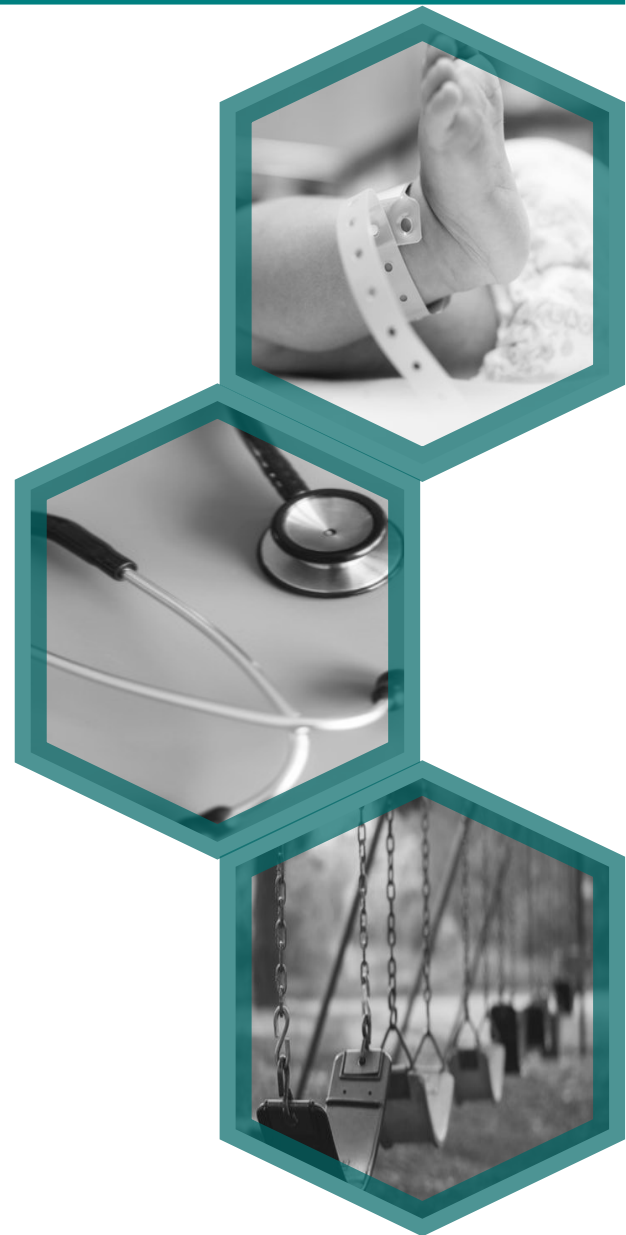


Office of State Budget
and Management

Child and Family Health

Pew-MacArthur Results First Initiative

May 2019



Contents

Executive Summary 2

I. Introduction 4

II. Child and Family Health Policy Area Background 6

III. Program Inventory 11

IV. Benefit-Cost Analysis 14

Diabetes Prevention Program (DPP) 18

Eat Smart, Move More, Weigh Less 19

Adolescent Parenting Program (AP2) 20

Baby Love Plus 21

Centering Pregnancy 22

Healthy Beginnings 23

Pregnancy Care Management (OBCM) 24

QuitlineNC for Pregnant Women 25

V. Conclusion & Next Steps 26

Appendix A: Results First Child & Family Health Program Inventory Chronic Diseases Outcomes 28

Appendix B: Results First Child & Family Health Program Inventory Birth Outcomes 34

Appendix C: Benefit-Cost Analysis Methodology 44

Appendix D: Endnotes 49

Executive Summary

Overview of the Pew-MacArthur Results First Initiative

The Pew-MacArthur Results First Initiative (Results First) helps states inform budget and policy decisions to improve societal outcomes and maximize the value of taxpayer dollars. Through Results First, state agencies collaborate with the Office of State Budget and Management to inventory social programs, assess the value of the outcomes they produce, and estimate their costs. The Results First approach utilizes existing rigorous program evaluations and benefit-cost analysis models to identify high-return program “investments” and promising innovations.

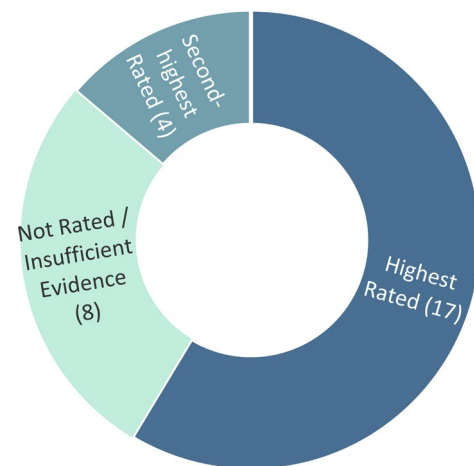
Child & Family Health

The analysis of program costs and benefits allows decisionmakers to compare programs that target similar outcomes. This first phase of the Results First initiative focuses on programs that are intended to support child and family health by improving the following specific outcomes:

- Chronic disease outcomes, including obesity and type 2 diabetes; and
- Birth outcomes, such as reducing unnecessary cesarean sections, infant mortality, low birthweight, preterm birth, small for gestational age, very low birthweight, and Neonatal Intensive Care Unit (NICU) admissions.

The Department of Health and Human Services’ Division of Public Health (DPH) delivers a range of services to promote and protect child and family health. Thirty-one programs directly impact the specific outcomes listed above. Many of these programs are available across the state while others are unique services targeting the specific needs of participating communities. Several programs are tailored to reach especially high-risk or under-resourced populations.

Some of these programs have been rigorously evaluated to determine their effectiveness, while very limited research may be available for other programs. Seventeen of DPH’s programs targeting these outcomes are highest rated, meaning that multiple program evaluations found strong evidence that program participation improves outcomes. The strength of the evidence of effectiveness for four of the programs achieved the second-highest rating, while strong evaluation research is not available for eight programs.



Benefit-Cost Analysis Findings

Monetization of program benefits is only possible when rigorous program evaluations are available to measure the outcomes attributable to program participation. Of the 31 programs in the inventory, it was possible to monetize the costs and benefits for six programs with birth outcomes and two programs with chronic disease outcomes. The inability to monetize outcomes at this time does not indicate that the programs are not cost-effective; more research is needed by the academic community to determine the extent to which these programs produce positive outcomes.

For seven programs, the estimated benefits generated by the program exceed the cost of implementation. In many cases, these types of interventions generate a stream of benefits over many years. The estimated lifetime benefits of the programs, minus the cost of investing in the program, ranged from \$940 per participant for Eat Smart, Move More, Weigh Less to \$15,030 per participant for Healthy Beginnings. Most benefits accrue to participants through avoided out-of-pocket healthcare expenditures, increased earnings, and reduced risk of infant mortality. Taxpayers benefit from publicly-funded healthcare cost savings and reduced risk of infant mortality. These avoided costs are shared among state, federal, and local governments. Private insurers and society as a whole benefit from reduced healthcare utilization and reduced risk of premature mortality.

Summary of Benefit-Cost Results by Target Outcome

Program Name	Lifetime Program Benefits	Net Program Cost	Benefit to Cost Ratio	Lifetime Benefits Minus Cost
Chronic Disease Outcomes				
Diabetes Prevention Program (DPP)	\$12,095	(\$471)	\$25.68	\$11,624
Eat Smart, Move More, Weigh Less (ESMMWL)	\$1,153	(\$215)	\$5.36	\$938
Birth Outcomes				
Adolescent Parenting Program	\$4,628	(\$7,254)	N/A	N/A
Baby Love Plus	\$18,523	(\$5,701)	\$3.25	\$12,822
Centering Pregnancy	\$4,682	(\$75)	\$62.43	\$4,607
Healthy Beginnings	\$18,646	(\$3,616)	\$5.16	\$15,030
Pregnancy Care Management (OBCM)	\$9,709	(\$822)	\$11.81	\$8,887
QuitlineNC for Pregnant Women	\$4,833	(\$120)	\$40.28	\$4,713

Conclusion & Next Steps

OSBM worked with DHHS to identify the following action steps based on the findings from the Results First process:

1. Seek opportunities to expand programs that are proven effective and have positive benefit-cost analysis findings.
2. Prioritize and evaluate programs where research is limited or outdated.
3. Use Results First to help complement current strategic planning efforts.
4. Incorporate Results First into DHHS’s performance management framework.

I. Introduction

In 2017, S.L. 2017-57 directed the Office of State Budget and Management (OSBM) to implement the Pew-MacArthur Results First Initiative (Results First) in North Carolina. Results First is an initiative that helps states inform budget and policy decisions to improve societal outcomes and maximize the value of taxpayer dollars. The approach relies on rigorous program evaluations and benefit-cost analysis to identify high-return program “investments.” Through Results First, OSBM collaborates with state agencies to identify and estimate the benefits and costs of state programs. Results First serves as a valuable approach to help inform policymakers of cost-effective programs for achieving positive outcomes for North Carolina and to identify opportunities for piloting and evaluating promising, innovative approaches.

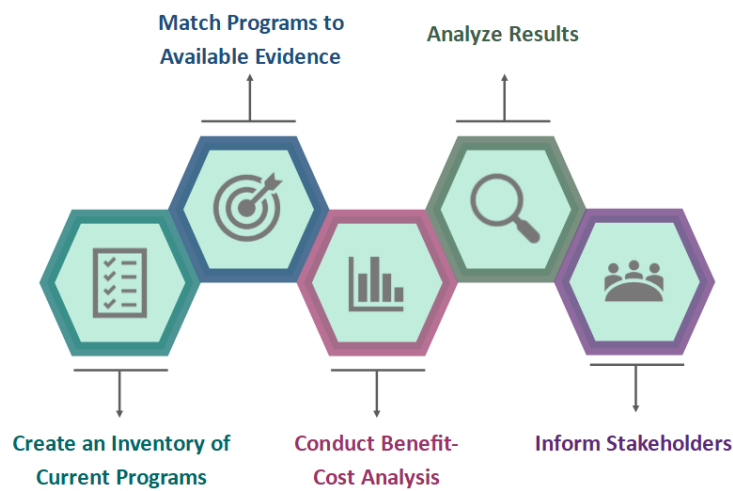
In cooperation with Results First and the Governor’s Office, the Department of Health and Human Services (DHHS) was selected as the first partner agency. Programs that support child and family health were chosen as the initial programmatic focus. With Results First, OSBM and DHHS defined the scope of this policy area to include programs that address the following outcomes in health:

- Chronic disease outcomes, including obesity and type 2 diabetes; and
- Birth outcomes, such as reducing unnecessary cesarean sections, infant mortality, low birthweight, preterm birth, small for gestational age, very low birthweight, and Neonatal Intensive Care Unit (NICU) admissions.

Pew-MacArthur Results First Initiative

North Carolina’s Results First Initiative is part of the national [Pew-MacArthur Results First Initiative](#) and was developed based on an econometric model designed by the [Washington State Institute for Public Policy](#). At no additional cost to the state, The Pew Charitable Trusts provides training and technical assistance, a nationally representative clearinghouse database of evaluated programs, and a benefit-cost model that helps identify evidence-based programs that yield high returns on investment.¹ Through Results First, state agencies collaborate with OSBM to inventory programs, assess value of the outcomes they produce, and estimate their costs. Figure 1 below provides an outline of the Results First process.

Figure 1: Pew-MacArthur Results First Process



Program Inventory & Benefit-Cost Analysis

The Results First process produces two main products: the program inventory and the benefit-cost analysis. The program inventory starts as a comprehensive list of the programs in a particular policy area, along with basic information on the programs' duration, frequency, oversight agency, delivery setting, and target population. Partner states then use this information to match their programs to the research evidence to determine each programs' effectiveness. The main source for this evidence is the [Results First Clearinghouse Database](#). The database is an online resource that brings together information on the effectiveness of social policy programs from nine national clearinghouses. Included programs have different levels of evidence based on the quality, quantity, and/or scientific rigor of the research.

The Results First Clearinghouse Database helps state partners determine which of their programs are evidence-based and if so, how effective they are according to available research. Not all programs will match to the Results First Clearinghouse Database. This does not necessarily mean they are not effective programs. Rigorous evaluations may not exist for that program or the program may be too small to warrant a rigorous evaluation. Together, the list of programs and their associated evidence levels are the program inventory.

The program inventory also helps identify which programs and services will be included in the benefit-cost analysis. After the inventory is complete and each program's level of evidence has been determined, OSBM, in consultation with the partner agency, identifies which programs qualify for the benefit-cost analysis. In its simplest form, the benefit-cost model calculates the monetary values of benefits and costs of a program over time. For example, if the state funds a program that improves birth outcomes for participants, the model would calculate the potential monetized benefits, such as reduced health care costs, and the costs of implementing the program.

With Results First's assistance, OSBM works with partner agencies to collect cost information and customize the benefit-cost model. The model will estimate a jurisdiction-specific return on investment for the programs in the Results First model. Only programs that have been evaluated with the highest level of rigor will match to the model. This information can be used to better understand the cost-effectiveness of programs and to compare similar programs.

Benefit-cost analysis conducted with the Results First model do not directly evaluate outcomes or effectiveness for programs delivered in North Carolina. Rather, the Results First model helps to estimate the benefits North Carolina can expect if its programs have the same impact found in previous evaluations for similar or equivalent programs. The model assumes that programs in North Carolina are being implemented with the same level of effectiveness as those in the research.

Role of OSBM & Partner Agencies

As the lead agency, OSBM facilitates the process and provides technical expertise in benefit-cost analysis and evidence-based decision-making. OSBM works with agency staff to collect information for the program inventory and benefit-cost model. Partner agencies such as DHHS provide programmatic expertise and have the primary responsibility to develop the program inventory. Partner agencies work with OSBM to estimate costs for the benefit-cost analysis and to provide other data as necessary. Along with OSBM, partner agencies review results and use them to inform how programs are designed and how resources are allocated across programs.

II. Child and Family Health Policy Area Background

Chronic Disease Outcomes

The World Health Organization (WHO) defines chronic diseases as diseases that are not communicable, develop slowly, and persist for long periods of time. The Centers for Disease Control and Prevention (CDC) defines chronic diseases as conditions that last one year or more and require ongoing medical attention or limit activity of daily living or both. The four main types of chronic diseases are cardiovascular diseases (heart attack, stroke), cancer, chronic respiratory diseases (chronic obstructive pulmonary disease, asthma), and diabetes. There are several risk factors for chronic disease that are within our control; specifically, poor nutrition, including diets low in fruit and vegetables and high in sodium and saturated fats; lack of physical activity; excessive alcohol use and tobacco use. Of the approximately 248 North Carolinians who die every day, 160 residents die as a result of a chronic disease.²

Diabetes and Obesity, Two Prevalent Chronic Diseases in North Carolina

Type 2 diabetes is marked by high levels of blood glucose (sugar) resulting from defects in the production or action of insulin, a hormone that regulates blood glucose levels. Type 2 diabetes is the leading cause of kidney failure, lower-limb amputations other than those caused by injury, and new cases of blindness among adults. Prediabetes is a condition whereby people have higher than normal blood glucose (sugar) levels, but not yet high enough to be diagnosed as diabetes. Prediabetes is a precursor of type 2 diabetes, as well as a risk factor for heart disease and stroke. With a lifestyle change program, people with prediabetes can lower their risk of developing type 2 diabetes by as much as 58%.^{3 4}

Many North Carolinians suffer from complications of overweight and obesity. North Carolina uses the Behavioral Risk Factor Surveillance System (BRFSS), a specialized survey, to monitor the health-related behavior and conditions of the state's population. According to the 2015–2016 data from this survey:

- 83% of people with diabetes are overweight or obese.
- 80% of people with high blood pressure are overweight or obese.
- 75% of people with a history of heart disease or stroke are overweight or obese.
- 77% of people with high cholesterol are overweight or obese.⁵

The basic cause of overweight and obesity is calorie (energy) imbalance whereby calorie intake is greater than calorie use. Consequently, diet (calorie intake) and physical activity (calorie use) are major determinants of overweight and obesity. In North Carolina, over half of adults (52%) do not get the recommended 150 minutes per week of moderate-intensity aerobic physical activity.⁶

Chronic Disease Prevalence in North Carolina

Outlined below is a quick look at the prevalence of the North Carolinians affected by select chronic diseases.

Obesity

The issue of excess weight and obesity continues to be one of the most pressing public health problems of our time. North Carolina had the 17th highest adult obesity rate for 2016 in the country.⁷ The percentage of North Carolina adults who are obese has more than doubled over the last two decades. In 1990, approximately 13% of adults in North Carolina were obese. In 2016, 31.8% of the North Carolina population was obese and more than two-thirds of North Carolina adults (67%) were overweight or obese.⁸ Like adults, a high percentage of North Carolina children are overweight or obese. According to

2016 child health survey data, 13% of children ages 10 through 17 were obese and another 18% were overweight based on their body mass index.⁹

Nutrition

According to the 2015 Behavioral Risk Factor Surveillance System (BRFSS), only 13% of North Carolina adults reported consuming five or more servings of fruits, vegetables, or beans recommended daily.¹⁰ North Carolina children and adolescents have similar nutritional patterns to adults. Among North Carolina high school students in 2017, 17% ate fruit or drank 100% fruit juice three or more times per day and 12% ate vegetables three or more times per day.¹¹

Physical Inactivity

Over half of North Carolina adults (52%) did not meet aerobic physical activity recommendations in 2015.¹² The 2017 America's Health Rankings report ranks North Carolina 6th in physical inactivity with a rank of 1 being the worst. Among North Carolina high school students in 2017, nearly 78% did not meet physical activity recommendations.¹³

Diabetes

Despite recent improvements in overall ranking, North Carolina still has the 17th highest prevalence of diabetes among the 50 states and the District of Columbia.¹⁴ North Carolina's prevalence of type 2 diabetes is also higher than the national average. Type 2 (or adult onset) diabetes may account for 90-95% of all diagnosed cases of diabetes and has many risk factors, including age and obesity. The prevalence of type 2 diabetes in North Carolina is also marked by significant racial, economic, and geographic disparities. In 2015, 10% of North Carolina's adults reported having been diagnosed with prediabetes, a precursor of type 2 diabetes.¹⁵ The actual statewide prevalence may be as much as 20%, since prediabetes is often undiagnosed.

Cardiovascular Disease (CVD)

Almost one in 10 North Carolina adults report a history of CVD (heart attack, coronary heart disease or stroke) according to BRFSS data collected in 2016. Approximately 3.8% of adults in the State reported a history of stroke, 4.6% reported a history of heart attack, and almost 4.7% reported a history of angina or coronary heart disease.¹⁶

Birth Outcomes

One of the key indicators of overall health of a population is its infant mortality rate. While the infant mortality rate in North Carolina declined from 10.6 deaths per 1000 live births in 1990 to its lowest rate of 7.0 in 2010, the rate has plateaued to between 7 and 7.4 for the past eight years. Moreover, since 1998 the infant mortality rate for black, non-Hispanic infants has remained at least 2.2 times higher than that for white, non-Hispanic babies (in 2017, the rates were 12.5 and 5, respectively). Similar disparities exist among American Indian babies, (2013-2017 five-year rate of 9.1), and a smaller, but present, disparity exists among Hispanic babies (2017 rate of 5.7).¹⁷

Overall for North Carolina in 2017, almost one in five infant deaths (19.6%) were due to prematurity and low birth weight, and two-thirds of all infant deaths (68%) occurred within the first 28 days after birth.¹⁸ These birth outcomes are frequently dependent on the health of the mother, both during pregnancy and over the entire life, including before her own conception. Unfortunately, more than one in five women of reproductive age in North Carolina is uninsured.¹⁹ In addition, Black, Hispanic and American Indian families in North Carolina are more than twice as likely to experience extreme poverty (below 50% of the Federal

Poverty Level) than White families.²⁰ These factors make it difficult for too many North Carolinians to access preventive services and maintain good health.

Focusing on maternal and child health and maximizing our utilization of evidence-based and evidence-informed strategies further strengthens our state's ability to improve birth outcomes. It will support goals to close birth outcome disparities, promote the growth of North Carolina's children and families, and strengthen our state's ongoing investments in health and well-being.

Role of Department of Health and Human Services and Division of Public Health

Chronic Disease Outcomes

At DHHS, the Division of Public Health (DPH)'s role is to support the work that prevents and reduces North Carolina's chronic disease burden through policy and environmental approaches that promote health as well as reinforce healthful behaviors (such as in schools and childcare, worksites, and communities), collaboration to support health system interventions, and support of strategies to improve community-clinical linkages.

While some DPH programs provide direct services to individual citizens, legal, policy and environmental approaches to promote health do not provide direct services to clients but focus on large systems changes which create opportunities for citizens to make the best choice for their health or create environments that promote health. Examples of such policy and environmental approaches to impact chronic disease in our state are:

- Smoke-free bars and restaurant legislation became effective in 2010 and was associated with a 7% risk reduction in emergency room visits for asthma.²¹
- North Carolina leads the nation in smoke-free/tobacco-free college campuses with 108 smoke-free campuses and 104 tobacco-free campuses.²²
- DPH is supporting changes to the built environment (e.g. walkable communities/bike paths) that promote physical activity.
- DPH is working with organizations and retailers to support healthy food environments that promote healthy purchases and therefore better nutrition.

Birth Outcomes

DHHS strives to assure, promote and protect the health and well-being of all North Carolinians, and one of its critical focus areas is on mothers, infants, children, and families. The agency has numerous maternal and child health programs that emphasize a "life course" approach to achieving health, and it acknowledges that adult health is a function of child health and health across generations. In other words, healthy babies are more likely to come from healthy mothers. In order to achieve those health outcomes, while also eliminating health disparities related to race/ethnicity, disability and socioeconomic status, DHHS values the use of evidence-based and evidence-informed preventive health services beginning in the pre-pregnancy period and extending throughout childhood, while also accounting for special health care needs.

To further its effectiveness, DHHS also leverages the cross-sector expertise and experience of its many partners and leaders throughout the state to improve birth, child, and family outcomes. The Perinatal Health Strategic Plan, launched in March 2016, focuses on the underlying determinants of health and equity to improve the health of women throughout their lives, which leads to healthier pregnancies and

healthier babies. DHHS is also working with stakeholders to implement the NC Early Childhood Action Plan, which focuses on three central themes: that North Carolina's young children birth to age eight are healthy, safe and nurtured, and learning and ready to succeed.

Division of Public Health Program Monitoring

DPH maintains a rigorous subrecipient monitoring program that ensures investments in evidence-based programs and services achieve the results that rigorous research indicates should occur, to ensure that the investments of state and federal resources achieve the intended outcomes. This monitoring assures, where applicable, fidelity to evidence-based program models, regular reporting of data from funding recipients, and provision of additional technical assistance to funding recipients if needed to ensure intended program outcomes and outputs are achieved. Both programmatic and fiscal reporting by funded entities occur, along with site visits, desktop audits, and other monitoring activities as needed or warranted by specific circumstances.

DPH regularly reports required data and outcomes elements to its federal funders as part of federal grants requirements. This reporting necessitates regular reporting to DPH of certain data elements by funded entities. DPH also participates in the DHHS's Open Windows performance management system. Like other DHHS divisions, DPH regularly updates performance metrics in the Open Windows system to provide stakeholders, decision makers and the public with information about performance of its funded programs and services.

Integration across Department of Health and Human Services' Programs and Services

Programs and services included in the Results First Initiative, as reflected in this report, are integrated with other programs and services within DPH. They are further integrated across DHHS programs and services. Some examples include:

- DPH Women's and Children's Health programs collaborate with:
 - DHHS Division of Mental Health (DMH) programs to address perinatal substance use.
 - DMH and Division of Social Services (DSS) programs on the DHHS Infant Plan of Safe Care and the Positive Parenting Program (Triple P).
 - NC Medicaid for access to contraception and reproductive life planning/pregnancy intendedness through national projects with the Association of State and Territorial Health Officials (ASTHO) and the CDC sponsored 6|18 Initiative.
 - NC Medicaid and Community Care of NC for care management for pregnant women and at-risk children.
 - NC Medicaid for a home visiting pilot.
- DPH Chronic Disease staff have worked with NC Medicaid:
 - To examine opportunities to promote improved outcomes in tobacco cessation and diabetes prevention thru the CDC 6|18 Initiative.
 - Through a request for proposals for Medicaid managed care, to require Managed Care Organizations to implement quality improvement projects in specific areas including tobacco cessation and diabetes prevention.

DPH programs further align with DHHS priorities which cut across multiple DHHS divisions. As previously noted, the NC Early Childhood Action Plan focuses on improving outcomes related to children's health, safety and well-being, and developmental and academic readiness, and will galvanize coordinated action

across public and private stakeholders throughout North Carolina. The Action Plan is being led by DHHS and its divisions, with support from the Office of the Governor, the Early Childhood Advisory Council, and other groups across the state.

DHHS and DPH recognize that the opportunity for health begins where we live, work, learn and play and a multifaceted approach is needed to improve the health of North Carolinians. North Carolina will launch “Healthy Opportunity Pilots” in two to four geographic areas of the state to test evidence-based interventions designed to reduce costs and improve health by more intensely addressing housing instability, transportation insecurity, food insecurity, interpersonal violence, and toxic stress for eligible Medicaid beneficiaries. Prepaid health plans will implement the pilots in collaboration with a network of human service organizations (e.g., community-based organizations and social services agencies) established and overseen by Lead Pilot Entities. Entities can refer patients to programs and services operated by DPH that address areas above.

III. Program Inventory

OSBM worked with DHHS to develop an inventory of child and family health programs that address the specified chronic disease and birth outcomes. The program inventory contains basic information on each of the identified programs in the given policy area, along with the programs’ duration, frequency, oversight agency, delivery setting, and target population.

OSBM used the program inventory to identify similar or equivalent programs that matched in the Results First Clearinghouse Database and the Results First benefit-cost model. Based on these matches, OSBM categorized programs into one of seven evidence rating levels, listed in the following table. The Results First Clearinghouse Database applies evidence rating levels to each clearinghouses’ distinct rating systems, creating a common language that allows users to quickly see what levels of evidence each program has and where each program falls on a spectrum from negative impact to positive impact. As an example, a highest rated program must demonstrate a positive impact based on the most rigorous research.

The Results First Clearinghouse Database contains information on programs from nine national clearinghouses. The clearinghouses of interest for the child and family health policy area include [What Works for Health](#) and the [California Evidence Based Clearinghouse for Child Welfare](#). OSBM also reviewed research from the [Washington State Institute for Public Policy \(WSIPP\)](#).

Results First applies the following rating levels of evidence:

Table 1: Pew-MacArthur Results First Clearinghouse Database Rating Levels

Rating Category	Definition
Highest Rated	The program had a positive impact based on the most rigorous evidence.
Second-highest Rated	The program had a positive impact based on high-quality evidence.
Insufficient Evidence	The program’s current research base does not have adequate methodological rigor to determine impact.
No Evidence of Effects	The program had no impact based on the most rigorous or high-quality evidence. That is, there was no difference in outcomes between program participants and those in the comparison group.
Mixed Effects	The program had inconsistent impacts based on the most rigorous or high-quality evidence. That is, study findings showed a mix of positive impact, no impact, and/or negative impact.
Negative Effects	The program had a negative impact based on the most rigorous or high-quality evidence.
Not Rated	The program is not in the Results First Clearinghouse Database.
Not Applicable	This category reflects a name for a collection of related programs that reflect a common goal.

Program Inventory Findings

The final Child and Family Health Inventories include 13 programs targeting chronic disease outcomes and 18 programs targeting birth outcomes. Table 2, below, shows the number of programs within each target outcome and their associated evidence rankings. For the complete Child and Family Health Inventories, please see [Appendix A: Chronic Disease Outcomes](#) and [Appendix B: Birth Outcomes](#).

Table 2: Child and Family Health Programs' Evidence Ratings

Inventory Outcome	Highest Rated	Second-highest Rated	Insufficient Evidence	No Evidence, Mixed, or Negative Effects	Not Rated	Not Applicable
Birth Outcomes	10	3	1	0	2	2
Chronic Disease Outcomes	7	1	0	0	5	0
Total	17	4	1	0	7	2

Large Proportion of Child and Family Health Programs are Highest Rated

The program inventory yielded some insights into the effectiveness and design of child and family health programs related to reducing diabetes and obesity as well as to improving birth outcomes.

As seen in Table 2, a large proportion (72%) of child and family health programs that address our target outcomes are rated as effective based on the most rigorous or high-quality evidence. Fifty-nine percent are highest-rated, while 14 percent are second-highest rated. No programs have evidence of either mixed or negative effects. Eight programs have either insufficient evidence or are not rated in the Results First Clearinghouse Database.

Two programs in the inventory were determined to be a collection of interventions or sub-programs that work towards a common goal, and thus were not appropriate to analyze through this process. Those were given a "Not Applicable" rating.

Diverse target populations and programs' geographic scope

Overall, the programs and services implemented by DPH support health promotion and disease prevention, with this report focused on birth outcomes and chronic disease. The variety of programs offered provide multiple service delivery options, which allows greater access to services. For example, some programs are delivered online, while others are delivered in person. Depending on the service area, there may not be onsite provides available. Conversely, some participants may not have access to online programs. By offering programs with various service delivery options, DPH is able to span its reach by serving more populations with diverse needs.

Of the programs supported by DHHS targeting chronic disease outcomes, 12 are offered statewide and one is offered in 27 North Carolina counties. One finding from the chronic disease inventory is that the chronic disease programs have a wide reach in terms of target populations. Programs are offered for adults at risk for diabetes as well as for adults with a diabetes diagnosis. For programs that address heart disease and stroke, DHHS offers programs that aim to reduce incidences of heart disease and stroke by targeting dental health instructors, health care providers, adults, and the public. Programs that address obesity by promoting physical activity and nutrition target elementary and middle school students, adults, and families, as well as employers and employees. Programs are delivered online as well as on-site at community settings, schools, or local health departments.

There are 18 programs supported by DHHS that specifically target birth outcomes. Eight are offered statewide with the other 10 being offered in specific counties throughout North Carolina. These programs have a wide variety of target populations that include pregnant and postpartum women, their children, their families, and their health providers. The statewide programs, such as Pregnancy Medical Home and You Quit, Two Quit, serve a wide range of pregnant women. The programs offered in specific counties, such as Baby Love Plus, often target specific populations that might have additional or specific needs such as pregnant adolescents, low-income or minority pregnant women, as well as families facing challenges such as low-income, substance abuse, mental health issues, and/or domestic violence. Programs are offered in many settings, including local health departments, homes and community settings.

IV. Benefit-Cost Analysis

Overview of Benefit-Cost Model & Definitions

The [Results First Model](#) is based on the benefit-cost model originally developed by the [Washington State Institute for Public Policy](#) (WSIPP). Results First uses WSIPP's methodology and applies it to all programs that qualify for the benefit-cost analysis. Results First helps states and counties adopt the model to their own jurisdictions, estimating a jurisdiction-specific return on investment. Only programs that have been evaluated with the highest level of rigor will match to the model. Below is a basic overview of the benefit-cost model, along with important definitions. For the full methodology on the benefit-cost analysis, please see [Appendix C](#).

Monetized Benefits

For each program in the model, WSIPP conducts a literature review of a topic area of interest. For example, with the Diabetes Prevention Program, WSIPP reviewed eight studies on lifestyle diabetes prevention programs that targeted individuals at high risk for developing type 2 diabetes. WSIPP uses these reviews to draw overall conclusions about the average effectiveness of the programs on particular outcomes.

This change in an outcome can then be monetized based on the relationship between the outcome and the associated benefit. For example, if a program reduces obesity, we can expect that participants, taxpayers, and private healthcare insurers to benefit directly in the form of increased labor market earnings, avoided healthcare expenditures, and benefits from reducing participants' risk of premature mortality. Depending on the particular outcome, the following types of avoided costs and/or benefits are computed for this policy area:

- Reduced health care utilization and reduced total costs of care.
 - Reduced hospital costs in the first year after birth for mothers and infants.
 - Reduced health care costs for health morbidity.
 - Reduced nursing home utilization.
- Increased labor market earnings from avoided health morbidity or mortality.
- Reduced risk of premature death.

The model is also able to show monetized benefits broken down by different perspectives. Included perspectives are program participants, government (taxpayers), private insurer providers, and society. Adding the distributional lens allows decision-makers to see how different groups benefit from the program. For example, a program that has a benefit of an increase in earnings will both benefit the participant in the program (increase in earnings net of taxes) and taxpayers (increase in taxes).

Monetized Costs

In order to provide comparable analysis of programs that may differ substantially in scale, the model reports the incremental, or marginal, costs and benefits of the program on a per-participant or per-unit basis. Marginal cost is defined as the direct expense of providing the program to one more additional client or unit. Marginal costs exclude "fixed" costs such as overhead and other expenses that do not vary with a moderate change in enrollment. OSBM worked with DHHS to estimate marginal costs for each of the programs in the benefit-cost model.

Benefits minus Costs

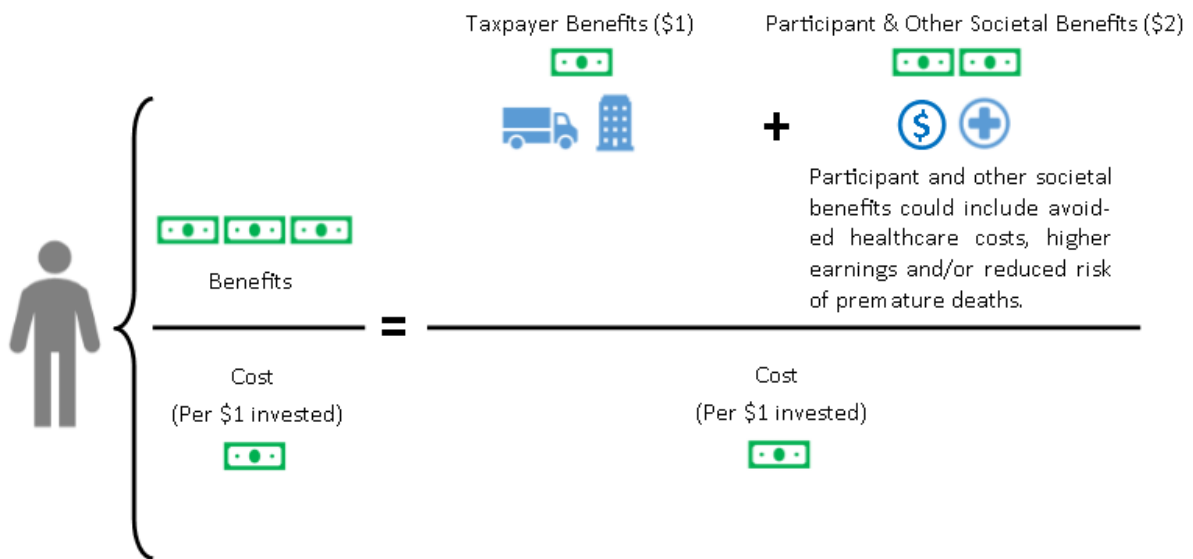
The model calculates the benefits from program participation over the lifetime of the individual and subtracts the costs of delivering the intervention to the participant. If the number is positive, it means the program has greater expected benefits than costs. If the number is negative, it means the program has greater expected costs than benefits.

Benefit-Cost Ratio

The model also calculates the benefit-cost ratio, which takes the total benefits over the total costs to come up with an expected return on investment. This ratio means “For every dollar invested, we can expect XX dollars in benefits.” If the ratio is above one, we can expect benefits greater than the costs. If the ratio is below one, we can expect costs greater than benefits. The figure below further explains the benefit-cost ratio.

Figure 2: Benefit-Cost Ratio

Hypothetical Example: Every dollar invested leads to an estimated \$1.00 in state taxpayer benefits plus \$2.00 in other state societal benefits.



Adapted from Minnesota Management and Budget.

Likelihood Benefits Exceed Costs

A risk analysis provides a measure of how confident we can be that the benefits will exceed the costs, accounting for a range of reasonable assumptions and variances. For each program, the benefit-cost model was re-run 10,000 times with random variations to test the sensitivity of the results to high and low values of key inputs. OSBM reports for each program the percentage of cases from the simulations where the benefits exceed the costs.

Benefit-Cost Analysis Limitations

The benefit-cost analysis provides valuable information on the cost-effectiveness of an individual program by comparing the costs to the total lifetime benefits generated by the program. Benefit-cost analysis can also be used to compare programs with similar objectives. Programs can be compared according to the size of the net impact (benefits minus costs), although decisionmakers should account for the strength of the evidence of effectiveness and the quality of the data available to monetize impacts. This method also identifies the distribution of the costs and benefits among different groups, such as the government, program participants, and private sector entities.

It is important, however, to note that the benefit-cost analysis is only one tool to inform decisions and that cost-effectiveness is only one of many important decision criteria. Stakeholders should also consider the local context and community needs where the program is being implemented and the goals of the individual programs. Programs with similar objectives may target very different sub-population groups or target especially high-risk or under-resourced communities. This specific targeting may account for some differences in cost-effectiveness between programs. Stakeholders should also consider what other interventions and resources are available to address the specific problem or serve unique populations. Is the program in question part of a larger suite of interventions, or is it one of the only resources available?

Furthermore, decisionmakers should understand the limitations of benefit-cost analysis. As previously discussed, program benefits and costs are monetized using existing research on the program's effectiveness, economic models of lifetime outcomes, and administrative data. While the process relies on the best data and evidence available, results are only as robust as the quality of the research, the data, and assumptions that are inputs to the model. Programs can have multiple outcomes, but if no one has measured the program's effect on specific outcomes, the full program's impact cannot be monetized. Finally, the benefit-cost analysis usually presents the effects of a singular program. It is not possible to determine the effect of receiving multiple programs unless the evaluation study was specifically designed to account for multi-program participation.

Benefit-Cost Analysis Findings

Monetization of program benefits is only possible when rigorous program evaluations are available to measure the outcomes attributable to program participation. Of the 31 programs in the inventory, it was possible to monetize the costs and benefits for six programs with birth outcomes and two programs with chronic disease outcomes. The inability to monetize outcomes at this time does not indicate that the programs are not cost-effective; more research is needed to determine the extent to which these programs produce positive outcomes. Two programs - Nurse-Family Partnership and Healthy Families America - have outcomes in the child welfare policy area and will be added once the child welfare area is complete.ⁱ

All results from the benefit-cost analysis are presented below. In addition, each of the programs in the benefit-cost model have one-page summaries with more detailed information. Each summary presents the total measured benefits, total costs, benefits minus costs, benefit-cost ratio, likelihood benefits exceed costs, and program outcomes.

Table 3: Summary of Benefit-Cost Results by Target Outcome

Program Name	Participant Benefits	Taxpayer Benefits	Other Benefits	Net Program Cost	Benefits Minus Cost	Benefit to Cost Ratio	Chance Benefits will Exceed Costs
Chronic Disease Outcomes							
Diabetes Prevention Program (DPP)	\$5,626	\$4,602	\$1,867	(\$471)	\$11,624	\$25.68	81%
Eat Smart, Move More, Weigh Less (ESMMWL)	\$648	\$364	\$141	(\$215)	\$938	\$5.36	65%
Birth Outcomes							
Adolescent Parenting Program	\$339	\$930	\$3,359	(\$7,254)	N/A	N/A	N/A
Baby Love Plus	\$1,603	\$1,025	\$15,895	(\$5,701)	\$12,822	\$3.25	100%
Centering Pregnancy	\$393	\$331	\$3,958	(\$75)	\$4,607	\$62.43	85%
Healthy Beginnings	\$1,614	\$1,026	\$16,006	(\$3,616)	\$15,030	\$5.16	100%
Pregnancy Care Management (OBCM)	\$792	\$1,113	\$7,804	(\$822)	\$8,887	\$11.81	97%
QuitlineNC for Pregnant Women	\$401	\$360	\$4,072	(\$120)	\$4,713	\$40.28	90%

ⁱAt this point, OSBM would only be able to calculate monetized benefits associated with improved birth outcomes. Since these programs also have monetized benefits associated with improved child welfare outcomes, the analysis would show an incomplete picture.

Diabetes Prevention Program (DPP)

Diabetes Prevention Program (DPP) is a 12-month diabetes prevention program targeting adults at risk for developing type 2 diabetes. Providers offer on-site, online, and combination DPP classes to adults at risk of diabetes. Trained Lifestyle Coaches lead group classes in the community, often at YMCAs or local health departments. The program requires a curriculum approved by the Centers for Disease Control and Prevention (CDC) and provides diabetes education and behavioral self-management strategies for weight loss and physical activity. Weekly classes are offered for the first six months and monthly sessions the second six months. The program currently serves approximately 1,000 people across the state annually.

Benefit-Cost Summary Per Participant (2017 Dollars)	
Benefits per participant + \$ 12,095	\$25.68 Benefit to cost ratio
Costs per participant - \$ (471)	
Benefits less costs = \$ 11,624	81% Likelihood benefits will exceed costs

Multiple rigorous studies of lifestyle diabetes prevention programs that target individuals at high risk for developing type 2 diabetes suggest that this type of program can effectively reduce weight and Hemoglobin A1c, and therefore the likelihood of developing type 2 diabetes. DPP generates on average net benefits of \$11,624 per participant. By investing in DPP, North Carolina can expect \$25.68 in return for every dollar spent on the program. When tested for the sensitivity of key inputs, we found that the program has an 81% chance of producing benefits greater than the costs. For each participant, the program breaks even within the first year. At this point, the total benefits to participants, taxpayers, and others, are equal to the cost of the program. See [Appendix C](#) for more information on the methodology.

Monetized Benefits

On average, for every individual who participates in DPP, we can expect \$12,095 in total benefits, estimated over the lifetime of the participant. Of that, participants can expect benefits of \$5,626 from avoided out-of-pocket healthcare expenditures and increased earnings. Taxpayers can expect \$4,602 in avoided costs, attributable to publicly-funded healthcare cost savings and increased tax revenue from higher earnings. The state share of the taxpayer cost savings is \$776. Private insurers can expect to save \$1,391 from reduced healthcare utilization. Society also benefits by an additional \$476 for the value of reducing the risk of mortality.

\$12,095
Benefits per participant

\$5,626	Participant benefits
\$4,602	Taxpayer benefits
\$1,391	Private insurer benefits
\$476	Indirect societal benefits

Program Outcomes Measured

- Weight Loss
- Reduction in Hemoglobin A1c

Costs

The estimated per participant cost of \$471 reflects the average cost of Lifestyle Coaches' time and travel to deliver the classes, course materials, and training. It also covers the initial eligibility screening and follow-up evaluation. The Centers for Disease Control and Prevention supplied the cost estimate. DPP per-participant costs will vary by delivery location and the chosen program delivery model. DPP is funded with participant fees provided by individuals, employers, and health insurance providers. Federal funds primarily support training and program promotion, administered by DPH.

Eat Smart, Move More, Weigh Less

Eat Smart, Move More, Weigh Less (ESMMWL) is a 15-week weight management program delivered in an interactive, real-time format by a Registered Dietician Nutritionist in online settings. The curriculum teaches participants strategies for healthy eating and physical activity behaviors through weekly one-hour sessions. Delivered by NC State University in partnership with the Division of Public Health, the program offers general enrollment and is also provided through employers and health plans. Approximately 1,845 participants enroll in the program annually, most of which are North Carolinians.

Benefit-Cost Summary Per Participant (2017 Dollars)	
Benefits per participant + \$ 1,153	\$5.36
Costs per participant - \$ (215)	Benefit to cost ratio
Benefits less costs = \$ 938	65%
	Likelihood benefits will exceed costs

Multiple rigorous studies of behavioral interventions for obesity suggest that this type of program reduces obesity. ESMMWL generates on average net benefits of \$938 per participant. By investing in ESMMWL, North Carolina can expect \$5.36 in return for every dollar spent on the program. When tested for the sensitivity of key inputs, we found that the program has a 65% chance of producing benefits greater than the costs. For each participant, the program breaks even within the first year. At this point, the total benefits to participants, taxpayers, and others, are equal to the cost of the program. Most of the benefits accrue within two years. See [Appendix C](#) for more information on the methodology.

Monetized Benefits

On average, for every individual who participates in ESMMWL, we can expect \$1,153 in total benefits, estimated over the lifetime of the participant. Of that, participants can expect benefits of \$648 from avoided out-of-pocket healthcare expenditures and increased earnings. Taxpayers can expect \$364 in avoided costs, attributable to publicly-funded healthcare cost savings and increased tax revenue from higher earnings. The state share of the taxpayer cost savings is \$70. Private insurers can expect to save \$121 from reduced healthcare utilization. Society also benefits by an additional \$20 for the value of reducing the risk of mortality.



Program Outcomes Measured

- Weight change
- Obesity
- Diastolic blood pressure
- Systolic blood pressure

Costs

The estimated per participant cost of \$215 reflects the average cost of Registered Dietician Nutritionist' time and travel to deliver the classes, course materials, and training. NC State University provided the cost estimate. ESMMWL is funded with participant fees provided by individuals, employers, and health insurance providers.

Adolescent Parenting Program (AP2)

The Adolescent Parenting Program (AP2) is a secondary prevention program that supports adolescent parents in educational attainment, job readiness, improvement of parenting skills, and prevention of future pregnancies. Pregnant or parenting teens age 19 and under and enrolled in school or GED program are eligible. A coordinator provides home visiting services, individualized goal plans, intensive case management and services, and group educational sessions to a caseload of 15 to 25 pregnant or parenting teens. Providers are required to use Partners for Healthy Baby or Parents as Teachers curricula. Adolescents typically participate in the program for 16 months. 644 adolescents were served last year.

Benefit-Cost Summary Per Participant (2017 Dollars)	
Benefits per participant	+ \$ 4,628
Education and child wellbeing	Unknown
Costs per participant	- \$(7,254)
Benefits less costs	= Unknown
N/A Benefit to cost ratio	
N/A Likelihood benefits will exceed costs	

Multiple rigorous studies of enhanced prenatal care programs for pregnant adolescents suggest that this type of program can effectively reduce risk of preterm and very low birthweight births among pregnant teens. AP2 generates benefits related to improved birth outcomes valued at \$4,628 per participant. The program costs exceed those benefits by \$2,626 per participant. This analysis, however, presents an incomplete picture of the return on investment, as the monetized benefits reflect only the program's impact on birth outcomes. One of the primary objectives of AP2 is to avoid a second pregnancy during program participation. AP2 also aims to improve high school graduation rates, employment, and parenting abilities of participants. At this time, however, we cannot say what impact AP2 has on these outcomes and any associated monetizable benefits; the research on NC's AP2 only evaluated the program's impacts on birth outcomes and secondary pregnancy. Therefore, the benefit-cost analysis is incomplete. See [Appendix C](#) for more information on the methodology.

Monetized Benefits

On average, for every adolescent who participates in AP2, we can expect \$4,628 in benefits. Of that amount, the adolescent mother and her child can expect benefits of \$339 from reduced risk of infant mortality. Taxpayers can expect \$930 in avoided costs, attributable to publicly-funded healthcare cost savings and reduced risk of infant mortality. The state government share of the taxpayer cost savings is \$287. Society also benefits by an additional \$3,359 for the value of reducing the risk of infant mortality.

<p>\$4,628 Benefits per participant</p>	\$339	Participant benefits
	\$930	Taxpayer benefits
	\$0	Private insurer benefits
	\$3,359	Indirect societal benefits

Program Outcomes Measured

- Infant mortality
- Low & very low birthweight births
- Preterm births

Costs

The estimated per participant cost of \$7,254 reflects the average cost of local program staff and supervisor time; travel; and professional development costs. It also includes costs for DPH staff time, travel, and training. AP2 is administered by DPH and is funded with federal, state and local dollars.

Baby Love Plus

Baby Love Plus is a family and infant health program that provides outreach, health education, home visits, and group education sessions to preconception, perinatal, and interconception women and men. Beginning April 1, 2019, Baby Love Plus began offering services prenatally in addition to during the preconception and interconception periods. The benefit-cost analysis was conducted based on the new requirements and expected enrollment and costs. DHHS anticipates serving 100 women during the preconception period, 300 during pregnancy, and 100 during the interconception period on an annual basis. The program will also serve at least 100 children and 100 fathers annually. Baby Love Plus is offered in four predominately rural counties where perinatal health disparities are persistently high.

Benefit-Cost Summary Per Participant (2017 Dollars)	
Benefits per participant + \$ 18,523	\$3.25 Benefit to cost ratio
Costs per participant - \$ (5,701)	
Benefits less costs = \$ 12,822	100% Likelihood benefits will exceed costs

Eight rigorous studies on prenatal home visiting programs indicate that this type of program can improve birth outcomes for pregnant women. Baby Love Plus generates on average net benefits of \$12,822 per participant. By investing in Baby Love Plus, North Carolina can expect \$3.25 in return for every dollar spent on the program. When tested for the sensitivity of key inputs, we found that the program has an 100% chance of producing benefits greater than the costs. See [Appendix C](#) for more information on the methodology.

Monetized Benefits

On average, for every expectant mother who participates in Baby Love Plus, we can expect \$18,523 in total benefits, estimated over the lifetime of the mother and child. Of that, the mother and child receive benefits of \$1,603 from reducing the risk of infant mortality. Taxpayers can expect \$1,025 in avoided costs, attributable to publicly-funded healthcare cost savings and reduced risk of infant mortality. The state share of the taxpayer cost savings is \$247. Society also benefits by an additional \$15,895 for the value of reducing the risk of infant mortality.

\$18,523

Benefits per participant

\$1,603	Participant benefits
\$1,025	Taxpayer benefits
\$0	Private insurer benefits
\$15,895	Indirect societal benefits

Program Outcomes Measured

- Adequate prenatal care
- C-sections
- Low & very low birthweight births
- Preterm births
- Small for gestational age
- Infant mortality
- NICU admission

Costs

The estimated per participant cost of \$5,701 reflects the average cost of local program staff, travel, supplies and training costs based on the anticipated enrollment. It also includes costs for DPH staff time, travel, and training. The program is funded with federal funds and administered by DPH.

Centering Pregnancy

Centering Pregnancy is a group prenatal care program that provides 10 prenatal visits to groups of eight to 10 women. Each visit is 90 minutes to two hours long. Providers and trained facilitators lead discussions and activities designed to address important perinatal health topics such as nutrition, labor and delivery, breastfeeding, and infant care. Currently, Centering Pregnancy is offered at three Division of Public Health funded sites in North Carolina, serving approximately 176 participants in FY 2017-2018.

Benefit-Cost Summary Per Participant (2017 Dollars)	
Benefits per participant + \$ 4,682	\$62.43 Benefit to cost ratio
Costs per participant - \$ (75)	
Benefits less costs = \$ 4,607	85% Likelihood benefits will exceed costs

Five rigorous studies of group prenatal care programs suggest that this type of program can improve birth outcomes for pregnant women. Centering Pregnancy generates on average net benefits of \$4,607 per participant. By investing in Centering Pregnancy, North Carolina can expect \$62.43 in return for every dollar spent on the program. When tested for the sensitivity of key inputs, we found that the program has an 85% chance of producing benefits greater than the costs. [See Appendix C](#) for more information on the methodology.

Monetized Benefits

On average, for every expectant mother who participates in Centering Pregnancy, we can expect \$4,682 in total benefits, estimated over the lifetime of the mother and child. Of that, the mother and child receive benefits of \$393 from avoided out-of-pocket healthcare expenditures from reductions in C-sections and low birthweight births, along with the associated risk of infant mortality. Taxpayers can expect \$331 in avoided costs, attributable to publicly-funded healthcare cost savings and reduced risk of infant mortality. The state share of the taxpayer cost savings is \$87. Private insurers can expect to save \$123 from reduced healthcare utilization. Society also benefits by an additional \$3,835 for the value of reducing the risk of infant mortality.

\$4,682 Benefits per participant	\$393 Participant benefits
	\$331 Taxpayer benefits
	\$123 Private insurer benefits
	\$3,835 Indirect societal benefits

Program Outcomes Measured

- C-sections
- Low birthweight births
- Preterm births
- NICU admission
- Small for gestational age
- Infant mortality

Costs

Treatment cost estimates for this program reflect the difference between the costs of serving a mother through Centering Pregnancy and the costs of standard clinical prenatal care they would otherwise receive. Centering pregnancy costs \$75 more per person on average than standard prenatal care. This additional cost is for training, supplies, and license fees. The program is funded with federal and state funds and administered by DPH.

Healthy Beginnings

Healthy Beginnings is a minority infant mortality reduction program that aims to improve birth outcomes among minority women. Healthy Beginnings provides care coordination; needs assessments and screenings; home visits; and group education. Program components include: Early and continuous prenatal care, tobacco cessation, breastfeeding, postpartum care, infant safe sleep, reproductive life planning, healthy weight, and well-child care. Most participants enroll prenatally, but up to 20% can enroll within 60-days postpartum. Participants remain in the program until their baby turns two years old. Currently, Healthy Beginnings is offered at ten sites in North Carolina, serving approximately 502 participants.

Benefit-Cost Summary Per Participant (2017 Dollars)	
Benefits per participant + \$ 18,646	\$5.16 Benefit to cost ratio
Costs per participant - \$ (3,616)	
Benefits less costs = \$ 15,030	100% Likelihood benefits will exceed costs

Several rigorous studies of prenatal home visiting programs suggest that this type of program can improve birth outcomes among pregnant women who face disproportionately higher health risks than the general population. Healthy Beginnings generates on average net benefits of \$15,030 per participant. By investing in Healthy Beginnings, North Carolina can expect \$5.16 in return for every dollar spent on the program. When tested for the sensitivity of key inputs, we found that the program has a 100% chance of producing benefits greater than the costs. See [Appendix C](#) for more information on the methodology.

Monetized Benefits

On average, for every expectant mother who participates in Healthy Beginnings, we can expect \$18,646 in total benefits, estimated over the lifetime of the mother and child. Of that, the mother and child can expect benefits of \$1,614 from reducing the risk of infant mortality. Taxpayers can expect \$1,026 in avoided costs, attributable to publicly-funded healthcare cost savings and reduced risk of infant mortality. The state government share of the taxpayer cost savings is \$247. Society also benefits by an additional \$16,006 for the value of reducing the risk of infant mortality.

\$18,646 Benefits per participant	\$1,614	Participant benefits
	\$1,026	Taxpayer benefits
	\$0	Private insurer benefits
	\$16,006	Indirect societal benefits

Program Outcomes Measured

- Adequate prenatal care
- C-sections
- Low & very low birthweight births
- Preterm births
- Small for gestational age
- Infant mortality
- NICU admission

Costs

The estimated per participant cost of \$3,616 reflects the average cost of local program staff and supervisor time, travel, supplies and professional development costs. It also includes costs for DPH staff time, travel, and training. The program is funded with federal and state funds and administered by DPH.

Pregnancy Care Management (OBCM)

Pregnancy Care Management (OBCM) is a care management program that provides prenatal care and other services for pregnant and postpartum women with high-risk pregnancies. Care Managers conduct a comprehensive medical and social assessment to identify participants' needs, develop care plans, and provide follow up services. Participants receive from four to ten face-to-face interventions and telephone calls. Typically, participants are enrolled starting with their first prenatal visit until 60 days post-partum. Pregnancy Care Management is offered statewide, serving approximately 27,868 participants.

Benefit-Cost Summary Per Participant (2017 Dollars)	
Benefits per participant + \$ 9,709	\$11.81 Benefit to cost ratio
Costs per participant - \$ (822)	
Benefits less costs = \$ 8,887	97% Likelihood benefits will exceed costs

Several rigorous studies of enhanced prenatal programs delivered through Medicaid indicate that this type of program can improve birth outcomes for pregnant women. OBCM generates on average net benefits of \$8,887 per participant. By investing in OBCM, North Carolina can expect \$11.81 in return for every dollar spent on the program. When tested for the sensitivity of key inputs, we found that the program has an 97% chance of producing benefits greater than the costs. See [Appendix C](#) for more information on the methodology.

Monetized Benefits

On average, for every expectant mother who participates in OBCM, we can expect \$9,709 in total benefits, estimated over the lifetime of the mother and child. Of that, the mother and child can expect benefits of \$792 from reducing the risk of infant mortality. Taxpayers can expect \$1,113 in avoided costs, attributable to publicly-funded healthcare cost savings and reduced risk of infant mortality. The state government share of the taxpayer cost savings is \$321. Society also benefits by an additional \$7,804 for the value of reducing the risk of infant mortality.

\$9,709
Benefits per participant

\$792	Participant benefits
\$1,113	Taxpayer benefits
\$0	Private insurer benefits
\$7,804	Indirect societal benefits

Program Outcomes Measured

- Low & very low birthweight births
- Preterm births
- Small for gestational age
- Infant mortality
- NICU admission

Costs

Treatment cost estimates for this program reflect the difference between the costs of serving a mother through OBCM and the costs of standard clinical prenatal care they would otherwise receive. OBCM costs \$822 more per person on average than standard prenatal care. This additional cost is for local program staff and supervisor time, travel, supplies, and training. It also includes costs for DPH and Community Care of North Carolina (CCNC) staff time, travel, and training. The program is funded with federal and state funds and administered by DPH.

QuitlineNC for Pregnant Women

QuitlineNC is a tobacco cessation program. Trained tobacco quit coaches provide phone-based tobacco cessation counseling services using the 5As (ask, advise, assess, assist, arrange) approach. QuitlineNC has a specific curriculum for pregnant women, which includes a 10-call protocol and relapse prevention. Pregnant women are referred to this program as part of prenatal care. During fiscal year 2017, 121 pregnant women participated in the program.

Benefit-Cost Summary Per Participant (2017 Dollars)	
Benefits per participant + \$ 4,833	\$40.28 Benefit to cost ratio
Costs per participant - \$ (120)	
Benefits less costs = \$ 4,713	90% Likelihood benefits will exceed costs

Seventeen rigorous studies of smoking cessation programs for pregnant women with intensive behavioral interventions suggest that this type of program can improve birth outcomes for pregnant women. QuitlineNC for pregnant women generates on average net benefits of \$4,713 per participant. By investing in QuitlineNC for pregnant women, North Carolina can expect \$40.28 in return for every dollar spent on the program. When tested for the sensitivity of key inputs, we found that the program has a 90% chance of producing benefits greater than the costs. See [Appendix C](#) for more information on the methodology.

Monetized Benefits

On average, for every expectant mother who participates in QuitlineNC for pregnant women, we can expect \$4,833 in total benefits, estimated over the lifetime of the mother and child. Of that, the mother and child can expect benefits of \$401 from avoided out-of-pocket healthcare expenditures from low birthweight births and the associated risk of infant mortality. Taxpayers can expect \$360 in avoided costs, attributable to publicly-funded healthcare cost savings and reduced risk of infant mortality. The state government share of the taxpayer cost savings is \$96. Private insurers can expect to save \$143 from reduced healthcare utilization. Society also benefits by an additional \$3,929 for the value of reducing the risk of infant mortality.

\$4,833 Benefits per participant	\$401 Participant benefits
	\$360 Taxpayer benefits
	\$143 Private insurer benefits
	\$3,929 Indirect societal benefits

Program Outcomes Measured

- Low birthweight births
- Regular smoking
- Smoking during late pregnancy
- Infant mortality

Costs

The estimated per participant cost of \$120 reflects the cost of the QuitlineNC 10-call program available to pregnant women. These costs are inclusive of coach salary and benefits; equipment; materials and supplies; incentives; and training. This program is funded with state and federal funds. DPH has a contract with Optum to provide these services.

V. Conclusion & Next Steps

Child and Family Health was selected as the first policy area for starting the Results First Initiative, as it builds on the work that DHHS and DPH have already done around evidence-based policymaking. DPH and DHHS at large have a history of carrying out evidence-based interventions and using a performance management framework that the Results First approach can complement. Through the Results First process, OSBM and DHHS found that a majority of their programs have been rigorously evaluated, receiving either the highest or second-highest rating. In addition, for the programs that qualified for the benefit-cost analysis, the estimated benefits generated by the program exceed the cost of implementation for seven of the eight programs. OSBM worked with DHHS to identify the following action steps based on the findings from the Results First process:

1. Seek opportunities to expand programs that are proven effective and have positive benefit-cost analysis findings: The majority of programs in the Child and Family Health program inventory had strong evidence ratings. Additionally, seven of the eight programs from the benefit-cost analysis had estimated benefits that exceed the costs. There may be opportunities where these programs can be expanded. For example, Diabetes Prevention Program (DPP) has the highest rated evidence ranking and a positive return on investment. However, it currently receives no state funding, nor is it covered by the State Health Plan or Medicaid. DHHS can use this information to communicate with decision-makers about the value of these programs and advocate for expansion for programs that may help advance the department's strategic goals. Additionally, the Results First findings can also provide insight to program participants and potential participants of the monetized benefits of utilizing these services, which could lead to program expansion. For example, highlighting to potential participants that on average, pregnant women who engage in Quitline NC can expect benefits of \$401 from avoided out-of-pocket healthcare costs, in addition to many other benefits.
2. Prioritize and evaluate programs where research is limited or outdated: A majority of the programs in the Child and Family Health Inventory have been rigorously evaluated and received the highest rating. However, through the program inventory process OSBM and DHHS found that research may be lacking, outdated or limited in scope for some of the programs. For example, research on Adolescent Parenting Program (AP2) only looked at the impacts of the program on birth outcomes and secondary births. It did not look at impacts on parenting abilities, high school graduation rates, or employment rates, all of which are primary goals of the program. Since the research only looked at birth outcomes and secondary births, we can only estimate the impact of the program on these specific outcomes and cannot ultimately complete the analysis.

While evaluation is not possible for all programs, the program inventory could help DHHS prioritize and evaluate programs where research is limited or outdated. DHHS has worked closely with its academic partners across the state to support research development relevant to its areas of work. For example, most recently, DHHS convened a group of researchers, practitioners, and DHHS representatives to collaboratively identify a prioritized list of questions, that if answered, would strengthen the state's response to the opioid epidemic. Having this shared research agenda is critical to aligning efforts and ensuring DHHS is utilizing

researchers' efforts and skills as much as possible. The Results First model could be useful in spurring a similar effort since the model requires certain research to conduct the evaluation. Knowing this information can help DHHS prioritize areas where new studies would be beneficial and work to inform researchers across the state of these needs, such as more comprehensive research on the AP2 to understand the range of benefits of the program.

3. Use Results First to help complement current strategic planning efforts: One of the benefits of the Results First inventory process is that stakeholders can see all the programs the state is investing in to target specific outcomes and the research behind those programs. In addition, the benefit-cost analysis provides valuable information on the cost-effectiveness of an individual program, which can be compared against other similar programs. It's important to note that neither tool is meant to answer everything, but rather complement current planning efforts. The Results First Initiative is a useful piece in a larger existing strategy DHHS uses to assess programs. DHHS and others can use this information to better understand the full array of available programs, where gaps in services may exist, and where to best invest limited resources. This insight all could be used to support the development and updates of future statewide action plans and strategic planning activities on related child and family health topics.

4. Incorporate Results First into DHHS's performance management framework: Investing in evidence-based programs is only one step in evidence-based policymaking. The next step is to look at whether your program is achieving the same results. DHHS has worked to build a performance management culture to support greater accountability and provide the best results and outcomes for those that receive services. DHHS has worked to develop a program and services inventory and align the budget structure to support broader strategic goals and objectives. It also has created a performance management framework that includes analyzing and reviewing its performance data as related to the goals of its strategic plan and using that data to drive improvement. Through the Results First process, OSBM and DHHS identified the following specific steps to continue its efforts in performance management:
 - i. DHHS is planning to expand and revise data points collected for the DHHS Open Window Performance Management System. This system provides information on DHHS' services, programs, grants, and contracts that support service delivery inclusive of performance measures. DHHS could also look at what the research says on outcomes from the Results First process and track performance of these outcomes to ensure it is achieving the same results.
 - ii. While the majority of programs in the benefit-cost model showed that the estimated benefits generated by the program exceeded the cost of implementation, further analysis could be done on the actual costs to see if any efficiencies could be gained. It's important to continuously monitor programs' performance and see if there are ways to achieve better or more efficient outcomes. An example could be to look at caseload requirements and whether they should be altered to achieve better results.

Appendix A: Results First Child & Family Health Program Inventory Chronic Diseases Outcomes

The Pew-MacArthur Results Initiative (Results First) helps states identify programs that are proven to work and inform policymakers and other stakeholders on how to best invest limited resources. Partnering with Results First, the Office of State Budget and Management (OSBM) works with state agencies to collect data to complete the inventory of currently funded programs, review the evidence base behind each and conduct a benefit-cost analysis.

For each policy area, OSBM publishes program inventories and reports. This inventory presents information about selected programs that have impacts on chronic disease outcomes, such as reducing the incidences of obesity and type 2 diabetes. The research includes outcomes verified by systematic reviews conducted by respected sources such as [Washington State Institute of Public Policy \(WSIPP\)](#) and [What Works for Health](#). The inventory was created in collaboration with the Department of Health and Human Services (DHHS).

Rating Category	Definition
Highest Rated	The program had a positive impact based on the most rigorous evidence.
Second-highest Rated	The program had a positive impact based on high-quality evidence.
Insufficient Evidence	The program’s current research base does not have adequate methodological rigor to determine impact.
No Evidence of Effects	The program had no impact based on the most rigorous or high-quality evidence. That is, there was no difference in outcomes between program participants and those in the comparison group.
Mixed Effects	The program had inconsistent impacts based on the most rigorous or high-quality evidence. That is, study findings showed a mix of positive impact, no impact, and/or negative impact.
Negative Effects	The program had a negative impact based on the most rigorous or high-quality evidence.
Not Rated	The program is not in the Results First Clearinghouse Database.
Not Applicable	This category reflects a name for a collection of related programs that reflect a common goal.

Other Definitions	
Source of Evidence	Source of evidence for the programs with evidence rankings. These include the Washington State Institute of Public Policy (WSIPP) and What Works for Health .
Other Evidence	Even though a program may not have a match in one of the clearinghouses or WSIPP’s meta-analyses, additional evidence may exist. Where available, DHHS experts and Results First provided additional context or research.

Results First Child & Family Health Program Inventory – Chronic Disease Outcomes

Program	Program Description	Target Population	Oversight Agency	Delivery Setting	Source of Evidence	Evidence Ranking	Other Evidence
Diabetes							
Diabetes Prevention Program (DPP)	Diabetes Prevention Program (DPP) is a 12-month diabetes prevention program. Providers offer on-site, online and combination DPP classes to adults at risk of diabetes in selected NC counties. Group classes are led by a trained Lifestyle Coach and offered in the community, often at YMCAs or local health departments. Weekly classes are offered for the first six months; and monthly sessions and phone calls for the second six months of the program. State funds primarily support training and program promotion. <u>Average Duration of the Program:</u> 12 months <u>Frequency of Service:</u> Weekly to monthly <u>Geographic Area:</u> Statewide	Adults at risk for type 2 diabetes determined by glucose testing	DHHS/ Division of Public Health	On-site and online	Lifestyle Interventions to Prevent Diabetes: Shorter-term Programs with Group-Based Counseling (WSIPP)	Highest Rated	
DPP - Eat Smart, Move More Prevent Diabetes (ESMMPD)	Eat Smart, Move More Prevent Diabetes (ESMMPD) is a 12-month online diabetes prevention program. An instructor delivers the program to adults at risk for diabetes in an interactive, real-time format. Key concepts include planning, tracking, and living mindfully to prevent diabetes. 18 sessions are offered in the program’s first six months. Eight sessions are offered in the remaining six months. The program is available for purchase nationally. <u>Average Duration of the Program:</u> 12 months <u>Frequency of Service:</u> Weekly to monthly <u>Geographic Area:</u> Statewide	Adults at risk for type 2 diabetes determined by A1c or CDC's paper risk test	DHHS/ Division of Public Health, NC State University	Online	Lifestyle Interventions to Prevent Diabetes: Shorter-term Programs with Group-Based Counseling (WSIPP)	Highest Rated	ESMMPD offers similar programming as DPP but delivery is online. An evaluation would be necessary to ensure the predicted effectiveness is achieved.
DPP - North Carolina Minority Diabetes Prevention Program (NCMDPP)	The NC Minority Diabetes Prevention Program (NCMDPP) aims to increase minority access to and participation in diabetes prevention programs. Program components include an awareness and marketing campaign in minority communities, community screenings for prediabetes and referrals, and “Prevent T2” and “Prevenga el T2” classes. Group classes are led by a trained Lifestyle Coach and offered weekly for the first six months; NCMDPP then offers	Racial and ethnic minority adults at risk for type 2 diabetes determined	DHHS	On-site	Lifestyle Interventions to Prevent Diabetes: Shorter-term Programs with Group-Based	Highest Rated	NCMDPP offers similar programming as DPP but the target population is different. An evaluation would be necessary to

Program	Program Description	Target Population	Oversight Agency	Delivery Setting	Source of Evidence	Evidence Ranking	Other Evidence
	monthly sessions and calls for the second half of the year-long program. <u>Average Duration of the Program:</u> 12 months <u>Frequency of Service:</u> Weekly to monthly <u>Geographic Area:</u> Statewide	by glucose testing			Counseling (WSIPP)		ensure the predicted effectiveness is achieved.
DiabetesSmart – Diabetes Education Recognition Program and Support (DSMES)	DiabetesSmart is a 10-hour group-based program that aims to increase access to diabetes self-management and support. Group classes are delivered in clinical or community settings to teach participants how to manage their diabetes. Participants learn how to manage blood sugar, control complications from diabetes, and keep costs down to an acceptable level for people with diabetes. An additional two hours of education are provided annually. Local health departments, pharmacies, and small clinics administer the program, while NC DHHS maintains the accreditation and provides technical assistance and training to local staff. <u>Average Duration of the Program:</u> 10 hours once per participant and additional 2 hours annually <u>Frequency of Service:</u> Varies based on instructor availability <u>Geographic Area:</u> 27 counties	Adults with a diagnosis of diabetes or whose diabetes is uncontrolled	DHHS/ Division of Public Health	On-site and telehealth where available	Chronic Disease Self-Management Programs (What Works for Health)	Highest Rated	
Heart Disease and Stroke							
Dental Professional Blood Pressure Training Curriculum	The Dental Professional Blood Pressure Training Curriculum teaches dental health instructors the basics of high blood pressure, the appropriate technique of recording blood pressure, and how to manage dental care in patients with high blood pressure. DHHS sends a printed copy of the curriculum to schools that request it. <u>Average Duration of the Program:</u> 1.5 hours <u>Frequency of Service:</u> Based on dental instructor interest <u>Geographic Area:</u> Statewide	Dental health instructors	DHHS/ Division of Public Health/ Oral Health Section	Online		Not Rated	
Health Care Provider Blood Pressure	The Health Care Provider Blood Pressure Refresher Course updates health care providers on current concepts in hypertension detection, evaluation, and treatment. It	Health care providers	DHHS/ Division of Public Health	Online		Not Rated	

Program	Program Description	Target Population	Oversight Agency	Delivery Setting	Source of Evidence	Evidence Ranking	Other Evidence
Refresher Course	provides information on accurately and reliably measuring blood pressures, properly maintaining and calibrating blood pressure equipment, and lifestyle changes to reduce high blood pressure. DHHS provides the course to providers. <u>Average Duration of the Program:</u> 1.5 hours <u>Frequency of Service:</u> Based on health care provider interest <u>Geographic Area:</u> Statewide						
Know It, Control It (KICI)	Know It, Control It (KICI) is a high blood pressure management program for adults led by trained blood pressure coaches. Participants meet in a group setting of 8 to 12 people or individually twice a month for four consecutive months. Sessions consist of blood pressure checks, training on how to self-monitor blood pressure, and education on healthy lifestyle topics. <u>Average Duration of the Program:</u> 4 months <u>Frequency of Service:</u> Weekly to bi-monthly <u>Geographic Area:</u> Statewide	Adults	DHHS/ Division of Public Health	On-site	Chronic Disease Self-Management Programs (What Works for Health)	Highest Rated	
Media Ads – Blood Pressure	The “Blood Pressure Campaign” is a media campaign aimed at NC adults with high blood pressure in the ‘stroke belt’ (East of I-95). The campaign is aimed at getting people to learn their blood pressure numbers, understand what they mean, and take steps to reach their blood pressure goals. The ads direct viewers to a web page with information and tools on how to control high blood pressure. The campaign reinforces blood pressure management programs and strategies. <u>Average Duration of the Program:</u> Varies according to funding and alignment with other initiatives or observances <u>Frequency of Service:</u> Varies according to funding and alignment with other initiatives or observances <u>Geographic Area:</u> Statewide	NC adults with high blood pressure	DHHS/ Division of Public Health	On-site and online		Not Rated	
Media Ads – Live Healthy to Be There	The “Live Healthy to Be There” is a statewide media campaign aimed at adults over 35 who are at risk for heart disease, stroke, diabetes and certain types of cancer. The campaign encourages people to visit the website to learn	Adults over 35 who are at risk for heart	DHHS/ Division of Public Health	On-site and online		Not Rated	

Program	Program Description	Target Population	Oversight Agency	Delivery Setting	Source of Evidence	Evidence Ranking	Other Evidence
	<p>steps that can be taken to decrease risk. The campaign reinforces diabetes and blood pressure prevention as well as management programs and strategies.</p> <p><u>Average Duration of the Program</u>: Varies according to funding and alignment with other initiatives or observances</p> <p><u>Frequency of Service</u>: Varies according to funding and alignment with other initiatives or observances</p> <p><u>Geographic Area</u>: Statewide</p>	disease, stroke, diabetes and certain types of cancer					
Physical Activity and Nutrition							
Active Routes to School	<p>Active Routes to School is a NC Safe Routes to School Project, where 10 project coordinators work across NC to make it easier for elementary and middle school students to safely walk and bike to school. Program activities consist of awareness events (i.e. National Bike to School Day), training on project implementation, as well as school-specific programming and policy change efforts. Coordinators also work to identify and address a safety feature near a school. The program also works within communities to identify opportunities for shared use of facilities and Complete Streets to improve access to physical activity.</p> <p><u>Average Duration of the Program</u>: N/A</p> <p><u>Frequency of Service</u>: N/A</p> <p><u>Geographic Area</u>: Statewide</p>	Elementary and middle school students	DHHS/ Division of Public Health, NC Department of Transportation	Schools	Safe routes to schools (What Works for Health)	Highest Rated	
Eat Smart, Move More, Weigh Less (ESMMWL)	<p>Eat Smart, Move More, Weigh Less (ESMMWL) is a 15-week weight management program delivered in an interactive, real-time format by a Registered Dietician Nutritionist. The curriculum teaches participants strategies for healthy eating and physical activity behaviors. The program offers general enrollment and is also provided through employers and health plans.</p> <p><u>Average Duration of the Program</u>: 15 weeks</p> <p><u>Frequency of Service</u>: 1-hour weekly session</p> <p><u>Geographic Area</u>: Statewide</p>	Adults	NC State University, DHHS/Division of Public Health	Online	Worksite obesity prevention interventions (What Works for Health)	Highest Rated	This NC-based preliminary trial shows favorable program results.

Program	Program Description	Target Population	Oversight Agency	Delivery Setting	Source of Evidence	Evidence Ranking	Other Evidence
<p>Faithful Families Eating Smart and Moving More</p>	<p>Faithful Families is a program for adults and families that promotes healthy eating and physical activity in faith communities. Nutrition and physical activity educators co-teach the nine-session curriculum in small groups with trained lay leaders from faith communities. Program facilitators implement policy and environmental changes as well as connect faith communities with relevant community and clinical programs and resources. The program is available for purchase nationally. <u>Average Duration of the Program:</u> 1 year <u>Frequency of Service:</u> Subject to instructor choice <u>Geographic Area:</u> Statewide</p>	<p>Adults with an emphasis on families</p>	<p>NC State University, DHHS/Division of Public Health</p>	<p>On-site at faith community settings</p>	<p>Community-wide physical activity campaigns (What Works for Health)</p>	<p>Second-highest Rated</p>	
<p>WorkWell NC</p>	<p>WorkWell NC is a resource developed and supported by NC DHHS that promotes and supports worksite wellness in NC. WorkWell NC provides a variety of no-cost online resources that employers, wellness leaders, and employees can use to establish, plan, implement and evaluate worksite wellness programs. Employers can use WorkWell NC to assess employee health needs with a CDC Scorecard, identify worksite and employee health resources, and improve employee health and safety. <u>Average Duration of the Program:</u> Subject to user interest <u>Frequency of Service:</u> Subject to user interest <u>Geographic Area:</u> Statewide</p>	<p>Employers and employees</p>	<p>DHHS/ Division of Public Health</p>	<p>Online</p>		<p>Not Rated</p>	

Appendix B: Results First Child & Family Health Program Inventory Birth Outcomes

The Pew-MacArthur Results Initiative (Results First) helps states identify programs that are proven to work and inform policymakers and other stakeholders on how to best invest limited resources. Partnering with Results First, the Office of State Budget and Management (OSBM) works with state agencies to collect data to complete the inventory of currently funded programs, review the evidence base behind each and conduct a benefit-cost analysis.

For each policy area, OSBM publishes program inventories and reports. This document presents the Program Inventory on selected programs that have impacts on birth outcomes, such as reducing unnecessary cesarean sections, infant mortality, low birthweight, preterm birth, small for gestational age, very low birthweight, and Neonatal Intensive Care Unit (NICU) admissions. The research includes outcomes verified by systematic reviews conducted by respected sources such as [Washington State Institute of Public Policy \(WSIPP\)](#), [What Works for Health](#), and the [California Evidence Based Clearinghouse for Child Welfare](#). The inventory was created in collaboration with the Department of Health and Human Services (DHHS). Combined with the benefit-cost analysis, the inventory may be used to better understand the programs that have impacts on birth outcomes and their levels of evidence, helping to inform program design and resource allocation across programs.

Some of DHHS' programs included in this inventory have evidence at different units of analysis. An initiative may have evidence at the "umbrella" program level, in addition to the subcomponents of individual programs. For example, Pregnancy Care Management is an umbrella program that provides care management and supportive prenatal care services, including 17P and smoking cessation. The Pregnancy Care Management program matches to Washington State Institute of Public Policy's Enhanced Prenatal Care Programs Delivered through Medicaid. In addition, individual subcomponents within Pregnancy Care Management, such as 17P, have an evidence rating in the What Works for Health Clearinghouse.

OSBM and DHHS included both units of analysis in the Program Inventory. In the Program Inventory, you will see two tables. The first table will include the list of umbrella programs and details about the available evidence of effectiveness for each umbrella program. The second table will include the list of subcomponents and details about the available evidence of effectiveness for each of the subcomponents.

In addition, some of DHHS' umbrella programs and subcomponents may have activities that address birth outcomes along with outcomes that extend beyond birth. For example, many of the home visiting programs, such as Nurse Family Partnership, have services that occur both before and after birth. OSBM worked with DHHS to include programs in the inventory if they had a primary focus on birth outcomes and/or there was research of the program demonstrating evidence of impact on birth outcomes. Programs or subcomponents that were outside of this scope were excluded from the analysis.

There are also programs (i.e. Adolescent Parenting Program) in which sites can select which curriculum will be appropriate for implementation in a community; the curricula may match to one of the clearinghouses or have other evidence.

Lastly, related programs are sometimes grouped under a common name that reflects a collective goal. In those cases, you will see N/A (not applicable) in the source of evidence, evidence ranking, and other evidence columns.

Rating Category	Definition
Highest Rated	The program had a positive impact based on the most rigorous evidence.
Second-highest Rated	The program had a positive impact based on high-quality evidence.
Insufficient Evidence	The program’s current research base does not have adequate methodological rigor to determine impact.
No Evidence of Effects	The program had no impact based on the most rigorous or high-quality evidence. That is, there was no difference in outcomes between program participants and those in the comparison group.
Mixed Effects	The program had inconsistent impacts based on the most rigorous or high-quality evidence. That is, study findings showed a mix of positive impact, no impact, and/or negative impact.
Negative Effects	The program had a negative impact based on the most rigorous or high-quality evidence.
Not Rated	The program is not in the Results First Clearinghouse Database.
Not Applicable	This category reflects a name for a collection of related programs that reflect a common goal.

Other Definitions	
Source of Evidence	Source of evidence for the programs with evidence rankings. These include the Washington State Institute of Public Policy (WSIPP) , What Works for Health and the California Evidence Based Clearinghouse for Child Welfare .
Other Evidence	Even though a program may not have a match in one of the clearinghouses or WSIPP’s meta-analyses, additional evidence may exist. Where available, DHHS experts and Results First provided additional context or research.

Results First Child & Family Health Program Inventory – Birth Outcomes
Umbrella Programs

Program	Program Description	Target Population	Delivery Setting	Source of Evidence	Evidence Ranking	Other Evidence
<p>Adolescent Parenting Program</p>	<p>The Adolescent Parenting Program (APP) is a secondary prevention program (i.e., prevention of second or higher order pregnancies) for pregnant or parenting teens. A coordinator provides home visiting services, individualized goal plans, intensive case management and services, and group educational sessions to a caseload of 15-25 pregnant or parenting teens. Providers are required to use Partners for Healthy Baby or Parents as Teachers curricula.</p> <p><u>Average Duration of Program:</u> Varies; Enter program when pregnant or parenting and remain in program until graduate from high school or GED program, or age out at age 20. Average enrollment time is 16 months.</p> <p><u>Frequency of Service:</u> At least monthly home-visiting services and quarterly group education sessions</p> <p><u>Geographic Area:</u> Alamance, Buncombe, Cabarrus, Caldwell, Catawba, Cumberland, Davidson, Edgecombe, Gaston, Guilford, Harnett, Henderson, Lee, Mecklenburg, New Hanover, Onslow, Orange, Robeson, Rockingham, Rowan, Scotland, Vance, Watauga, and Wilson counties.</p>	<p>Pregnant and parenting teens age 19 and under and enrolled in school or GED program</p>	<p>Home and community settings</p>	<p>Adolescent Parenting Program (California Evidence-Based Clearinghouse for Child Welfare)</p>	<p>Second-Highest Rated</p>	<p>Sites are required to use Parents as Teachers or Partners for a Healthy Baby curriculum</p>
<p>Baby Love Plus</p>	<p>Baby Love Plus is a family and infant health program that provides outreach, health education, home visits, and group education sessions to preconception, perinatal, and interconception women and men. Beginning April 1, 2019, Baby Love Plus began offering services prenatally in addition to during the preconception and interconception periods. Baby Love Plus is offered in four predominately rural counties where perinatal health disparities are persistently high.</p> <p><u>Average Duration of Program:</u> Varies; Can enter during preconception period through interconception.</p> <p><u>Frequency of Service:</u> Monthly group sessions and regular home visits. Home visit and other contact frequency is determined by the service delivery level and age of the child.</p>	<p>Preconception, pregnant, and interconception women, children and fathers. Priority group is African American and American Indian.</p>	<p>Home, local health departments, and various community settings</p>	<p>Other Prenatal Home Visiting Programs (WSIPP)</p>	<p>Highest Rated</p>	

Program	Program Description	Target Population	Delivery Setting	Source of Evidence	Evidence Ranking	Other Evidence
	<p><u>Subcomponents Include:</u> Breastfeeding Education and Support, Reproductive Life Planning/Effective Contraception, Safe Sleep, Tobacco Cessation and Counseling</p> <p><u>Geographic Area:</u> 4+ counties depending on funding</p>					
Centering Pregnancy	<p>Centering Pregnancy is a group prenatal care program that provides 10 prenatal visits to groups of 8-10 women. Each visit is 90 minutes to two hours long. Providers and support staff lead discussions and activities designed to address important health topics, such as nutrition, labor and delivery, breastfeeding, and infant care.</p> <p><u>Average Duration of Program:</u> 9 months</p> <p><u>Frequency of Service:</u> 10 group prenatal visits</p> <p><u>Geographic Area:</u> Alamance, Columbus, Granville, and Vance counties</p>	Pregnant women	Local health departments	Centering Pregnancy (What Works for Health)	Highest Rated	
Family Connects	<p>Family Connects is a newborn home visiting program that uses a triage model of care, providing one to three home visits to every family living within a defined service area, typically when the infant is 2 to 12 weeks old. Families with identified needs can receive further support, including additional home visits and connections to community resources for longer-term services.</p> <p><u>Average Duration of Program:</u> Initial contact is prenatal. First home visit occurs within 2 weeks of birth, lasting for about 12 weeks.</p> <p><u>Frequency of Service:</u> 1 to 3 home visits</p> <p><u>Geographic Area:</u> Durham County</p>	All newborns born in the 3 selected counties	Home	Early Childhood Home Visiting Programs (What Works for Health)	Highest Rated	WSIPP's meta-analysis shows favorable effects based on this NC study .
Healthy Beginnings	<p>Healthy Beginnings is a case management program that aims to reduce the infant mortality rate among minority babies. Healthy Beginnings provides care coordination, individualized care plans, home visits, and group education. Topics such as tobacco cessation, breastfeeding, safe sleep, reproductive life planning, healthy weight, and well-child care are covered in the group classes.</p> <p><u>Average Duration of Program:</u> Most participants enroll prenatally, but up to 20% can enroll within 60-days postpartum. Participants remain in the program until their baby turns 2 years old.</p> <p><u>Frequency of Service:</u> Monthly contacts, a minimum of 6 home visits annually, and 6 group educational sessions.</p>	Minority pregnant and postpartum women	Community and faith-based organizations, local health departments, homes, and community settings	Other Prenatal Home Visiting Programs (WSIPP)	Highest Rated	

Program	Program Description	Target Population	Delivery Setting	Source of Evidence	Evidence Ranking	Other Evidence
	<p><u>Subcomponents Include:</u> Breastfeeding Education and Support, Reproductive Life Planning/Effective Contraception, Safe Sleep, Tobacco Cessation and Counseling</p> <p><u>Geographic Area:</u> Alamance, Beaufort, Buncombe, Columbus, Forsyth, Gaston, Granville, Lee, Pitt, and Vance counties</p>					
<p>Healthy Families America (HFA)</p>	<p>Healthy Families America (HFA) is a home visiting program in which families enroll within three months after birth and can stay enrolled up until the child turns 5 years old. HFA includes screenings and assessments to determine families at risk for child maltreatment or other adverse childhood experiences; home visiting services; and routine screening for child development and maternal depression. HFA encourages local sites to implement enhancement services, such as parent support groups, that further address the specific needs of their communities and target populations.</p> <p><u>Average Duration of Program:</u> Prenatally or within 3 months after birth until the child is 3 to 5 years old</p> <p><u>Frequency of Service:</u> 1 home visit per week for the first 6 months after child’s birth; less frequent after first 6 months. Frequency is based on families’ needs and progress. Visits typically last 1 hour.</p> <p><u>Geographic Area:</u> Ashe, Burke, Mitchell, Wayne, Wilson, and Yancey counties.</p>	<p>Families facing challenges such as low-income; substance abuse; mental health issues; and/or domestic violence.</p>	<p>Home</p>	<p>Healthy Families America (What Works for Health)</p>	<p>Second-Highest Rated</p>	
<p>Improving Community Outcomes for Maternal and Child Health (ICO4MCH)</p>	<p>The Improving Community Outcomes for Maternal and Child Health (ICO4MCH) is an initiative that provides funding to local health departments to implement or expand upon at least three areas from a list of specified strategies that aim to improve birth outcomes, reduce infant mortality, and improve health among children aged 0-5. Funding currently is provided to five local health departments serving 14 counties.</p> <p><u>Average Duration of Program:</u> See specific subcomponent for more information.</p> <p><u>Frequency of Service:</u> Varies</p> <p><u>Subcomponents Include:</u> Breastfeeding Education and Support, Family Connects, Reproductive Life Planning/Effective Contraception, Tobacco Cessation and Counseling, Positive Parenting Program.</p>	<p>Preconception, pregnant and parenting families; providers</p>	<p>Clinic, home, and community</p>	<p>N/A</p>	<p>N/A</p>	

Program	Program Description	Target Population	Delivery Setting	Source of Evidence	Evidence Ranking	Other Evidence
	<p><u>Geographic Area:</u> Alleghany, Ashe, Avery, Cumberland, Durham, Hoke, Mecklenburg, Montgomery, Richmond, Robeson, Union, Watauga, and Wilkes counties</p>					
<p>Infant Mortality Reduction</p>	<p>Infant Mortality Reduction is an initiative that provides funding to local health departments in counties with the highest infant mortality rates to implement or expand upon at least one of a list of specified strategies that aim to lower infant mortality rates.</p> <p><u>Average Duration of Program:</u> See specific subcomponent for more information.</p> <p><u>Frequency of Service:</u> Varies</p> <p><u>Subcomponents Include:</u> 17P, Centering Pregnancy, Nurse Family Partnership, Reproductive Life Planning/Effective Contraception, Safe Sleep, Tobacco Cessation and Counseling</p> <p><u>Geographic Area:</u> Alamance, Anson, Beaufort, Bertie, Caldwell, Camden, Cherokee, Chowan, Cleveland, Columbus, Currituck, Forsyth, Gates, Granville, Halifax, Hertford, Lee, Lenoir, Montgomery, Pasquotank, Perquimans, Pitt, Richmond, Robeson, Rockingham, Sampson, Scotland, Swain, Vance, Warren, and Wilkes counties</p>	<p>Varies</p>	<p>Varies</p>	<p>N/A</p>	<p>N/A</p>	
<p>Nurse Family Partnership (NFP)</p>	<p>Nurse Family Partnership (NFP) is a home-visiting program aimed at improving the health and life-course of first-time, low-income mothers and their children. Registered nurses trained in the NFP model provide one-on-one home visits with participating families. During visits, nurses assess and evaluate clients; encourage positive behaviors and accomplishments; and reinforce maternal behaviors that are consistent with program goals. Topics covered include obtaining prenatal and postpartum care; parenting and caring for an infant; and development of young children.</p> <p><u>Average Duration of Program:</u> 39 weeks. Enroll by the end of 28th week of pregnancy and graduate when the child turns 2. Ideally, participants enroll early in the second trimester.</p> <p><u>Frequency of Service:</u> Weekly home visits for the first month; biweekly until the baby is born. Weekly home visits for the first 6 weeks after the baby is born; biweekly until the baby is 20 months; monthly from 20-24 months. Home visits last 60-75 minutes.</p>	<p>First-time, low-income mothers and their children up to age 2</p>	<p>Home</p>	<p>Nurse Family Partnership (What Works for Health)</p>	<p>Highest Rated</p>	

Program	Program Description	Target Population	Delivery Setting	Source of Evidence	Evidence Ranking	Other Evidence
	<u>Geographic Area:</u> Bladen, Buncombe, Cherokee, Cleveland, Columbus, Durham, Edgecombe, Forsyth, Gaston, Graham, Guilford, Halifax, Haywood, Hertford, Jackson, Macon, McDowell, Mecklenburg, Nash, Pitt, Polk, Rockingham, Robeson, Rutherford, Swain, and Wake counties.					
QuitlineNC for Pregnant Women	QuitlineNC is a tobacco cessation program. Trained tobacco quit coaches provide phone-based tobacco cessation counseling services using the 5As approach. QuitlineNC has a specific curriculum for pregnant women. Pregnant women are also referred to this program as part of prenatal care. <u>Average Duration of Program:</u> Varies <u>Frequency of Service:</u> Non-pregnant participants are offered up to 4 calls and a custom quit plan. Pregnant participants are offered a special 10-call protocol that includes relapse prevention. <u>Geographic Area:</u> Statewide	Tobacco users	Telephone counseling	Tobacco Quitlines (What Works for Health)	Highest Rated	Tobacco Quitlines does not specifically measure outcomes for pregnant women; rather for the general population.
Pregnancy Medical Home (PMH)	Pregnancy Medical Home (PMH) provides prenatal and postpartum services for pregnant women who are eligible for Medicaid. The program engages and enrolls obstetrical providers as PMHs, provides risk screenings, coordinates care with a Pregnancy Care Manager, and refers pregnant women with a high-risk condition to Pregnancy Care Management (OBCM). <u>Average Duration of Program:</u> Pregnancy until 2 months after delivery <u>Frequency of Service:</u> Varies with pregnancy risk, start of prenatal care <u>Subcomponents Include:</u> 17P, Tobacco Cessation and Counseling, Reproductive Life Planning/Effective Contraception <u>Geographic Area:</u> Statewide	Pregnant and postpartum women	Prenatal care providers including Local health departments, community health centers, and private providers		Not Rated	What Works for Health cites evidence for Medical Homes , but prenatal outcomes are not measured.
Pregnancy Care Management (OBCM)	Pregnancy Care Management (OBCM) is a care management program that provides prenatal care and other services for pregnant and postpartum women with high-risk pregnancies. Care Managers conduct a comprehensive medical and social assessment to identify participants' needs, develop care plans, and provide follow up services.	Pregnant and postpartum women who have a MIIS score over 200 (Medicaid & limited low-	Provider offices, local health departments or homes. Some contact	Enhanced Prenatal Care Programs Delivered through Medicaid (WSIPP)	Highest Rated	Two NC studies are included in WISPP's review: Hillemeier et al. (2015) and Buescher et al. (1991)

Program	Program Description	Target Population	Delivery Setting	Source of Evidence	Evidence Ranking	Other Evidence
	<p><u>Average Duration of Program</u>: Typically, first prenatal visit until 60 days post-partum</p> <p><u>Frequency of Service</u>: Depending on risk, patient receive from 4 up to 10 face-to-face interventions and telephone calls. Contacts occur every 30 days.</p> <p><u>Subcomponents Include</u>: Breastfeeding Education and Support, Reproductive Life Planning/Effective Contraception, Tobacco Cessation and Counseling</p> <p><u>Geographic Area</u>: Statewide</p>	income, uninsured women)	may be by phone.			
You Quit, Two Quit	<p>You Quit, Two Quit (YQTQ) is a tobacco cessation program that provides training and technical assistance to health care providers on tobacco screening and cessation using the 5As method (Ask, Advise, Assess, Assist, and Arrange) for women of reproductive age.</p> <p><u>Average Duration of Program</u>: 1.5 hours</p> <p><u>Frequency of Service</u>: Training provided once</p> <p><u>Geographic Area</u>: Statewide</p>	Health care providers in, federally qualified health centers, and private providers	Clinic settings	Health Care Provider Reminder Systems for Tobacco Cessation (What Works for Health)	Highest Rated	

Results First Child & Family Health Program Inventory – Birth Outcomes
Subcomponents

Program	Program Description	Target Population	Delivery Setting	Source of Evidence	Evidence Ranking	Other Evidence
<p style="text-align: center;">17 alpha-hydroxyprogesterone caproate (17P)</p>	<p>17P is a synthetic form of progesterone that has been shown to reduce the recurrence of preterm birth for women who have a history of spontaneous preterm birth. The 17P program provides consumer and provider education, technical assistance, and the injection itself. <u>Average Duration of Program:</u> Approx. 5 months between 16 weeks and 36 weeks gestation <u>Frequency of Service:</u> Approx. 20 weekly injections <u>Umbrella Program:</u> Infant Mortality Reduction, Pregnancy Medical Home <u>Geographic Area:</u> Statewide (Pregnancy Medical Home)</p>	<p>Low-income pregnant women with history of spontaneous preterm birth</p>	<p>Clinic or participant's home</p>	<p>Synthetic progesterone (17P) access (What Works for Health)</p>	<p>Insufficient Evidence</p>	<p>Note: This insufficient evidence looks at both increasing access to 17P and the injection itself.</p>
<p style="text-align: center;">Breastfeeding Education and Support</p>	<p>The Breastfeeding Education and Support program provides education, support, and referral to encourage breastfeeding initiation and maintenance for at least six months. Peer support is also provided. Social workers, community health workers, and/or outreach workers provide the services. <u>Average Duration of Program:</u> Prenatally (focus on third trimester) through the duration of breastfeeding, typically up to 6 months <u>Frequency of Service:</u> Varies <u>Umbrella Program:</u> Baby Love Plus, Healthy Beginnings, Improving Community Outcomes for Maternal and Child Health, Pregnancy Care Management <u>Geographic Area:</u> Statewide (Pregnancy Care Management)</p>	<p>Providers, businesses, community settings, and pregnant women in selected counties</p>	<p>Clinic, home, and community settings</p>	<p>Breastfeeding promotion programs (What Works for Health)</p>	<p>Highest Rated</p>	
<p style="text-align: center;">Reproductive Life Planning / Effective Contraception</p>	<p>Reproductive Life Planning/Effective Contraception is a program that encourages women and men to reflect on their reproductive intentions and find a method of contraception that is suitable for their plans. Services provided include contraceptive services, pregnancy testing and counseling, helping clients achieve pregnancy, basic infertility services, preconception health services, and sexually transmitted infections services. This also includes increasing access to long acting reversible contraception. <u>Average Duration of Program:</u> Preconception, postpartum, and interconception periods.</p>	<p>Varies</p>	<p>Program or clinic site, participants' home, or at a community location</p>	<p>Long-acting reversible contraception access (What Works for Health)</p>	<p>Second-Highest Rated</p>	

Program	Program Description	Target Population	Delivery Setting	Source of Evidence	Evidence Ranking	Other Evidence
	<p><u>Frequency of Service</u>: Varies, depends on the reproductive life plan and/or contraceptive method selected.</p> <p><u>Umbrella Program</u>: Baby Love Plus, Healthy Beginnings, Improving Community Outcomes for Maternal and Child Health, Infant Mortality Reduction, Pregnancy Care Management, Pregnancy Medical Home</p> <p><u>Geographic Area</u>: Statewide (Pregnancy Medical Home/Pregnancy Care Management)</p>					
<p>Safe Sleep</p>	<p>The Safe Sleep program provides education and outreach for parents and caregivers on safe sleep guidelines to reduce the incidence of Sudden Infant Death Syndrome (SIDS) and sleep-associated deaths.</p> <p><u>Average Duration of Program</u>: Varies - Typically occurs prenatally through the child's first year of life.</p> <p><u>Frequency of Service</u>: Varies</p> <p><u>Umbrella Program</u>: Baby Love Plus, Healthy Beginnings, Infant Mortality Reduction</p> <p><u>Geographic Area</u>: Alamance, Anson, Beaufort, Bertie, Buncombe, Caldwell, Camden, Cherokee, Chowan, Cleveland, Columbus, Currituck, Edgecombe, Forsyth, Gaston, Gates, Granville, Halifax, Hertford, Lee, Lenoir, Montgomery, Nash, Pasquotank, Perquimans, Pitt, Richmond, Robeson, Rockingham, Sampson, Scotland, Swain, Vance, Warren, and Wilkes counties</p>	<p>Varies</p>	<p>Varies</p>		<p>Not Rated</p>	<p>Program based on CDC guidelines, which cites this American Academy of Pediatrics review.</p>
<p>Tobacco Cessation & Counseling</p>	<p>Tobacco Cessation & Counseling is a program that uses the 5As method (Ask, Advise, Assess, Assist, Arrange) of tobacco cessation counseling. Providers offer interventions to pregnant smokers at the first prenatal visit, as well as throughout the course of pregnancy. Motivational interviewing is utilized, and referrals are also made to Quitline.</p> <p><u>Average Duration of Program</u>: Preconception, prenatal, postpartum, and interconception periods</p> <p><u>Frequency of Service</u>: Varies, however the method is used at each in-person visit for tobacco users.</p> <p><u>Umbrella Program</u>: Baby Love Plus, Healthy Beginnings, Improving Community Outcomes for Maternal and Child Health, Infant Mortality Reduction, Pregnancy Care Management, Pregnancy Medical Home</p> <p><u>Geographic Area</u>: Statewide (Pregnancy Medical Home/Pregnancy Care Management)</p>	<p>Pregnant and postpartum women; healthcare providers</p>	<p>Clinic and/or home setting</p>	<p>Health Care Provider Reminder Systems for Tobacco Cessation (What Works for Health)</p>	<p>Highest Rated</p>	<p>Guidelines from Agency for Healthcare Research and Quality (AHRQ)</p>

Appendix C: Benefit-Cost Analysis Methodology

Overview of the Benefit-Cost Analysis Approach

A benefit-cost analysis helps decisionmakers determine whether the value of the benefits received from an individual program are likely to exceed the costs and helps them compare the return on investment from multiple programs shown to improve selected outcomes. The benefit-cost model in its simplest form estimates the expected worth of an investment by calculating the monetary values of the outcomes of the programs minus the cost of producing the outcome. The benefits and costs are calculated over the lifetime of the program's effect.

To provide standardized comparisons of programs with different time horizons and different scales of operation, all values are expressed on a per-participant basis in present day value terms. To provide a standard comparison, the model adjusts past dollars for inflation and future dollars by a standard discount. The benefit-cost analysis also considers the monetary values of different stakeholder perspectives, including those of the program participant, state and federal governments (taxpayers), and the wider society (businesses such as insurance providers and employers, as well as the market economy at large).

After the inventory is completed and the strength of the evidence of effectiveness is identified for each program, a program's costs and benefits can be monetized. Only North Carolina programs matched to the programs in the Results First's benefit-cost model will be included in the benefit-cost analysis.

Results First's benefit-cost model was initially developed by the Washington State Institute for Public Policy (WSIPP).²³ The model was designed to produce internally consistent estimates of the benefits and costs of various public policies for the Washington State Legislature. Since 2011, Results First has partnered with WSIPP to help states and counties adopt the model and apply the model's rigorous analysis to their policy and budget decisions. WSIPP's methodology for the benefit-cost analysis is applied to all programs that qualified for the benefit-cost analysis. For more information on Washington State Institute for Public Policy (WSIPP), please see [Washington State Institute for Public Policy's](#) home page.

WSIPP uses the following steps to identify effective programs and to build the benefit-cost model:

1. Conduct a meta-analysis.
2. Calculate the size of the effect of the program on direct and indirect outcomes.
3. Monetize the benefits of expected changes in outcomes.
4. Calculate the marginal cost per participant.

To customize and operationalize the model for North Carolina programs, the agency and OSBM work together to establish the statewide baseline for outcomes of interest and calculate incremental costs of these programs, typically on a per-participant basis. After incorporating these inputs into the model, it is possible to compare the costs and benefits of programs intended to achieve a specified outcome.

Meta-Analysis

Rigorous program evaluations can help determine whether a program causes an improvement in the outcome(s) of interest, and if so, by how much. The first step in WSIPP's approach is to conduct a meta-analysis, sometimes called a "study of studies," to identify and evaluate all available research on a

particular program and to draw an overall conclusion about the average effectiveness of the program based on the findings from the most rigorous studies.

WSIPP uses the following steps in its meta-analysis:

1. Define a topic of interest (i.e. Do drug courts reduce crime? Do home visiting programs reduce child abuse and neglect?)
2. Gather all credible evaluations that have been conducted in that topic from around the U.S. and beyond. WSIPP systematically reviews all relevant research evaluations in a given topic, looking for research studies that have strong, credible evaluation designs and ignoring those with weak methods.
3. Develop an average effectiveness of a program to a specific outcome. This is computed given the weight of the most credible research.

The most important criterion for a study to be included in WSIPP's review is that the evaluation either have a control or comparison group or use advanced statistical methods to control for unobserved variables. Random assignment studies are preferred, but WSIPP also considers non-randomly assigned comparison groups. WSIPP will only include quasi-experimental studies if there is sufficient information to demonstrate the control and comparison groups are comparable on characteristics that could affect a participant's outcomes.

WSIPP does not include studies in its meta-analysis if the treatment group is made up of solely program completers. There can be unobserved self-selection factors that could distinguish program completers from dropouts, which may bias estimated treatment effects.

WSIPP includes both peer-reviewed and non-peer reviewed studies. It has been suggested that peer-reviewed studies may be biased to show positive program effects; and therefore, WSIPP will include all studies that meet its criteria, regardless of published source.

For more information on WSIPP's procedure for the meta-analysis, please see Chapter 2.2 of the [WSIPP Benefit-Cost Technical Documentation](#).

Effect Size

The second step WSIPP takes is to calculate an average effect size for a program area based on the meta-analysis. An effect size measures how much a program or policy affects an outcome. For example, if a prenatal care program reduces infant mortality rates (the change in outcomes), the effect size is the number of lives saved as a result of the program.

The effect sizes used by WSIPP are standardized statistical indices that incorporate the magnitude and direction of the impact. WSIPP takes into account the impact of the program and the variance within both the control and treatment groups. If the effect size is positive, the outcome increases. If the effect size is negative, the outcome decreases. The effect sizes can be compared between different outcomes because they are standardized. Each study provides one or more effect size.

WSIPP calculates a weighted average effect size from the studies that are rigorous enough to meet WSIPP's inclusion criteria. Those effect sizes are adjusted for the following factors:

1. Methodological quality of each study in the meta-analysis.

2. Whether the researcher(s) who conducted the study is (are) invested in the program's design and results.
3. Relevance or quality of outcome measured in the study.
4. Whether the research was conducted in a laboratory or other "non-real world" setting.
5. When a study uses a wait-list group for the comparison group, rather than a treatment-as-usual comparison group.

Estimating Monetary Benefits of Program Outcomes

As stated earlier, the benefit-cost model calculates the expected worth of an investment by calculating the net present value of a stream of benefits and costs that occur over time. The benefits are calculated by estimating the monetary values of the programs' outcomes. This is the next step in the analysis.

Programs included in the child and family health policy area are intended to improve the undesirable birth and chronic disease outcomes listed below:

- Infant mortality
- Unnecessary C-sections
- Low birthweight births
- Very low birthweight births
- Preterm births
- NICU admissions
- Small for gestational age births
- Incidence of Type 2 diabetes
- Incidence of obesity

Reducing the incidence of these birth and chronic disease outcomes results in monetizable benefits. Changes to these outcomes may be a direct or an indirect effect of the program. OSBM used North Carolina data for measuring birth outcome inputs, along with national measures for North Carolina diabetes and obesity inputs in the model. Depending on the particular outcome, the model computes the following types of avoided costs and/or benefits:

- Reduced health care utilization and reduced total costs of care.
 - Reduced hospital costs in the first year after birth for mothers and infants.
 - Reduced health care costs for health morbidity.
 - Reduced nursing home utilization.
- Increased labor market earnings from avoided health morbidity or mortality.
- Reduced risk of premature death.

OSBM used WSIPP's health care cost and mortality value estimates from national data sources. For labor market earnings, OSBM used national earnings data adjusted to reflect North Carolina wage rates.

Linkages

The benefit-cost model also identifies and monetizes "linkages" from program outcomes if sufficient research is available to support the analysis. If the program causes an outcome which is linked to another outcome, this second outcome will also be monetized. For example, there is research showing a relationship between diabetes and nursing home admissions. If a program reduces the incidence of diabetes, and therefore also reduces admissions in a nursing home, the model will estimate both the

benefits of the reduction of the incidence of diabetes, along with the linked outcome (nursing home admissions). WSIPP conducts a meta-analytic review of relevant research to identify linkages throughout the model. Linkages between birth outcomes (preterm, low birthweight, and small for gestational age) and the likelihood of infant mortality are also estimated and monetized in the model. OSBM used average North Carolina nursing home cost estimates.

WSIPP describes its methods for monetizing health care outcomes in Chapter 4.10 of the [WSIPP Benefit-Cost Technical Documentation](#).

Benefits by Perspective

In addition to calculating the impact of a program on society as a whole, benefit-cost analysis presents program impacts from different perspectives. Included perspectives are program participants, government (taxpayers), and other beneficiaries such as private insurers. Adding the distributional lens allows analysts to see how different groups benefit from the program. For example, a program that results in improved health will benefit the program participant and taxpayers through avoided healthcare expenditures.

Taxpayer benefits are comprised of impacts to the federal, state, and local governments. Taxpayer benefits are typically in the form of avoided expenditures over an individual's lifetime resulting from program participation. Such benefits could include avoided public healthcare costs or avoided criminal justice expenditures. When increased earnings are attributable to a program, taxpayer benefits could also include increased tax revenue, split between federal, state, and local entities. Importantly, taxpayer benefits are *not* cost savings associated with delivering the program, but better thought of as avoided expenses. Furthermore, the timing of these avoided expenditures is dependent upon the nature of the program outcome and varies throughout a participant's lifetime.

Calculating Marginal Cost Per Participant

In order to provide comparable analysis of programs that may differ substantially in scale, the model reports the incremental, or marginal, costs and benefits of the program on a per-participant or per-unit basis. Marginal costs typically exclude "fixed" costs, such as overhead and other expenses, that do not vary with a small to moderate change in enrollment. Compared to using an average, marginal costs and benefits are a more accurate measure of the change in resources associated with a per-person increase or decrease in the state's investment in a program. This method assumes that the state is already delivering the program consistent with program design and fidelity to the model.

Other Parameters – Base Year, Price Indices, Discount Rates, & Risk Analysis

The analysis accounts for changes in price levels over time by reporting all prices in inflation-adjusted base year 2017 dollar values. All monetary values are converted to the base year values using the Bureau of Economic Analysis' Implicit Price Deflator for Personal Consumption Expenditures price index. For health care costs, the model utilizes the BEA Implicit Price Deflator for Personal Consumption Expenditures for Health Services.

The benefit-cost model uses a range of real (inflation-adjusted) discount rates to compute how much the future costs and benefits generated by a program are worth to society today. A discount rate has a similar function to an interest rate; it accounts for time preferences (money now is preferred to money later) and for the opportunity costs of investing resources. The discounted lifetime benefits less the discounted lifetime costs – the return on investment from a program – is called the net present value. WSIPP uses a

low, real (inflation-adjusted) discount rate of 2%, a modal rate of 3.5%, and a high rate of 5%. This range is used for testing sensitivity of results to differences in these and other input choices, described in the next two paragraphs.

Monte Carlo simulations are conducted to measure the effect of assumptions and data uncertainty on benefit-cost analysis findings. The benefit-cost model is built using the best available data from North Carolina demographic and health statistics, agency administrative data, independent research findings on program benefits, and economic modeling conducted by WSIPP. However, all models require making assumptions and computations must rely on “average” or “most likely” point estimates. Monte Carlo simulations, a type of risk analysis, provide a measure of how confident we can be that the benefits will exceed the costs by accounting for a range of reasonable assumptions and variances. The Monte Carlo simulation runs the model thousands of times, each time varying multiple key inputs sampled from within the low to high end range of the values. This simulation allows analysts to see how a range of costs and benefits estimates can affect the program’s net present value, along with the likelihood that the benefits will exceed the costs.

Examples of key inputs that are varied in the Monte Carlo simulations include program effect sizes, program costs, discount rates, value of mortality risk reduction, healthcare costs by disease, and healthcare cost escalation rate. For the complete list, please see Chapter 7.1 of the [WSIPP Benefit-Cost Technical Documentation](#).

Appendix D: Endnotes

-
- ¹ The Pew-MacArthur Results First Initiative, a project of The Pew Charitable Trusts and the John D. and Catherine T. MacArthur Foundation, works with states and localities to develop the tools policymakers need to make more informed decisions, ensuring that resources are directed toward effective, cost-beneficial approaches.
- ² North Carolina Center for Health Statistics, Special data query based on NC electronic mortality data files.
- ³ National Center for Chronic Disease Prevention and Health Promotion, Division of Diabetes Translation. Prediabetes. Accessed at www.ded.gov/diabetes/basics/prediabetes.html on November 25, 2018.
- ⁴ Knowler WC, Barrett-Connor E, Fowler SE, et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med.* 2002;346(6):393-403.
- ⁵ North Carolina Center for Health Statistics. Data produced upon request, November 2017.
- ⁶ North Carolina Center for Health Statistics, 2016 Behavioral Risk Factor Surveillance System Results.
- ⁷ Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health, BRFSS Prevalence & Trends Data (online)
- ⁸ North Carolina Center for Health Statistics, 2016 Behavioral Risk Factor Surveillance System Results.
- ⁹ 2016 National Survey of Children’s Health.
- ¹⁰ North Carolina Center for Health Statistics, 2015 Behavioral Risk Factor Surveillance System.
- ¹¹ North Carolina Center for Health Statistics, 2017 Behavioral Risk Factor Surveillance System.
- ¹² North Carolina Center for Health Statistics, 2016 Behavioral Risk Factor Surveillance System Results.
- ¹³ 2016 National Survey of Children’s Health.
- ¹⁴ Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health, BRFSS Prevalence & Trends Data (online).
- ¹⁵ North Carolina Center for Health Statistics, Behavioral Risk Factor Surveillance System 2015
- ¹⁶ Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health, BRFSS Prevalence & Trends Data (online)
- ¹⁷ North Carolina Center for Health Statistics (2018), Vital Statistics, 2017 Infant Mortality Statistics for North Carolina.
- ¹⁸ Ibid.
- ¹⁹ North Carolina Center for Health Statistics (2018), 2017 NC Behavioral Risk Factor Surveillance System.
- ²⁰ US Census Bureau; 2017 American Community Survey 1-Year Estimates, Table S1703: Selected Characteristics of People at Specified Levels of Poverty in the Past 12 Months; generated for North Carolina; using American FactFinder; <<http://factfinder.census.gov>>; (18 December 2018).
- ²¹ North Carolina Department of Health and Human Services, Division of Public Health, “Evaluation of the NC Smoke-free Restaurants and Bars Law,” (December 2013), <https://www.tobacconepreventionandcontrol.ncdhhs.gov/smokefreenc/docs/ComprehensiveEvaluationoftheSmokefreeRestaurantandBarsLawFINAL-APPROVED.pdf>.
- ²² Smoke-Free and Tobacco-Free Policies in Colleges and Universities — United States and Territories, 2017/CDC *MMWR Weekly* / June 22, 2018 / 67(24);686–689
- ²³ The Pew-MacArthur Results First Initiative, Results First Cost-Benefit Model Aids Policymakers in Funding Decisions, <https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2019/05/results-first-cost-benefit-model-aids-policymakers-in-funding-decisions>