving maternal and infant health in at-risk communities. Programs offer a suite of health and social services for pregnant women and infants. Grantees have flexibility in the program design, though the program does require community engagement and outreach strategies and needs assessments as well as ongoing evaluation.^{lxxxiv} There are currently 100 Healthy Start community efforts funded through the federal Maternal and Child Health Bureau. Three Healthy Start home visiting programs operate in North Carolina: Healthy Start CORPS, through the University of North Carolina and sited in Pembroke; NC Baby Love Plus in Raleigh; and Robeson Health Care Corporation Healthy Start, also in Pembroke.

NC Baby Love

North Carolina's Medicaid program for pregnant women is called Baby Love. The program provides childbirth education, health and behavior intervention and medical home visits.^{lxxxv} Healthy Start Baby Love Plus is a Forsyth County initiative with a primary focus on reducing infant mortality and promoting women and children's health.^{lxxxvi}

NC Pregnancy Medical Homes and Case Management

North Carolina Pregnancy Medical Homes provide comprehensive pre-natal care for pregnant women enrolled in Medicaid through public-private partnership and service delivery. This approach connects community- and medically-based initiatives through a network of “providers, health professionals, social service agencies, local health departments, and community organizations to provide coordinated care.” A trained social worker or nurse is assigned to any pregnant woman at higher risk for preterm birth and works to facilitate transportation, access benefits for which they may be eligible, including mental and behavioral health services, and discuss any concerns the woman may have. Recent studies indicate the program is associated with lower rates of children born pre-term and with low birthweight.^{lxxxvii}

Newborn Individualized Developmental Care and Assessment Program (NIDCAP)

NIDCAP is an educational and consultation program that supports specialized infant care in the neonatal intensive care unit and special care nurseries. This approach is listed as a proven program by the Promising Practices Network (PPN). NIDCAP helps to improve the cognitive and physical growth and overall health of pre-term and high-risk newborns through the “...effective delivery of intensive and special care in a neurodevelopmentally supportive, individualized, and family-centered framework.”^{lxxxviii} One NIDCAP Training Center operates in North Carolina, at WakeMed Hospital in Raleigh.

Nurse Family Partnership (NFP)

The Nurse-Family Partnership (NFP) is a home visiting program designed to promote healthy behaviors and parent capacity for first-time, low-income mothers and their children. It includes one-on-one home visits by a trained public health registered nurse. The visits begin early in the woman’s pregnancy (with program enrollment no later than the 28th week of gestation) and conclude when the woman’s child turns two years old. Mothers are connected with social services. The intervention promotes supporting relationships and improves prenatal health and outcomes, child health and development, and families’ economic self-sufficiency and/or maternal life course development.^{lxxxix} NFP operates in 22 counties across North Carolina, including Buncombe, Cherokee, Cleveland, Columbus, Edgecombe, Forsyth, Gaston, Guilford, Halifax, Haywood, Hertford, Jackson, Macon, Mecklenburg, Northampton, Pitt, Polk, Robeson, Rockingham, Rutherford, Swain and Wake.^{xc}

Parents as Teachers (PAT)

Parents as Teachers (PAT) is a universal-access, family-focused parent education intervention that has been shown to reduce low weight births.^{xcii} The intervention focuses on early detection of children’s developmental delays and health concerns, and on parents’ knowledge of early childhood development, parenting practices, and school readiness. It is often coupled with the PAT home visiting model but can be used in early care and education settings that provide home-based services. PAT serves expectant families and families with children up through the kindergarten year and has been implemented with families with low incomes, teen parents, first-time parents, immigrant families, families with substance abuse or mental health issues, and families of diverse cultures and ethnicities. PAT may be modified to be culturally responsive to “special populations,” or offered in conjunction with other early care and education programs.^{xciii} Currently in North Carolina the following programs are formally PAT-affiliated: Catawba County Early Head Start, School Readiness Program-P.A.T./Davidson County Partnership for Children, Smart Start of Mecklenburg County, and The Children's Center in Winston-Salem.^{xciii}

Special Supplemental Nutrition Program for Women, Infants and Children (WIC)

WIC is a federal nutritional support, established in 1974 to improve the health of low-income women and their young children by providing better nutrition and nutrition education (including breastfeeding support) and referrals to needed health and social services.^{xciiv} Available in all 50 states, WIC benefits generally are provided through electronic vouchers or paper checks for the purchase of food, though in some states, foods are distributed from a central warehouse. All WIC state administrative agencies must implement WIC electronic benefit transfer (EBT) by October 1, 2020.^{xcv}

From 2009 through 2016, participation in the North Carolina WIC program declined, from just under 270,000 to just over 241,000. This year, the federal government estimates that 238,687 North Carolinians will participate in WIC, including 57,724 infants and 120,130 children. The average monthly food cost per person is \$49.^{xcvi} Benefits of participation in the North Carolina WIC program documented over time by the North Carolina Department of Health and Human include:

- An increase in the number of women receiving adequate prenatal care, and a decrease in infant mortality by at least 25 percent and in low birthweight and preterm births by 3.3-3.5 percent
- A decrease in the rate of child anemia, improvements in children's diets, a higher rate of immunizations, and better vocabularies than comparable children who do not participate in WIC
- A reduction of \$744 in Medicaid costs per enrolled baby during the first 50 days of life, which was \$3.90 in savings per WIC dollar invested^{xcvii}

Appendix A. Examples of Comprehensive, Race-Informed Approaches to Reducing Low Weight Births

Boston Public Health Commission: Boston

The Boston Public Health Commission (BPHC) has prioritized closing the racial gaps in low birthweight outcomes in the city of Boston, committing to an overall reduction in low birthweight rates citywide and reducing the gap in low birthweight rates between black and white residents by 25 percent over five years. The low birthweight rate disparity between black and white infants is partly due to the stress and social condition-related risk factors that more frequently affect black residents.^{xcviii}

The Boston Public Health Commission's 10-step plan of action:

1. **Launch and Marketing:** Set and announce the priority for reducing low birthweight births for Black infants with the intention of increasing awareness and buy-in among stakeholders
2. **Employ a cross-system approach** including cross-sector partnerships to:
 - a. address social determinants of health
 - b. leverage health, insurance payers and community organizations to improve seamless systems of care and referral
 - c. Identify collaboration barriers and opportunities, joint funding opportunities to facilitate systems-level programming and needs for cross-institutional education/training
 - d. Use public health campaigns/social media to build public support for goals, and public demand for action
 - e. With stakeholders, define, create and evaluate preconception care models addressing medical and social determinants that can be implemented and sustained
3. **Prioritize community engagement** including
 - a. Support for women, men and youth to contribute to the development of health programs in their communities
 - b. Promoting models of health care that emphasize empowerment as a health strategy (e.g., CenteringPregnancy)
 - c. Expanding the focus beyond maternal-child health to engage men and meet men's health needs
 - d. Providing employment for community leaders and activists to support community action steps toward target goals.
4. **Better integrate programs** within the Boston Public Health Commission
 - a. Provide regular forums for joint education and inter-bureau sharing and collaboration
 - b. Enhance cross-program referral and joint programming (e.g. sexually transmitted vaginal infection treatment and low birthweight prevention)
 - c. Encourage protocol creation and training within each bureau to address the key priority of low birthweight reduction (e.g. EMS training and consultation to determine whether there is potential to create protocols for emergency management of preterm labor)
5. **Continue to address the medical causes of low birthweight** and promote improved medical care among Boston providers

- a. Support programming in substance abuse treatment, infection prevention and treatment, and connection to primary care and preconception care
 - b. Promote programs and policies that help women return to pre-pregnancy weight prior to a next pregnancy, particularly those that encourage breastfeeding
6. **Expand programming and policies that address the social determinants that lead to low birthweight, and build partnerships where necessary**
- a. Segregation (fair housing policies)
 - b. Institutional racism, e.g., workplace policies and practices such as; sick leave policies, promotions and job qualifications
 - c. Neighborhood economic development (business collaborations and consultants/partnerships for neighborhood level economic development)
7. **Encourage civic participation**
- a. Target action to educate policy makers on issues that contribute to low birthweight births for Black women
 - b. Target action to reform policies that contribute to stress for women, male partners and families
8. **Ensure data collection and evaluation for all programs**
- a. Create some common metrics across BPHC programming to understand whether and how systems-level programs achieve their own targets, and joint targets
9. **Support research** on social determinants of racial inequities in low birthweight
- a. Develop stronger evidence base for understanding the causes of low birthweight inequities, both medical and social
 - b. Collect better information on how to **support potential fathers** and partners to reduce low birthweight
10. **Commit to reach both short term and long term goals** with metrics within and across bureaus.^{xcix}

Black Infant Health Program: California

The Black Infant Health intervention program (BIH) in California is designed to improve the health of black women, infants, and children, reducing the infant mortality rate by increasing first trimester prenatal care visits, and fostering the continuity of health care services during the perinatal and interconception period for African American women and their infants.

This approach is based on bundling a comprehensive set of practices and services: prenatal care and outreach, case management, health behavior modification, social support and empowerment, education on the role of men, assistance in using appropriate medical care and other family support services, and education on the causes of infant mortality and the relationship between low birthweight and infant survival. The program is working—BIH program participants experience preterm and low birthweight rates comparable to the geographic area average. The rate of very low birthweight babies was 1.9 percent among participants, compared with 3.0 percent in the comparison group.^c

The Magnolia Project: Northeast Florida

The Magnolia Project, an initiative of the Northeast Florida Healthy Start Coalition, is an empowerment-focused program that serves high-risk, currently not pregnant African American women who are at higher risk of becoming pregnant soon. These women include those who lack regular health care, women with a previous poor birth outcome, women who abuse substances, or those with a history of mental health or psychosocial problems.

Women develop a participant care and goal plan based around the project's offerings. The project promotes wellness and health and resiliency in the face of negative social determinants of health, and offers comprehensive services including outreach, health education, social support, well-woman care, prenatal care, case management and care coordination. The program has helped improve racial disparities in infant mortality rates..^{ci}

Interpregnancy Care Program: Grady Memorial Hospital, Atlanta

The Georgia Statewide Task Force on Perinatal Care recommended an evaluation of interpregnancy care for higher-risk women in 1998. The Grady Memorial Hospital Interpregnancy Care Program (IPC) targeted African American women who had previously delivered a very low birthweight infant at Grady and who qualified for indigent or charity care. IPC included enhanced case management, primary health and dental care services, among other outreach services, for two years in the community setting with a community health worker called a Resource Mother. Health care visits addressed key areas linked to low birthweight (poorly controlled chronic diseases, reproductive system infections, poor nutrition, substance abuse, depression, domestic violence, and short interpregnancy intervals) alongside group educational experiences..^{ci}

Approximately one third of the women enrolled had experienced poorly managed or undiagnosed chronic health problems. Women in the IPC experienced fewer pregnancies (2.6 times less than the control cohort within an 18-month period) and fewer adverse outcomes (3.5 times less likely) than the control group..^{ciii}

Appendix B. National Conference of State Legislatures (NCSL) Review of State Policies to Improve Healthy Births and the Health of Babies and their Mothers

Text is cited directly from the source document.

Policy	Strategies
Promote early, high quality prenatal care	<p>Assess state needs and develop improvement plans</p> <ul style="list-style-type: none"> • New Jersey awarded grants to adopt Evidence Based Practices (EBPs) such as patient navigators and doulas. A 2013 report on first trimester showed overall improvement, despite racial disparities and other access challenges. <p>Educate women about healthy pregnancies through education and outreach</p> <ul style="list-style-type: none"> • New York Department of Health provides “Your Guide to Health” and other materials related to maternal depression and preconception care. <p>Target high-risk Medicaid enrollees</p> <ul style="list-style-type: none"> • Colorado’s Prenatal Plus targets high-risk pregnant women with early and comprehensive services and care coordination, resulting in Medicaid savings of \$2.48 for each program dollar, in first year infant health costs. • New York’s Community Health Worker Program provides one-on-one outreach, education and home visiting to uninsured and under-insured pregnant women at risk of low birthweight and infant death.
Reduce early elective deliveries	<ul style="list-style-type: none"> • Illinois, New York, Texas and Washington have passed laws to reduce early elective deliveries. • 34 states have established “perinatal quality collaboratives,” including hospitals, health department staff and perinatal care providers to improve pregnancy outcomes and reduce early elective deliveries. • Ohio adopted several interventions, reduced NICU admissions, and saved \$27 million. • Working with the hospital association, South Carolina DHHS reduced early elective deliveries by 50 percent, saving \$6 million in one quarter. • Louisiana works with the state medical society, hospital association and health providers to distribute patient and provider “tools.” Doctors who complete training are eligible for reduced malpractice premiums.
Reduce barriers to breastfeeding	<ul style="list-style-type: none"> • 46 states have laws that “explicitly allow women to breastfeed in any public or private location.” • Laws in 29 states “exempt breastfeeding from public indecency laws.” • Laws in 25 states “typically requiring employers to provide time each day and adequate facilities for a breastfeeding employee.” • 25 state Medicaid programs cover breastfeeding education, 15 cover lactation counselors, 31 cover equipment rentals. • States promote breastfeeding through WIC and SNAP • New York adopted a Breastfeeding Mothers Bill of Rights

<p>Promote newborn screening</p>	<ul style="list-style-type: none"> • All states operate a newborn screening program, with most national recommendations including screening for 31 core and 26 secondary conditions. • All states require screens for at least 26 of the 31 core. • Connecticut, Maryland, Indiana, New Hampshire, Tennessee and West Virginia have laws requiring heart screening.
<p>Promote early intervention/ treatment for Medicaid-enrolled children</p>	<ul style="list-style-type: none"> • EPSDT functions as the basis for Medicaid screenings • Some states screen through local public health child health clinics funded through the Title V Maternal and Child Health Block Grant. • Washington and Maine have incorporated AAP Bright Futures standards into screening. MaineCare provides increased reimbursement for doctors who incorporate these.
<p>Promote safe sleep and reduce incidence of SIDS</p>	<p>Some states require data collection on SIDS to monitor trends and develop prevention strategies</p> <ul style="list-style-type: none"> • Michigan, based on survey data that black non-Hispanic mothers were 20 percent less likely to place their babies on their backs to sleep, developed a targeted Safe Sleep Campaign. • 12 states require special training on SIDS for child care staff, fire fighters, EMTs and law enforcement officers.
<p>Promote evidence-based home visitation</p>	<p>Targeted funds and programs</p> <ul style="list-style-type: none"> • Arkansas, Iowa, Maryland, Michigan, South Carolina and Washington “target public investments into research-based models that demonstrate evidence of effectiveness.” • Washington requires evidence based models. • South Carolina targets high risk families, requiring a minimum number of visits and participation in quality assessments. <p>Use Medicaid</p> <ul style="list-style-type: none"> • 32 states offer home visiting as an enhanced prenatal Medicaid benefit. • Minnesota defined a set of mental health services, including individual and family therapy, crisis counseling and the use of a behavioral health aide, to be offered under EPSDT. <p>Strengthen data capacity</p> <ul style="list-style-type: none"> • Massachusetts Healthy Families home visiting created a comprehensive data strategy based on performance measurement on 27 indicators linked with an independent program evaluation to assess impacts and outcomes. <p>Promote coordination of early childhood resources</p> <ul style="list-style-type: none"> • Connecticut’s Office of Early Childhood Education Cabinet established a Home Visiting Steering Committee to establish best practices and link home visiting to other state priorities including literacy development, family economic stability, and father engagement.
<p>Reduce preventable</p>	<p>CDC 2012 National Action Plan for Child Injury Prevention</p> <ul style="list-style-type: none"> • Varies by state

<p>childhood injuries</p>	<ul style="list-style-type: none"> Investments in data and surveillance, research and evaluation, and information clearinghouses
<p>Promote oral health for pregnant women and infants</p>	<p>Establish guidelines for perinatal oral health</p> <ul style="list-style-type: none"> New York Department of Health convened experts to make recommendations. California Dental Association developed practice guidelines. <p>Encourage dentist participation in Medicaid and CHIP</p> <ul style="list-style-type: none"> Connecticut, South Carolina, Tennessee and Virginia have increased dental reimbursement rates. Other states have increased outreach, reduced administrative requirements, and streamlined authorization. <p>Integrate oral health into primary care services</p> <ul style="list-style-type: none"> In 2009, 34 state Medicaid programs reimbursed primary care providers for preventive oral health services. <p>Assure Medicaid and CHIP dental care coverage for pregnant women</p> <ul style="list-style-type: none"> California, Louisiana, Missouri, Oklahoma and Oregon have established dental benefits for pregnant women enrolled in Medicaid.
<p>Increase child immunizations</p>	<p>School requirements</p> <ul style="list-style-type: none"> Align state vaccination requirements for schools and child care with recommendations from the Advisory Committee on Immunization Practices. <p>Reimbursement and workforce policies</p> <ul style="list-style-type: none"> Adopt policies to promote access. Enroll providers in Medicaid which pays for immunizations. Expand pharmacists' and other health care professionals' role to include immunizations. Coordinate with home visiting and WIC programs. <p>Immunization systems</p> <ul style="list-style-type: none"> Establish statewide immunization registries. All states have at least one regional or local registry now. <p>Education and training for parents and health care providers</p>

Appendix C. North Carolina Maternal and Child Health Title V Block Grant Measures

Women and Children’s Health Services (WCHS) within the Department of Health and Human Services’ Division of Public Health is responsible for oversight of programs implemented under funding from the federal Title V grant and other programs including Title X, early intervention, nutrition services (including the state WIC program), and immunization. In addition to the Children and Youth Branch, the WCHS includes four other branches: Women’s Health (WHB), Early Intervention, Immunization (IB), and Nutrition Services.^{civ}

The 2017 Title V application includes a summary of priority needs and related measures. Those that track well against the goal and outcomes of the Pathways goal “Health and Development on Track, Beginning at Birth” are listed below. Abbreviations include:

- NPM – National Performance Measure
- ESM – Evidence-Based or Evidence-Informed Measure
- SPM – State Performance Measure.

The chart below is included because this work will provide, over time, additional data on outcomes that track with measures selected by Pathways.

North Carolina Priority Needs and Performance Measures by Primary Population Health Domain		
Domain	Priority Needs	Measures
Women/ Maternal Health	Improve the health of women of childbearing age with a special focus on health equity	NPM 1 % of women with a past year preventive medical visit ESM 1.1 # of participants in webinar explaining preventive services for women covered by ACA
Perinatal/ Infant Health	Reduce infant mortality with a special focus on social determinants of health	NPM 3 % of very low birthweight infants in a hospital with Level III+ NICU ESM 3.1 % of birthing hospitals that complete the CDC Levels of Care Assessment Tool annually NPM 4A % of infants who are ever breastfed NMP 4B % of infants exclusively breastfed through six months ESM 4 % of local health departments whose maternal health staff members were trained on breastfeeding promotion and support through North Carolina Regional Lactation Training Centers
Perinatal/ Infant Health	Increase the number of newborns screened for genetic and hearing	SPM 1 % of infants with confirmed hearing loss who are enrolled for intervention services no later than age six months

	disorders and prevent birth defects	
Child Health	Increase developmental screenings for children and adolescents	<p>NPM 6 % of children ages 10-71 months receiving a developmental screening using a parent-completed screening tool</p> <p>ESM 6.1 # of training opportunities for local health department providers on appropriate use of valid and reliable developmental, psychosocial, and behavioral health screening tools for children during state fiscal year</p>
CSHCN (Children with Special Health Care Needs)	Improve the health of children with special needs	<p>NPM 11 % of children with and without special health care needs who have a medical home</p> <p>ESM 11.1 # of policies, practices, and resources changed to support improved outcomes for CYSHCN by counties implementing Innovative Approaches strategies</p>
CSHCN (Children with Special Health Care Needs)	Provide timely comprehensive early intervention services for children with special developmental needs and their families	<p>SPM 3 # of infants and toddlers with Individualized Family Services Plans (IFSPs) who receive the early intervention services on the IFSP within 30 days</p>
Cross-Cutting or Life Course	Improve healthy behaviors in women and children and among families incorporating the life course approach	<p>NPM 14A % of women who smoke during pregnancy</p> <p>NPM 14B % of children who live in households where someone smokes</p> <p>ESM 14.1 # of women of reproductive age (15-44 years) who received at least one counseling session from the tobacco Quitline NC in the past 12 months</p>
Cross-Cutting or Life Course	Increase access to care for women, children and families, especially in uninsured populations and where disparities exist	<p>NPM 15 % of children ages 0 through 17 who are adequately insured</p>

ⁱ Hux, V., Catov, J. & Roberts, J. (2014). *Allostatic Load in Women with a History of Low Birthweight Infants: The National Health and Nutrition Examination Survey*. *Journal of Women's Health*. 23(12): 1039–1045. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4267553/>

ⁱⁱ Hux et al, *Allostatic Load in Women with a History of Low Birthweight Infants: The National Health and Nutrition Examination Survey*. *Journal of Women's Health*, op cit.

ⁱⁱⁱ March of Dimes. (n.d.). *Low birthweight*. Retrieved April 6, 2017 from <http://www.marchofdimes.org/complications/low-birthweight.aspx>

^{iv} Mayo Clinic. (n.d.). *Premature birth*. Retrieved from <http://www.mayoclinic.org/diseases-conditions/premature-birth/basics/definition/con-20020050>

^v Center for Parent Information and Resources. (2014). *Overview of Early Intervention*. Retrieved from <http://www.parentcenterhub.org/repository/ei-overview/>

^{vi} Center for Parent Information and Resources. (2014). *Key Terms to Know in Early Intervention*. Retrieved from <http://www.parentcenterhub.org/repository/keyterms-ei/#dd>

^{vii} Goodwin, K. Smart. (2014). *Smart Investments in Children's Health*. Retrieved from <http://www.ncsl.org/documents/health/SmartInvestments914.pdf>

^{viii} *Early and Periodic Screening, Diagnostic, and Treatment*. (n.d.). Retrieved April 4, 2017 from <https://www.medicaid.gov/medicaid/benefits/epsdt/index.html>

^{ix} Saini, R., Saini, S., & Saini, S. R. (2010). Periodontitis: A risk for delivery of premature labor and low-birth-weight infants. *Journal of Natural Science, Biology, and Medicine*, 1(1), 40-42. Doi: 10.4103/0976-9668.71671. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3217279/>

^x Barfield, W. (2016). *The Problem of Neonatal Abstinence Syndrome*. Retrieved from <https://www.cdc.gov/cdcgrandrounds/pdf/archives/2016/august2016.pdf>

^{xi} Preterm Birth and Low Birthweight. *Child Health USA*, op cit.

^{xii} Schorr, L. B., Marchand, V. (2007). *Pathway to Children Ready for School and Succeeding at Third Grade*. Retrieved from <http://first5shasta.org/wp-content/uploads/2013/07/PathwayFramework9-07.pdf>

^{xiii} Schorr et al, *Pathway to Children Ready for School and Succeeding at Third Grade*. op cit.

^{xiv} *Michigan News*. (2007, June 5). *Born to lose: How birthweight affects adult health and success*. Retrieved from (<http://ns.umich.edu/new/releases/5882-born-to-lose-how-birth-weight-affects-adult-health-and-success>)

^{xv} Schorr et al, *Pathway to Children Ready for School and Succeeding at Third Grade*. op cit.

^{xvi} Preterm Birth and Low Birthweight (2014). *Child Health USA*, 25-28. Retrieved from <http://mchb.hrsa.gov/chusa14/health-status-behaviors/infants/preterm-birth-low-birth-weight.html>

^{xvii} Kowlessar, N. M., Jiang, J., Steiner, C. (2013). *Statistical Brief #163*. Retrieved from <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb163.pdf>

^{xviii} Johnson, T. (2015). *Unraveling the Cost of Very Low Birthweight Infants*. Retrieved from <http://blog.neonatalperspectives.com/2015/08/07/unraveling-the-cost-of-very-low-birth-weight-infants/>

Note: Cost data presented in this report are from the Agency for Healthcare Research and Quality in the U.S. Department of Health and Human Services, 2014.

^{xix} This is calculated as follows. Average cost of low weight births per child minus the average cost of a non-LBW babies times 5,000 births (equal to 50% of all LWBs) = a savings in hospital costs of at least \$10,000 per child or \$50,000,000 annually. A more comprehensive modeling of projected savings would (a) employ more recent hospital costs from Medicaid and private insurance, control for such federal Medicaid reimbursement to the State of North Carolina as is already received and add back some level of funding to pay for prevention and early intervention programming.

^{xx} March of Dimes. (2016). *2016 Premature Birth Report Card*. Retrieved from

<http://www.marchofdimes.org/materials/premature-birth-report-card-north-carolina.pdf>

^{xxi} *Healthy North Carolina 2020: Focus Areas, Objectives, and Evidence-Based Strategies*. (n.d). Retrieved from <http://publichealth.nc.gov/hnc2020/objectives.htm>

^{xxii} The Urban Child Institute. (2012). *Prematurity and Low Birthweight*. Retrieved from <http://www.urbanchildinstitute.org/articles/policy-briefs/prematurity-and-low-birth-weight>

^{xxiii} Schorr, L., *Pathway to Children Ready for School and Succeeding at Third Grade*, 2007. <http://first5shasta.org/wp-content/uploads/2013/07/PathwayFramework9-07.pdf> and National Early Childhood

-
- Technical Assistance Center, *The Outcomes of Early Intervention for Infants and Toddlers with Disabilities and their Families*, 2011. <http://www.nectac.org/~pdfs/pubs/outcomesofearlyintervention.pdf>
- ^{xxiv} States/ and territories' definitions of/criteria for IDEA Part C eligibility. (2015). Retrieved from http://www.nectac.org/~pdfs/topics/earlyid/partc_elig_table.pdf
- ^{xxv} University of Michigan. (2007). *Born to lose: How birthweight affects adult health and success*. Retrieved from: <http://ns.umich.edu/new/releases/5882-born-to-lose-how-birth-weight-affects-adult-health-and-success>
- ^{xxvi} Schorr, L. (2007). *Pathway to Children Ready for School and Succeeding at Third Grade*. Retrieved from: <http://first5shasta.org/wp-content/uploads/2013/07/PathwayFramework9-07.pdf>
- ^{xxvii} American Speech-Language-Hearing Association (n.d.). *Effects of Hearing Loss on Development*. Retrieved April 4, 2017 from <http://www.asha.org/public/hearing/Effects-of-Hearing-Loss-on-Development/>
- ^{xxviii} American Optometric Association. (n.d.). *A Look at Reading and Vision: A Look at Reading and Vision*. Retrieved April 4, 2017 from <http://www.aoa.org/patients-and-public/resources-for-teachers/a-look-at-reading-and-vision?sso=y>
- ^{xxix} Asthma and Allergy Foundation of America. (n.d.). *Asthma Facts and Figures: Research*. Retrieved January 21, 2017 from <http://www.aafa.org/page/asthma-facts.aspx>
- ^{xxx} National Maternal and Child Oral Health Center. (n.d.). *Oral Health and Learning: When Children's Oral Health Suffers, So Does Their Ability to Learn*. Retrieved January 30, 2017 from <https://www.mchoralhealth.org/PDFs/learningfactsheet.pdf>
- ^{xxxi} University of Michigan. (2007). *Born to lose: How birthweight affects adult health and success*. Retrieved from: <http://ns.umich.edu/new/releases/5882-born-to-lose-how-birth-weight-affects-adult-health-and-success>
- ^{xxxii} Grote, N.K., Bridge, J. A., Gavin, A. R., Melville, J. L, Lyengar, S., Katon, W. J. (2011). A Meta-analysis of Depression During Pregnancy and the Risk of Preterm Birth, Low Birthweight, and Intrauterine Growth Restriction. *Archives of General Psychiatry*, 67(10), 1012-1024. DOI: 10.1001/archgenpsychiatry.2010.111. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3025772/>
- ^{xxxiii} *Compendium of Parenting Interventions*. (2015). (2). Retrieved from <https://www.acf.hhs.gov/ecd/resource/compendium-of-parenting-interventions>
- ^{xxxiv} American Academy of Pediatrics. (2012). *Prenatal Substance Abuse: Short- and Long-term Effects on the Exposed Fetus*. Retrieved from <http://pediatrics.aappublications.org/content/pediatrics/131/3/e1009.full.pdf>
- ^{xxxv} Garcia, J,L., Heckman, J.J., Leaf, D.E., and Prados, M.J. *The Life-cycle Benefits of an Influential Early Childhood Program*. 2016. The Heckman Equation. Retrieved from: https://heckmanequation.org/assets/2017/01/Garcia_Heckman_Leaf_etal_2016_life-cycle-benefits-ecp_r1-p.pdf
- ^{xxxvi} Child Trends. (2013). *Child trends data bank: Screening and risk for developmental delay Indicators on children and youth*. Bethesda, MD. Retrieved from: http://www.childtrends.org/wp-content/uploads/2013/07/111_Developmental-Risk-and-Screening.pdf
- ^{xxxvii} Resources Especially for Child Care Providers and Preschools, Center for Parent Information and Resources, 2013 <http://www.parentcenterhub.org/repository/childcare/>
- ^{xxxviii} Schorr, L. (2007). *Pathway to Children Ready for School and Succeeding at Third Grade*. Retrieved from: <http://first5shasta.org/wp-content/uploads/2013/07/PathwayFramework9-07.pdf>
- ^{xxxix} National Collaborative on Education and Health. (2015). *Brief on Chronic Absenteeism and School Health*. Retrieved from <http://www.attendanceworks.org/wordpress/wp-content/uploads/2011/03/Chronic-Absenteeism-and-School-Health-Brief-1.pdf> and Moonie, S., Cross, C. L., Guillermo, C. J., & Gupta, T. (2010). Grade retention risk among children with asthma and other chronic health conditions in a large urban school district. *Postgraduate medicine*, 122(5), 110-115.
- ^{xl} Anum, E.A., Retchin, S.M, and Strauss, J.F. (2004). Medicaid and Preterm Birth and Low Birthweight: The Last Two Decades. Originally published in the *Journal of Women's Health*, 19(3): 443-451. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2867587/>.
- ^{xli} Behrman, R., Butler, A. (2007). Behavioral and Psychosocial Contributors to Preterm Birth. *Preterm Birth: Causes, Consequences, and Prevention* (3). Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK11361/>
- ^{xlii} Medicaid and Preterm Birth and Low Birthweight, op cit.
- ^{xliii} North Carolina Pregnancy Risk Assessment Monitoring System (PRAMS). (2005). Barriers to Prenatal Care. NC PRAMS Fact Sheet. Retrieved from <http://www.schs.state.nc.us/schs/prams/pdf/BarriersToPrenatal.pdf>

-
- ^{xliiv} March of Dimes. (n.d.). *Racial and Ethnic Disparities in Birth Outcomes: Fact Sheet*. Retrieved from http://www.marchofdimes.org/materials/March-of-Dimes-Racial-and-Ethnic-Disparities_feb-27-2015.pdf
- ^{xlv} March of Dimes. (n.d.). *Low birthweight*. Retrieved from <http://www.marchofdimes.org/complications/low-birthweight.aspx>
- ^{xlvi} Preterm Birth and Low Birthweight, *Child Health USA*, op cit.
- ^{xlvii} March of Dimes, op cit.
- ^{xlviii} Firth, P. (2014). Homelessness, Poverty and the Brain: Mapping the Effects of Toxic Stress on Children. Retrieved from <http://firesteelwa.org/2014/09/homelessness-poverty-and-the-brain-mapping-the-effects-of-toxic-stress-on-children/>
- ^{xlix} Born to lose, op cit.
- ^l Born to lose, op cit.
- ^{li} Goodwin, K. Smart. (2014). Smart Investments in Children’s Health. Retrieved from <http://www.ncsl.org/documents/health/SmartInvestments914.pdf>
- ^{lii} *Born Too Early: Improving Maternal & Child Health by Reducing Early Elective Deliveries*. (2014). NIHCM Issue Brief, National Institute for Health Care Management Foundation. Retrieved from: https://www.nihcm.org/pdf/Early_Elective_Delivery_Prevention_Brief_2014.pdf
- ^{liii} Alexander, D. (2015). Does Physician Pay Affect Procedure Choice and Patient Health? Evidence from Medicaid C-section Use. Retrieved from: http://scholar.princeton.edu/sites/default/files/dalexand/files/procedure_choice_6_15.pdf
- ^{liiv} *Committee Opinion: Benefits to Women of Medicaid Expansion Through the Affordable Care Act*. (2016). The American College of Obstetricians and Gynecologists, Committee on Health Care for Underserved Women. Retrieved from: <http://www.acog.org/Resources-And-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Benefits-to-Women-of-Medicaid-Expansion-Affordable-Care-Act>
- ^{liv} *Promising Practices for Preventing Low Birthweight*. (2010). Retrieved from http://www.promisingpractices.net/briefs/briefs_lowbirthweight.asp
- ^{lv} The American College of Obstetricians and Gynecologists. (2016). *Frequently Asked Questions: FAQ 182 Pregnancy*. Retrieved from <http://www.acog.org/Patients/FAQs/Obesity-and-Pregnancy#being>
- ^{lvii} Olds, D. (2010). The Nurse-Family Partnership. *Investing in Young Children: New Directions in Federal Preschool and Early Childhood Policy*. Retrieved from https://www.brookings.edu/wp-content/uploads/2016/07/1013_investing_in_young_children_haskins_ch6.pdf
- ^{lviii} North Carolina’s Perinatal Health Strategic Plan: 2016-2020. (2016). North Carolina Department of Public Health. Retrieved from <http://whb.ncpublichealth.com/docs/PHSP-FINAL-website-10-31-16.pdf>
- ^{lix} North Carolina Institute of Medicine. (2012). Prevention. *Growing Up Well: Supporting Young Children’s Social-Emotional Development and Mental Health in North Carolina*, 4. Retrieved from <http://www.nciom.org/wp-content/uploads/2012/08/Chapter-41.pdf>
- ^{lx} Wachino, V. (2016). *Maternal Depression Screening and Treatment: A Critical Role for Medicaid in the Care of Mothers and Children*. Retrieved from <https://www.medicaid.gov/federal-policy-guidance/downloads/cib051116.pdf>
- ^{lxi} Wachino, V. (2016). *Maternal Depression Screening and Treatment: A Critical Role for Medicaid in the Care of Mothers and Children*. Retrieved from <https://www.medicaid.gov/federal-policy-guidance/downloads/cib051116.pdf>
- ^{lxii} “CMS directs use of CPT code 99420 (Health Risk Screen), one (1) unit per administration, with EP modifier when billing for this service. When conducted as part of a comprehensive Health Check Early Periodic Screening visit, this screen may be billed to the infant’s Medicaid coverage. Providers should carefully review this Program Guide’s section on *General Guidance on Use of Structured Screening Tools* and follow all documentation requirements.” 2016 NC Health Check Program Guide, op cit., p. 43
- ^{lxiii} *Improving Community Outcomes for Maternal and Child Health (ICO4MCH)*. (2017). <http://www.ncalhd.org/wp-content/uploads/2017/02/ICO4MCH-Overview.pdf>
- ^{lxiv} World Health Organization. (1998). Evidence for the ten steps to successful breastfeeding. *Child Health Development*, 98.9. Retrieved from http://apps.who.int/iris/bitstream/10665/43633/1/9241591544_eng.pdf See also, World Health Organization. (2010). *Ten steps to successful breastfeeding from WHO and UNICEF*. Retrieved from <http://www.news-medical.net/news/20100730/Ten-steps-to-successful-breastfeeding-from-WHO-and-UNICEF.aspx>

- ^{lxv} Centers for Disease Control and Prevention. (2014). *Best Practices for Comprehensive Tobacco Control Programs*. Retrieved from http://www.cdc.gov/tobacco/stateandcommunity/best_practices/
- ^{lxvi} *Implementing Triple P-Positive Parenting Program – Home Visiting (Triple P-Home Visiting)*. (2014). Retrieved from <http://homvee.acf.hhs.gov/Implementation/3/Triple-P-Positive-Parenting-Program-sup---sup--Home-Visiting--Triple-P-Home-Visiting-/64/1>
- ^{lxvii} March of Dimes. (n.d.). *Low Birthweight*. Retrieved from April 1, 2017 from <http://www.marchofdimes.org/complications/low-birthweight.aspx>
- ^{lxviii} *Low Birthweight*, op cit., p. 4
- ^{lxix} *Low Birthweight*, op cit., p. 5
- ^{lxx} The Early Childhood Technical Assistance Center. (2015). *States' and territories' definitions of/criteria for IDEA Part C eligibility*. Retrieved from http://ectacenter.org/~pdfs/topics/earlyid/partc_elig_table.pdf Information on each state is provided in this matrix of IDEA Part C eligibility criteria along with links to individual state programs.
- ^{lxxi} Conde-Agudelo, A., Rosas-Bermudez, A., Castaño, F., & Norton, M. H. (2012). Effects of Birth Spacing on Maternal, Perinatal, Infant, and Child Health: A Systematic Review of Casual Mechanisms. *Studies in Family Planning*, 43(2), 93-114. Retrieved from https://www.k4health.org/sites/default/files/conde-agudelo_2012.pdf
- ^{lxxii} Conde-Agudelo et al, *Effects of Birth Spacing on Maternal, Perinatal, Infant, and Child Health: A Systematic Review of Casual Mechanisms*, op cit.
- ^{lxxiii} Tavernise, S. (2015, July 5). Colorado's Effort Against Teenage Pregnancies Is a Startling Success. *The New York Times*. Retrieved from http://www.nytimes.com/2015/07/06/science/colorados-push-against-teenage-pregnancies-is-a-startling-success.html?_r=0
- ^{lxxiv} Larzellere, M. & Williams, D. (2012). Promoting Smoking Cessation. *American Family Physician*. 85(6):591-598. Retrieved from <http://www.aafp.org/afp/2012/0315/p591.html>
- ^{lxxv} Maryland's Tobacco Resource Center. (n.d.). *Brief Interventions & 5 A's*. Retrieved April 6, 2017 from <http://mdquit.org/cessation-programs/brief-interventions-5>
- ^{lxxvi} Centering Healthcare Institute. (n.d.). *A better way to get patient-centered prenatal care*. Retrieved from <https://www.centeringhealthcare.org/what-we-do/centering-pregnancy>
- ^{lxxvii} Gruber, K., Cupito, S. & Dobson, C. (2013). Impact of Doulas on Healthy Birth Outcomes. *Journal of Perinatal Education*. 22(1): 49–58. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3647727/>
- ^{lxxviii} *Doulas*. (n.d.). Retrieved April 6, 2017 from <https://improvingbirth.org/best-practices/doulas/>
- ^{lxxix} Hofmann, S. G., Asnaani, A., Vonk, I. J., Sawyer, A. T., Fang, A. (2012). The Efficacy of Cognitive Behavioral Therapy: A Review of Meta-analyses. *Cognitive Therapy and Research*, 36(5), 427-440. DOI: 10.1007/s10608-012-9476-1. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3584580/>
- ^{lxxx} Arch, J. J., Dimidjian, S., Chessick, C. (2012). Are exposure-based cognitive behavioral therapies safe during pregnancy? *Archives of Womens Mental Health*, 15(6), 445-457. DOI: 10.1007/s00737-012-0308-9. Retrieved from http://www.colorado.edu/clinicalpsychology/sites/default/files/attached-files/arch_dimidjian_chessick_is_exposure_safe_during_pregnancy_2012.pdf
- ^{lxxxii} Lee, E., Mitchell-Herzfeld, S. D., Lowenfels, A. A., Greene, R., Dorabawila, V., & DuMont, K. A. (2009). Reducing low birthweight through home visitation: a randomized controlled trial. *American Journal of Preventive Medicine*, 36(2), 154-160. DOI: 10.1016/j.amepre.2008.09.029. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/19135906>
- ^{lxxxiii} Healthy Families America. (n.d.). *Evaluations of Healthy Families America by State*. Retrieved October 31, 2017 from <http://www.healthyfamiliesamerica.org/state-evaluations/>
- ^{lxxxiiii} Healthy Families America. (n.d.). *Great childhoods begin at home*. Retrieved October 31, 2017 from <http://www.healthyfamiliesamerica.org/>
- ^{lxxxv} Promising Practices Network. (n.d.). *Heathy Start*. Retrieved October 31, 2016 from <http://www.promisingpractices.net/program.asp?programid=118>
- ^{lxxxvi} North Carolina Health and Human Services. (2017). *Women's Health Branch: Baby Love Program*. Retrieved from <http://whb.ncpublichealth.com/services.htm>
- ^{lxxxvii} Forsyth County, North Carolina. (n.d.). *Healthy Start / Baby Love Plus*. Retrieved April 1, 2017 from http://www.co.forsyth.nc.us/publichealth/baby_love_plus.aspx
- ^{lxxxviii} Community Care of North Carolina. (2013). *CCNC Pregnancy Home Risk Screening Form*. Retrieved from <https://www.communitycarenc.org/media/files/pmh-risk-screening-form-english.pdf>

-
- ^{lxxxviii} Newborn Individualized Developmental Care and Assessment Program Federation International. (n.d.). *NIDCAP Training*. Retrieved October 31, 2016 from <http://nidcap.org/en/programs-and-certifications/nidcap-training/overview-2/>
- ^{lxxxix} *Nurse Family Partnership*. (2016). Home Visiting Evidence of Effectiveness (HOMVEE). Retrieved October 31, 2017 from <http://homvee.acf.hhs.gov/Model/1/Nurse-Family-Partnership--NFP--In-Brief/14>
- ^{xc} The Duke Endowment. (n.d.). *Expanding Nurse-Family Partnership*. Retrieved October 31, 2017 from <http://dukeendowment.org/our-work/expanding-nurse-family-partnership>
- ^{xcj} *Parents as Teachers (PAT)*. (2013). Retrieved from <http://homvee.acf.hhs.gov/Model/1/Parents-as-Teachers--PAT--sup---sup-/16/1>
- ^{xcii} *Parents as Teachers*, op cit., pp. 57-59
- ^{xciii} *Parents as Teachers*. (n.d.) Retrieved from <http://www.parentsasteachers.org/>
- ^{xciv} U.S. Department of Agriculture. (n.d.). *The Special Supplemental Nutrition Program for Women, Infants and Children: WIC Program*. (p. 1). Retrieved from <https://www.fns.usda.gov/sites/default/files/wic/WIC-Fact-Sheet.pdf>
- ^{xcv} U.S. Department of Agriculture, *The Special Supplemental Nutrition Program*, op cit., p. 2
- ^{xcvi} U.S. Department of Agriculture. (2017). *WIC Program*. Retrieved from <https://www.fns.usda.gov/pd/wic-program>
- ^{xcvii} *Research Proves WIC Makes a Difference*. (2017). Retrieved from <http://www.nutritionnc.com/wic/wicworks.htm>
- ^{xcviii} Boston Public Health Commission. (2011). *Low Birthweight: A Public Health Briefing*. Retrieved from http://www.bphc.org/aboutus/office-director/documents/lbw_goal_briefing.pdf
- ^{xcix} March of Dimes. (n.d.). *Low Birthweight*. Retrieved April 6, 2017 from <http://www.marchofdimes.org/complications/low-birthweight.aspx>
- ^c *Low Birthweight: A Public Health Briefing*, op cit., p. 14
- ^{ci} Biermann, J., Dunlop, A. L., Brady, C., Dubin, C., Brann, A. (2006). Promising Practices in Preconception Care for Women at Risk for Poor Health and Pregnancy Outcomes. *Maternal and Child Health Journal*, 10(Suppl 1), 21-28. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1592161/>
- ^{cii} Biermann et al, *Promising Practices in Preconception Care for Women at Risk for Poor Health and Pregnancy Outcomes*, op cit.
- ^{ciii} Biermann et al, *Promising Practices in Preconception Care for Women at Risk for Poor Health and Pregnancy Outcomes*, op cit.
- ^{civ} Association of Maternal and Child Health Programs. (2016). *North Carolina: Maternal and Child Health Block Grant 2016*. Retrieved April 1, 2017 from <http://www.amchp.org/Policy-Advocacy/MCHAdvocacy/Documents/North%20Carolina%202016.pdf>