

Early Health "Pay for Success" Social Impact Finance: Scaling Up Prenatal Health Care in Virginia

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Executive Summary

The Problem

This is the latest in a series of ReadyNation papers on using Pay for Success (PFS) social impact finance to improve early child health and education outcomes. This paper focuses on using PFS finance to scale-up effective early health interventions.

PFS is a new financial and contracting arrangement that increases investment in evidence-based programs resulting in measurable social outcomes. Savings from these outcomes can repay investors and fund continued services.

ReadyNation is leading a project to provide technical assistance to state and city teams developing PFS contracts (www.ReadyNation.org/PFS).

A child's prenatal and infant months are the most important in shaping its later health, educational performance, work productivity, and lifetime success. Premature and low birth weight (LBW) infants face lifetime threats to their adult productivity. Findings from brain and child development research show that that child development is a cumulative process. What happens at the beginning and every month thereafter, effects everything that follows. And remediation costs to correct problems are far higher than the costs of doing things correctly early on.

Pre-term and LBW infants face significant risks for medical and developmental disabilities, which, as this paper discusses, saddles government and private entities with billions in additional spending from birth and infancy and throughout a child's life. In addition to health, education and welfare costs, the impaired ability of these infants to become productive young adults, increases tax burdens on citizens, and worsens emerging workforce deficits in Virginia and the United States. Though the U.S. is one of the wealthiest nations in the world, and Virginia is one of its most prosperous states, both have among the highest rates of premature and low birth LBW births in the developed world.

The major cause of preterm and LBW births is not medical, but social. Poverty, stress, alcohol and drug use, smoking, obesity, and adolescence pose the greatest risks for poor birth outcomes.

The costs of poor birth outcomes are huge, both medically and socially. Studies show that these children fare worse in school and are more likely to require special education; are less likely to attend college and enter the professional workforce; and rank in the lower third of the country in terms of income. Nationally, preterm and LBW births cost more than \$26 billion in direct medical and other costs in 2005 – implying the costs to Virginia were about \$676 million.

This is particularly troubling given the pending workforce shortages facing this nation and Virginia as a result of declining birth rates, weakening migration, and high numbers of youth who simply do not have the skills and drive necessary to succeed in the jobs required to replace retirees and support economic growth.

A Solution

One option for reversing these trends is home nurse visiting, in which nurses and peer counselors provide support and education to high-risk pregnant women in their homes. Such programs have had excellent results over the past 30 years in improving birth outcomes and long-range outcomes such as reduced teen pregnancies, child abuse, injuries treated in the emergency room, crimes and arrests, alcohol, tobacco, and drug use, and need for government assistance, among other benefits. These long-term benefits, as well as short-term reductions in medical costs resulting from healthy infants, could significantly reduce state expenditures, freeing up capital for economic, educational, and infrastructure programs.

However, only about 15% of high-risk mothers in Virginia with children under age 5 receive such services. As a consequence government expenses and tax burdens are higher than they need be.

This paper proposes an innovative approach to expand nurse visiting programs to the 73,000 high-risk pregnant women in Virginia who need these services but are not receiving them.

Using Pay for Success Finance to Pay for Home Visiting Prenatal Counseling

Pay for Success (PFS) finance can be used to pay for expanding nurse visiting programs through the Virginia's Medicaid program. Medicaid covers all low-income pregnant women in the state. PFS finance involves a partnership between philanthropic and business entities (organizers and investors) and governments to provide performance-based investments in social programs, with payments made to the investors from cost avoidance savings that governments enjoy as a result of the program, or because the program meets certain prespecified outcome improvements.

PFS finance encourages investments in cost-saving preventive services to: reduce the need for more costly remediation; establish a framework for sustained multi-year collaboration between public, private and non-profit actors to help solve complex social problems; and bring market discipline to government decisions about which programs to expand while using rigorous evaluation to advance our knowledge of which interventions are most effective.

We believe that PFS finance can work in Virginia, given the successful outcomes of a pilot program conducted by Sentara Healthcare's OPTIMA Medicaid managed care plan and the Virginia Comprehensive Health Investment Project (CHIP), a nurse visiting program. Using a foundation grant and Sentara funding, the two developed the Partners in Pregnancy (PnP) program, a community-based pregnancy care partnership based on the nurse family partnership model. Nurses and social workers provide home visitations, coordinate medical care, link families to community resources, offer education around prenatal and infant care, and encourage self-care and advocacy for this vulnerable population.

An analysis from the University of North Carolina found significant improvements in birth outcomes between the CHIP mothers and a control group, as well as significantly lower short-term costs. Overall, the analysis estimated a benefit cost ratio of 1.26, implying a 26% return on investment, even without considering cost avoidance savings beyond the first year of infancy, including savings from fewer subsequent health problems, child abuse and neglect prosecutions, and special education assignments.

Spreadsheet Model of How PFS Finance Works to Scale Up Prenatal Counseling

To enable those interested in scaling up early health interventions using PFS finance, we provide a spreadsheet model that enables users to test different project and outcome parameters and understand the mechanics of PFS finance in a detailed way, and even carry out a preliminary assessment of the financial feasibility of a specific project.

The key idea in a PFS project is that private investors (the managed care organization and/or senior and subordinated lenders) are repaid only from success payments, amounting

usually to 80% to 90% of total cost avoidance savings.

The model contains the health and cost outcomes of the PnP project and shows that when the success payment percentage is 80%, the PnP project is not feasible if funding comes only from private sources, but it is when the success payment percentage is 100%.

Further, if funding includes public sources, for example, 80% from private lenders and 20% from state government, then the project is feasible with a success payment percentage of 80% to the investor. The PnP project is feasible in the sense that total cost avoidance savings are greater than the amounts borrowed to scale up the intervention, and in the sense that the return on investor capital is competitive with alternative uses of that capital.

Under these assumptions, the return on investment to the private lenders is 11.2%. And importantly, the portion of cost avoidance retained by the state for its own uses is more than it invested in the project, resulting in a return on investment to the state of 11.2%. In this instance the state receives a positive financial return on its investment as well as the benefits of lower health, welfare and prosecution costs in the future.

By taking out the PnP data and inserting the cost and outcome data for a specific intervention, and adjusting the project parameters such as the mix of funding sources to reflect the financing terms of a proposed project, users can test in a preliminary way the financial feasibility of scaling-up the intervention using PFS finance.

Steps to Identify and Implement Early Childhood PFS Finance in Virginia

There are many challenges to implementing early health PFS finance. Identifying the obstacles and working out ways to address them will take time and may require changes in state law. These challenges include (1) the method for allocating Medicaid patients in a region, (2) the disappearance, or "churning", of Medicaid patients and reappearance of them when they need care, and (3) immediate downward adjustments in Medicaid service payments by Virginia's Department of Medicaid Assistance Services as soon as the department learns that a service or patient group is costing less.

To address these and other challenges and pursue a process of identifying and funding promising projects, we suggest a series of next steps to develop effective PFS programs in Virginia designed to improve birth outcomes, so the next generation can contribute fully to the state's economic success.

Introduction

The Institute of Medicine calls the gestational period "one of the most important predictors of an infant's subsequent health and survival."¹ Yet the United States, which spends more per capita on health care than any other developed country in the world, has one the highest infant mortality rates among those nations, and one of the highest rates of preterm (before 37 weeks) and low birth weight (less than 5.5 pounds) babies.²

These infants have significant risks for medical and developmental disabilities, which, as this paper discusses, saddles taxpayers with billions in additional spending from birth and infancy and throughout the child's life. In addition to health, education and welfare costs, the impaired ability of these infants to become productive young adults, increases tax burdens on citizens, and worsens the emerging workforce crisis in Virginia.³

This paper is latest in a series of ReadyNation research reports on early childhood social impact finance.⁴ This report presents an approach to reducing preterm and low birth weight births and paying for the interventions that bring about the reductions using "pay for success" (PFS) finance principles. The increasingly noted problem of newborn obesity is not discussed in this report, though clearly it is highly likely that what is done to improve maternal, prenatal and newborn health will mitigate obesity also.

PFS finance has many advantages. It draws on the judgment and initiative of private sector investors in combination with philanthropic institutions and local and state governments. It is based on statistical evidence of sufficient quality to persuade private investors to put their own money at risk. It provides a way to pay for needed interventions using near-term monetizable cost avoidance savings within an arrangement that provides for clear performance assessment. And it provides a framework for states to capture the longer-term benefits of outcome improvements such as fewer neglect and child abuse prosecutions, improved school-readiness, higher 3rd and 4th grade reading and math scores, higher graduation rates and improved job-readiness. While longer-term benefits are not immediately monetizable, their effects on budget and tax burdens are concrete and very important.

Together, these near-term cost avoidance and longer-term outcome improvements are the reasons why partnerships of business investors, philanthropies, and governments may be an important answer to finding what early childhood interventions work and scaling them up for full effect.

The Business Case for Improving Birth Outcomes

With good parenting, nutrition, healthcare and education, the first months and years of life translate not only into healthier children, adolescents, and adults, but into a more productive work force.

Nobel Prize winner James Heckman, PhD, the Henry Schultz distinguished service professor of economics at the University of Chicago, expresses this in the "Heckman Equation." It shows the significant effect that early childhood development has on later-life health, economic, and social outcomes for individuals and society. His research, and that of others, clearly demonstrate the substantial return on investment that comes from investing in the youngest residents—beginning in the prenatal months (Figure 1).⁵

Indeed, LBW and preterm babies have significantly increased risks of developmental, motor and social development disabilities. They are more likely to have learning disabilities, be enrolled in special education classes, have a lower IQ, and drop out of high school than children born full-term.^{6,7} These consequences and others are discussed later in this paper.

Figure 1:



Source: The Heckman Equation Brochure. Available at http://heckmanequation.org/content/resource/heckman-equation-brochure-0.

Early childhood development is so important to businesses and economic growth that the US Chamber of Commerce launched, in conjunction with ReadyNation, its Early Childhood Education Initiative (ICW) in 2010 to leverage the power of national, state, and local businesses to improve childhood education and programs, thus improving the future workforce.⁸ A ReadyNation survey showed that state Chamber of Commerce or Business Roundtables in, 49 of the 50 states have endorsed early childhood as an important public policy issue.⁹

The Virginia Chamber of Commerce has also made early childhood education a priority, including implementing private sector models such as pay for performance in publicly funded child care and early learning.¹⁰ Pay-for-performance programs, also called Pay for Success (PFS), involve partnerships between philanthropic and business entities (investors) and governments to provide performance-based investment in social programs with payments made to the investors after the program meets certain prespecified outcomes.¹¹

Why would chambers of commerce become involved with early childhood outcomes? Because of the need for a stronger workforce, particularly in Virginia.

Virginia's Workforce Challenge

There were about 4.7 million job openings in the US in late 2014, more than 100,000 in Virginia, yet many employers say they cannot fill many of them because of a "skills gap," particularly in the science, technology, engineering, and math (STEM) arenas.¹²⁻¹⁴ In addition, recent data from the Defense Department indicates that an estimated 71% of U.S young adults ages 18 to 24 cannot join the military because they lack high school degrees, clean police records, or adequate physical fitness.¹⁵ This shortage of employable people, especially people with the skills modern businesses and governments require, is a drag on growth.

"You can't work with a basic high school diploma today," said Brett Vassey, president and CEO of the Virginia Manufacturers Association. "We need middle-level skills. Sixty-five percent of our occupational demand over the next five years are positions that require middle-level skills."¹⁶

Other states are deeply concerned about workforce deficits. New York, for example, has a population of about 19.7 million and estimates that if current education and labor market trends continue, the state will face a deficit of 350,000 workers for skilled jobs by 2020 – about 1.8% of the state's population. These are the jobs requiring more than a high school diploma but less than a 4-year degree.¹⁷

Virginia is no different. Declining birth rates, weakening migration, and the possible unemployability of more than half of Virginia's young adults means that the state will not have enough productive working age people to replace retiring employees and support economic growth. Virginia's population is about 8.3 million, and over the next 10 years about 500,000 seasoned older workers will retire, but only about 340,000 employable young adults will enter the labor force. This is a deficit of about 140,000, approximately 1.7% of the state's population.¹⁶ (See Appendix A for a discussion of Virginia's workforce demographics.)

Building a Workforce: Do it Right, From the Beginning

The science of human brain development clearly demonstrates that the foundation for STEM skills and the teamwork capabilities needed for job success today are established in the first five years of life.¹⁸ Unless Virginia can build the human capital it needs to compete nationally and globally, current demographic and economic trends will continue and perhaps intensify.

As every businessperson knows, trying to fix a product at the end of producing it, or even midway, is far more expensive than making it correctly from the beginning. Applied to human capital, producing the young adults Virginia needs requires focusing on the earliest months of life and staying focused through toddlerhood, pre-kindergarten, the next 12 years of school, and job training.¹⁷

For these reasons, the Virginia Chamber of Commerce put early childhood at the top of its priorities in 2014 Blueprint Virginia, its strategic plan for the state.¹⁰ The plan represents the combined work of local and regional chambers and more than 600 organizations across the state. The highest priority: start now to build a globally competitive workforce and do it from the earliest moments of a child's life.

The Virginia Chamber developed this plan because top executives of some of the state's most far-sighted businesses, especially companies that cannot or do not want to relocate, are beginning to worry that the Commonwealth could experience a longer-term, self-amplifying negative cycle of declining economic competitiveness if it does not act now.

The reason is simple. As recent events show, Virginia's "golden

age" is over. The state's economy has, for the past 2 decades, depended heavily on three primary drivers: the military, federal contracts, and federal employment. Since 2011, however, the value of federal contracts coming into the state's northern counties has plummeted 14%, or \$11 billion, while federal employment has dropped 5%, or by 22,000 jobs. In addition, the state is still barely recovered from the recession, down 8,000 jobs overall from 2008.¹⁹

As Stephen Fuller, director of the Center for Regional Analysis at George Mason University, said about the northern Virginia region: "The region has stopped growing. High wage jobs and most new jobs are paying below the average for all jobs."²⁰

Getting Virginia back on track will require a strong, healthy workforce capable of taking on the high-tech jobs of the future.

Impact of Birth Outcomes on Workforce

The rate of preterm and LBW births can significantly impact the workforce through lost labor market and household productivity. An Institute of Medicine analysis put the cost of lost productivity related to preterm birth at \$11,214 per case, or \$5.7 billion annually (in 2005 dollars).¹

Such long-term effects primarily stem from the cognitive and behavioral deficits that often accompany preterm birth, as well as heightened health problems related to early delivery, including cerebral palsy, vision and auditory deficits, and intellectual disabilites.¹ One study found that children born prematurely had reduced memory and attention span in early adulthood, scoring an average of 8.4 points lower on IQ tests than those born full term.²¹ Others find that children born prematurely are more likely to be manual workers, less likely to have a college education, rank in the lower third of the country in terms of income, and less likely to be upwardly mobile.^{22,23}

Clearly, these deficits, and others discussed below, are detrimental to the development of the kind of workforce Virginia needs to ensure economic and social success.

Prenatal and Infant Health and Development

Research clearly demonstrates that the prenatal period followed by the first 5 years of life are, by far, the most important to future development and success.²⁴ Yet infants born prematurely or at a LBW have significant risks of physical, cognitive, social, and other developmental delays, as well as higher risks of later-life diseases and obesity.²³⁻³⁰ In 2012 (the latest year for which figures are available), 12% of live births in the US were preterm; 8% of infants were of LBW; and 1.4% were of very LBW (less than 1,500 grams).^{31,32}

These rates vary significantly by socioeconomic status, race and ethnicity, with the rate of LBW among children from lowincome families about 10% compared to the 6% rate seen in more economically advantaged families.

Low Birthweight and Preterm Births in Virginia

Virginia is a rich state, ranked 10th in the country in per capita income. Yet in 2012, 11% of the Commonwealth's 100,000 live births were preterm, while 9.7% were born at either a low birth weight, or very low birth weight (Table 1). Among African Americans, those rates were considerably higher, reflecting one of many racial and ethnic disparities in the US healthcare system.³¹ Rates were also higher for women of low socioeconomic standing.³³ As such, Virginia ranks 23rd in the country in its rate of preterm births and LBW infants.³⁴

In addition, 17% of pregnant women in Virginia do not receive prenatal care beginning in the first trimester, a figure that varies widely depending on location. In rural counties like Alleghany and Bristol, for instance, only about a third of women receive early prenatal care.³⁵ In Scott and Accomack counties, approximately half of all pregnant women did not receive first trimester care. Overall, Virginia ranks 18th out of the 50 states in terms of adequacy of prenatal care.³⁶

Yet prenatal care is essential in ensuring a healthy pregnancy and birth. Indeed, it is a Healthcare Effectiveness Data and Information Set (HEDIS) measure that many state Medicaid agencies use to evaluate quality.³⁷

Lack of prenatal care is just one reason why half or more of all births in 2008 in 73 out of 134 localities in the state were deemed "high risk." Other factors include LBW, Medicaid or self-pay status, educational status, and age.³⁸ Each year, 650 infants in Virginia under age 1 die, an infant mortality rate of 6.3%, which is higher than the national rate of 6.1%.³⁹

However, early intervention through home visiting programs like those described below can improve birth outcomes. Such programs offer a promising possibility for applying pay-forsuccess financing, as explored later in this paper.

TABLE 1: Prenatal and Birth Statistics—Virginia and the United States, 2012

Indicator	Virginia	US
Total births 40	103,013	3.9 million
Children ages 0-17 living in poverty ^{*41}	15.5%	23%
Children ages 0-17 living in extreme poverty**41	7.2%	10%
Percent of women who do not receive prenatal care in the first trimester ³⁵	17%	16.3% ²⁴
Percent of live births of women who receive late or no prenatal care (2010)	4% ⁴²	6% ⁴³
Preterm births^	11% ³⁴	12% ³²
Low birth weight	8.1%44	8% ³¹
Very low birth weight	1.6%44	1.4% ³¹
Infant mortality rate ^{#39}	6.3%	6.1%
*At or below 100% of federal poverty level (FPL)		

**50% or less than the FPL

^Birth < 37 weeks

#Deaths < 1 year of age

Consequences of Preterm/LBW Births

Although NICUs are miracles of modern medicine capable of keeping barely viable infants alive, "the need for so much intensive are for so many babies is a sign of political, medical, and moral failure in developing ways to address the problems that sustain an epidemic of prematurity."

(Lantos JD. Hooked on neonatology. *Health Aff (Millwood)*. 2001;20(5):240)

Preterm birth is the leading cause of infant deaths, accounting for 35% of neonatal mortality. It is also a major cause of longterm neurological disabilities in children, as well as a major risk factor for other medical complications.¹ Being born too early damages nearly every body organ, leading to chronic lung injury, blindness, destruction of the intestines, and brain injury.¹ Among the outcomes:

Lung injuries. Without adequate time for lung development in utero, preterm infants face a plethora of lung-related conditions. Particularly damaging is respiratory distress syndrome, an acute condition requiring mechanical ventilation, which is often followed by long-term lung damage called bronchopulmonary dysplasia. These infants are also at greater risk of respiratory infections and asthma throughout infancy and childhood, and more likely to be hospitalized with either than full-term infants.¹

Gastrointestinal complications. The immature gut of a preterm baby can result in an acute injury called necrotizing enterocolitis, when the lining of the intestinal wall dies and the tissue falls off. It typically requires surgery to remove the dead tissue and is often fatal.¹

Cardiovascular complications. Premature infants have a higher risk of patent ductus arteriosis, a congenital condition in which a heart valve doesn't close before birth, leading to heart failure and reduced blood flow throughout the body. Other cardiovascular complications include rhythm disturbances and apnea (sporadic breathing).¹

Central nervous system dysfunction. Preterm infants are extremely vulnerable to bleeding in the brain, which can cause long-term neurological dysfunction. Brain injury also contributes to their higher risk of cerebral palsy, cognitive impairment, intellectual disabilities, language disorders, attention deficit disorders, and visual problems.

Preterm infants are also more vulnerable to infections,

including sepsis, given their immature immune system. This, in turn, may lead to long lasting problems like cerebral palsy and cognitive impairment. Other conditions affecting preterm infants include anemia, a 10- to 50-fold increased risk of hearing problems, and retinopathy of prematurity (blindness).¹

Long-Term Effects of Preterm and LBW Births

The deleterious effects of a compromised fetal environment and preterm birth continue throughout a child's life. These include increased risks of obesity, cardiovascular disease, diabetes, and hypertension, and asthma, among others.^{30,45-47}

They are also more likely to be hospitalized during adolescence and adulthood for psychiatric reasons, including drug and alcohol dependency.²⁷

However, non-medical consequences are just as prevalent. As described above, children born between 34 and 36 weeks were more likely to be manual workers, less likely to have a college education, rank in the lower third of the country in terms of income, and less likely to be upwardly mobile.^{22,23}

Other research finds similar deficits in children and adults born with LBW, including poor academic performance, greater need for special education, and lower likelihood of having a professional or managerial job by age 26. They also had significantly lower incomes than those born at a healthy weight, leave home later than those born at a healthy weight, and develop intimate relationships later.^{48,49} Studies also find that LBW infants are more likely to be placed in foster care and to endure abuse, both of which are likely due to the socioeconomic environment into which they are born (recall that women of low socioeconomic status are more likely to have a LBW baby).^{50,51}

These children often experience significant problems in school, with one study of 153 children born before 28 weeks finding that just half were ready for kindergarten at age five. Studies of children born below 800 or 1000 grams (1.7 or 2.2 pounds) find that up to a third repeat a grade; 15% to 47% require special education support; and up to a fifth were in special education classes. In addition, children born prematurely or with a LBW have up to a 10-fold increased risk of learning disabilities, and higher rates of ADHD and behavioral problems.¹

Cost of Preterm/LBW Births

Given the numerous complications related to preterm and LBW births, the economic costs are astounding, responsible

for more than \$26 billion in direct medical and other costs, or \$51,600 per preterm infant, in 2005 alone.^{1,32} This includes \$16.9 billion in medical services, as well as \$611 million for early intervention services, \$1.1 billion for special education services, and \$5.7 billion in lost household and labor market productivity associated with the disabilities prevalent in preterm infants (all 2005 dollars). None of these figures include medical costs beyond early childhood, which are also significant.¹ If Virginia's 2005 costs are proportional to its share of national GDP (2.4%) or non-farm job holders (2.7%), the cost of preterm and LBW births in Virginia in 2005 was about \$676 million.

In just the first year of life, late preterm infants (those born at 33 to 36 weeks gestation) cost 3 times as much as full-term infants (\$12,247 vs \$4,069, 2005 dollars).¹

In addition, VLBW infants, which make up just 6% of all births nationally, are responsible for about 30% of all pediatric medical costs through age 7.¹

However, just a 250 gram increase in an infant's weight (about 8 ounces) saves an average of \$12,000 to \$16,000 in the first year of life; while an increase of about a pound saves \$28,000.⁵²

Risk Factors for Preterm and Low Birthweight Births

Numerous medical and social factors increase the risk of delivering a preterm or LBW infant. Most, with the exception of certain preexisting medical conditions, are modifiable, with research finding that improving these factors can significantly improve birth outcomes.¹

These include:

Alcohol consumption. Even just one drink a day throughout pregnancy increases a woman's risk of preterm birth and LBW births.⁵³⁻⁵⁵ By far the most serious consequence of heavy drinking during pregnancy is fetal alcohol syndrome disorder (FASD)–the leading known preventable cause of mental retardation in the country.⁵⁶ The condition exists on a continuum, with some children diagnosed with fetal alcohol effects (FAE) exhibiting some of the FASD characteristics but not all. Other diagnoses include alcohol-related birth defects, diagnosed in children with congenital abnormalities; and alcohol-related neurodevelopmental disorder, diagnosed in children with measurable but less intense neurobehavioral deficits than those seen in children with FAE.⁵⁷ Fetal alcohol syndrome disorder is marked by physical as well as cognitive and emotional effects. These include short eyelid openings, flat midface, thin upper lip, and a groove between the nose and upper lip. These children also have poor growth and exhibit significant cognitive and behavior problems including hyperactivity and attention problems, learning and memory deficits, and problems with social and emotional development.⁵⁷

Preventing FASD should be an economic priority given that the cost of raising a child with FASD is estimated to be 30 times higher than the cost of preventing the condition.⁵⁸

In Virginia, 7.8% of mothers consumed alcohol during pregnancy.³⁸

Drug use. Between 5% and 20% of pregnant women use illicit drugs during pregnancy, or misuse legal medications such as opioids and benzodiazepines.⁵⁹ The implications of drug use during pregnancy on the child are significant, with one study of 304 first-time mothers admitted to the hospital for mental and behavioral disorders linked to opioid or marijuana use found that they were nearly three times as likely to deliver a preterm baby, while the babies of mothers admitted to the special care nursery or NICU.⁶⁰ Another study evaluating the impact of methamphetamine use in pregnant women found their children exhibited delays in motor development during their first 3 years.⁶¹

Meanwhile, women who use cocaine during pregnancy are twice as likely to deliver prematurely as those who don't.¹ A follow-up study of children born to cocaine-using women found adverse effects on language development even at 12 years of age.⁶²

The growing epidemic of prescription drug abuse in the United States is present in pregnant women, with the number of pregnant mothers using legal opioids increasing fivefold from 2000 to 2009. Maternal and fetal withdrawal from the drugs can cause arrhythmias and hypertension in mothers and infant, fetal hypoxia, intrauterine growth retardation, preterm delivery, and fetal death. In addition, misuse of stimulants such as the ADHD amphetamine drugs significantly increase the risk of preterm and LBW births.⁵⁹

Cigarette smoking. Cigarette smoking is a leading cause of adverse birth-related outcomes, including infant mortality, preterm birth, and LBW.^{1,63} One study found that the use of cigarettes and alcohol during pregnancy had a more

deleterious effect on fetal growth than cocaine use, while another found a threefold increased risk of a LBW infants born to women who smoked during pregnancy.^{54,64} In addition, smoking during pregnancy is associated with reduced academic performance.⁶⁵

Interestingly, despite years of effort aimed at reducing smoking during pregnancy, smoking prevalence before, during, and after pregnancy has remained consistent since 2000.⁶⁶

In Virginia, 10.8% of pregnant women smoked during pregnancy in 2007.³⁸

Stress. Maternal stress due to anxiety, depression, or emotional distress is strongly linked to preterm delivery and LBW. It also impacts developmental outcomes throughout the child's lifespan.¹ In addition, major life event stressors such as divorce, death in the family, illness, injury, or unemployment, increases the risk of preterm delivery. A case control study of life stressors in African-American women found that 3 or more adverse life events experienced during pregnancy tripled the risk of a preterm birth and LBW infant.⁶⁷

In Virginia, 74% of women who had a live birth experienced one or more stressful life events in the 12 months before giving birth.³⁸

Maternal obesity. An analysis of a Swedish database containing information on more than 1.5 million pregnancies and deliveries found that overweight women (body mass index [BMI] 25 to less than 30) had a 26% increased risk of delivering prematurely. Women with a BMI of 30 to less than 35 had a 58% increased risk; those with a BMI of 35 to less than 40 a twofold increased risk of a preterm birth; and those with a BMI of 40 or more a threefold increased risk.⁶⁸

Women who are underweight when they conceive as well as those who do not gain enough weight during pregnancy also have a higher risk of preterm birth.¹

In Virginia, 22.9% of women who died from pregnancy-related causes were overweight, 43.7% of them obese. That compares to national figures of 14.5% and 28.5% respectively. The maternal mortality ratio for overweight or obese Black women was 2.2 times higher than for overweight or obese white women.³⁸

Teen births. Teen mothers are more likely to have preterm and LBW babies than older women. They are also more likely to enter prenatal care late and live in poverty, while their children

are more likely to experience abuse and neglect, and end up in foster care or with multiple caretakers.

In Virginia, 8,652 births in 2012 were to teenaged mothers (a rate of 16.7 per 1,000 women), with a live birth rate of $11.8^{.69}$

As these numbers depict, there are numerous opportunities to improve social and behavioral risk factors for preterm and LBW infants in Virginia.

Addressing Preterm and Low Birth Weight Births

There are dozens of programs available at the state and national level designed to improve prenatal health and outcomes. The focus of this paper is home visiting programs for pregnant and new mothers, but it is worth discussing a few other, more comprehensive approaches. Most of these and other approaches center around the concept of a patient-centered medical home, which provides a comprehensive suite of medical and mental health services delivered in a coordinated fashion among providers.

Strong Start for Mothers and Newborns Initiative. The Centers for Medicare and Medicaid began Strong Start in 2012. The program provides grants to states and other localities to test ways to encourage best practices for reducing the rate of early elective deliveries (those that lack medical indications) for all payers, and, of interest to this paper, to test 3 models of enhanced prenatal care for reducing preterm births among women covered by Medicaid and/or CHIP.⁷⁰ They include:

- Enhanced Prenatal Care through Centering/Group Visits – group prenatal care that incorporates peerto-peer interaction in a facilitated setting for health assessment, education and psycho-social support.
- Enhanced Prenatal Care at Birth Centers – comprehensive prenatal care facilitated by teams of health professionals including peer counselors. Services include collaborative practice, intensive case management, counseling and psychosocial support.
- Enhanced Prenatal Care at Maternity Care Homes – enhanced prenatal care including psychosocial support, education and health promotion in addition to traditional prenatal care. Services provided will expand access to care, improve care coordination and provide a broader array of health services.

First Steps. The First Steps program provides comprehensive services to Medicaid-eligible pregnant women and infants up to a year. The goal is to increase access to early prenatal care, promote healthy birth outcomes, and reduce infant morbidity and mortality. It is a comprehensive suite of services, including medical support, family planning, expedited access to alcohol and drug assessment/treatment services, counseling, case management, and care coordination.⁷¹

Changing reimbursement models. States are also experimenting with performance-based reimbursement models for physician groups that demonstrate improved entry and retention in prenatal care and improved birth outcomes. For instance, Arkansas is paying obstetricians a flat fee for all pregnancy-related care. If they meet performance targets, including low caesarian rates, they receive incentive payments or a share of cost avoidance savings.⁷²

Home Visiting Programs for Pregnant and New Mothers

Home visiting programs are designed to address the multitude of social and economic factors that contribute to poor birth outcomes. The ultimate goal is to improve medical, social, and educational outcomes. The two most prevalent models are the Nurse Family Partnership (NFP) and Healthy Families.

Table 2 depicts key differences between the two.

Nurse Family Partnership

The most well-known and replicated home visiting intervention is the Nurse-Family Partnership (NFP). The program uses specially trained, registered nurses to provide support and education to low-income, first-time mothers from the prenatal period through the child's second birthday.

David L Olds, PhD, and colleagues brought the NFP model onto the national scene in 1986 when they published the results of a randomized, controlled trial of a nurse home visiting program in Elmira, NY. They went on to conduct similar studies in Memphis and Denver, publishing dozens of evidence-based papers on outcomes as the infants of the participants grew.

Nurse family partnership programs provide nurse home visits to pregnant women with no previous live births, most of whom are low-income, unmarried, and teenagers. The nurses visit the women weekly or biweekly during their pregnancy and approximately monthly in the first two years of their children's

TABLE 2: Healthy Families America and Nurse Family Partnership

	Healthy Families America	Nurse Family Partnership
Goals	 Build and sustain community partnerships to systematically engage overburdened families in home visiting services prenatally or at birth. Cultivate and strengthen nurturing parent-child relationships Promote healthy childhood growth and development. Enhance family functioning by reducing risk and building protective factors⁷³ 	 Improve pregnancy outcomes by improving prenatal health Improve child health and development by helping parents provide more sensitive and competent care Improve parental life-course by helping parents develop a vision for their future and fulfill that vision by planning future pregnancies, completing their educations, and finding work ⁷³
Recipients	Families with at least one child and a risk of child abuse or other negative childhood outcomes.	First-time, low-income pregnant women, with first visit provided before the 28th week of pregnancy.
Services	Weekly during pregnancy. Weekly or monthly visits through the first 36 months (but may continue through the child's fifth birthday).	Weekly or biweekly during pregnancy. Weekly or monthly visits through the first 24 months of infancy.
Staffing	May be lay staff based on their knowledge of childhood development and ability to interact with the recipients	Must be a registered nurse with a four-year degree.
Flexibility	Greater flexibility in implementation at the local level	Highly structured approach designed to mimic the national model
Average duration of participation	33 weeks	55 weeks
Low Average cost per existing family	\$5,615 74	\$8,003 per family served 74

lives. They teach positive health-related behaviors, competent care of children, and maternal personal development (family planning, educational achievement, and participation in the workforce).⁷⁵

Healthy Families America

The NFP spawned several other models, some of which do not use nurses. One of the most widely used is the Healthy Families America (HFA). As described by the Coalition for Evidenced Based Policy, Healthy Families America is a flexible program model whose elements vary somewhat across state or local HFA programs. The program offers weekly home visits from trained paraprofessionals to families with a high risk of child abuse. The goal is to help families manage life's challenges and, in addition to home visits, may include parent support groups, job training, and other services.⁷⁵

Unlike the NFP model, HFA programs enroll most of their clients after they have had at least one child, while NFP only enrolls first-time pregnant women. Participants in the HFA program receive weekly or monthly visits through the child's third birthday (weekly during pregnancy) and as needed through age five, while those in NFP receive visits through the child's second birthday, with weekly or biweekly visits during pregnancy.⁷³

Impact of Home Visiting on Preterm and Low Birth Weight Deliveries

One of the first studies on the potential of home visiting programs to prevent LBW deliveries was published in 1996. An intervention group of 114 high-risk African-American pregnant women receiving Medicaid was randomly selected to receive in-person visits and telephone calls from registered nurses and peer counselors. A comparable-size control group of pregnant women was also randomly selected. The rate of LBW in the intervention group was 9.1% compared to 22.4% in the control group.⁷⁶

Only one of the Olds et al studies, however, demonstrated a reduction in LBW infants. The reduction was only in women who smoked and in adolescent mothers, both of which are risk factors for preterm and LBW infants. The nurse-visited adolescents gave birth to infants that were, on average, 395 g heavier than those in the age-matched comparison group, while just 2% of infants born to the nurse-visited smokers were preterm compared to 10% of those born to smokers in the control group.⁷⁷

Other studies, however, attest to the benefits of home visiting programs on births. One program that randomized 501 women to either bi-weekly home visitation services from specially trained neighborhood women or a control group found that the intervention group was nearly half as likely to deliver a LBW infant than the control group; 32% less likely if the intervention began at week 24 or less of pregnancy. There was, however, no significant difference in preterm births.⁵⁰

In Oklahoma, an analysis of birth records comparing outcomes in women who participated in the Children First nurse home visiting program and those who did not found that unmarried participants experienced preterm delivery rates 21% lower than the control group; LBW rates 23% lower; and infant mortality rates 64% lower, all statistically significant.⁷⁸

A comparison of Arizona's Healthy Start program with a control group also demonstrated significantly lower rates of LBW infants, particularly in Hispanic women. The authors suggest that one reason for the improvement was less cigarette smoking in the intervention group, again highlighting the importance of smoking cessation on birth outcomes.⁷⁹

TABLE 3: Outcomes from Nurse Family Partnership Programs

A 2013 report that analyzed data from 30 NFP evaluation reports identified the following expected outcomes when first-time, low-income mothers received services:⁸⁰

24% reduction in tobacco smoked

27% reduction in pregnancy-induced hypertension

28% reduction in preterm births

60% reduction in risk of infant death

31% reduction in births within 2 years postpartum

- 31% reduction in second teen births
- 14% increase in attempted breastfeeding
- 38% reduction in injuries treated in the emergency room (birth to 2 years)
- 38% reduction in child maltreatment through age 15
- 38% reduction in language delay
- 46% reduction in crimes and arrests, ages 11-17
- 53% reduction in alcohol, tobacco, and marijuana use, ages 12-15
- 23% increase in full immunization, ages 0-2
- 7% reduction in TANF payments through year 9 post-partum
- 9% reduction in food stamps through at least year 10 post-partum
- 7% reduction in use of Medicaid coverage through at least year 15 post-partum due to reduced births and increased program graduation

The authors concluded that: "On average, enrolling 1,000 low-income families in NFP will prevent 78 preterm births, 73 second births to young mothers, 1,080 child maltreatment incidents, 2,660 crimes by youth, 180 youth arrests, 230 personyears of youth substance abuse, and 3.4 infant deaths."⁸⁰

TABLE 4: Selected Outcomes from the Elmira, Memphis, and Denver Nurse Family Partnership Interventions

Women in the NFP Program:

- Experienced fewer instances of pregnancy-induced hypertension (PIH) than a control group, and those that did develop PIH had less severe forms⁸¹
- Were half as likely as those who in the control group to be involved in any child abuse and neglect by the time their child turned 15⁸²
- Were significantly less likely receive welfare and food stamps, to be arrested, to experience behavioral impairments due to substance abuse, and to have another child⁸¹
- Waited an average of 65 months after the birth of their first compared to 37 months in the control group. (Research shows that an interval of 24 months between births is ideal for the health of the mother and also for the development of the child)⁸²
- Followed improved diets during pregnancy, smoked 25% fewer cigarettes by the 34th week of pregnancy, and experienced greater social support and used more formal community services than those in the control groups⁸³
- Experienced reduced rates of preterm infants (in smokers)⁷⁷

Figure 2:



Total \$20,965 (Present Value at a 3% Discount Rate)

Source: Miller TR. Nurse-Family Partnership Home Visitation: Costs, Outcomes, and Return on Investment. HBSA, Inc. 2013.

TABLE 5: Long-term Outcomes of Children Born to Mothers in the NFP Program

Children born to mothers in the NFP program:

- Had 23% fewer injuries or ingestions through year 2 that required medical intervention than children in the control group, and were hospitalized less often and for fewer days⁸⁴
- Had higher IQs and fewer behavior problems by age 7 than the control group⁸⁵
- Were less likely to run away or be arrested or convicted of a crime by age 15 than those in the control group⁸³
- Had fewer sex partners by age 15 and fewer days of alcohol use⁸³
- Were significantly less likely to have been arrested or convicted of a crime by age 19 if they were female. The daughters of nurse-visited, unmarried and low-income women also had fewer children and less Medicaid use than the control group. However, there were no similar outcomes for boys⁸⁶

Meanwhile, an analysis of evaluation reports from 30 NFP programs found a 28% reduction in preterm births and a 60% reduction in risk of infant death (Table 3).⁸⁰ Other outcomes from the Olds' studies are shown in Table 4, while long-term outcomes in the children born to mothers in the program are shown in Table 5.

Studies also find significant reductions in admissions to the neonatal intensive care unit (NICU) or other inpatient settings as well as shorter lengths of stays for infants born to mothers participating in home visiting programs. One study found a home visiting program reduced NICU admissions 47%, while another for women pregnant with twins reported NICU lengths of stay 54% shorter and mean hospital charges 65% lower than a similar group that did not receive home visiting services.^{87,88}

Return on Investment from Home Visiting Programs

Estimates of the return on investment for home-visiting programs vary. Most of the HFA evaluations focus on reducing neglect and maltreatment rather than improving birth outcomes. One study that did measure the effect of the

Figure 3:





Source: Miller, T. R. (May 2014). Life Status and Financial Outcomes of Nurse-Family Partnership in Texas. Pacific Institute for Research and Evaluation.

Figure 4:



*Present value computed at 3% discount rate

Source: Miller, T.R. (September 2012). Nurse-Family Partnership Home Visitation: Costs, Outcomes, and Return on Investment. Executive Summary. H.B.S.A., Inc., PIRE

program on LBW found a statistically significant reduction in the incidence of LBW (from 10% to 5%), but no significant effect on the rate of preterm or LBW births.⁷⁵

For NFP, an analysis of several randomized, controlled trials conducted by Washington State Institute for Public Policy estimated a return on investment of \$17,180 (at a cost of \$9,118) for every child served by an NFP program (in 2003 dollars).⁸⁹

The analysis of 30 NFP evaluation reports referenced earlier⁸⁰ also found a substantial return on investment, with federal savings exceeding the cost of the program by the time the child turned 7, and state savings exceeding costs by age 10. Medicaid accounted for more than half of the overall savings (Figure 2).

A report on outcomes through year 12 in the Memphis NFP study found less spending on food stamps, Medicaid, welfare, and Temporary Assistance for Needy Families (TANF) for the nurse-visited families compared to the control families (\$8,772 vs \$9,797).⁹⁰ The analysis estimated a benefit to society per NFP family served of \$81,656, yielding a benefit-to-cost ratio of 9.5:1

Meanwhile, a 2014 evaluation of a statewide Texas NFP program found savings of \$1.78 million in tangible and intangible prevented costs of harm (Figure 3), including \$1.89 million in premature births and \$1.9 million in reduced preeclampsia (a dangerous condition that requires immediate delivery of the baby). Cumulative state and federal costs and savings through age 18 are shown in Figure 4.⁹¹

A major financial impact from such programs comes from their ability to prevent child abuse and maltreatment, which carries an average lifetime cost per child of \$210,012 (in 2010 dollars).⁷⁴

Home Visiting Programs and the Affordable Care Act

The success of programs like the NFP and HFA led to the inclusion of \$1.5 billion in the Affordable Care Act (ACA) to create the Maternal, Infant, and Early Childhood Home Visiting (MIECHV) program. The program provides grants to states to deliver evidence-based interventions to high-risk pregnant women, new mothers, infants, and young children in home and community settings. The ACA requires that 75% of grantee funds be used for home visiting program models with evidence of effectiveness based on rigorous evaluation research. The rest of the grant may be used for demonstration projects.⁹³

Challenges with Home Visiting Programs

Evaluations of various home visiting programs, including the NFP, highlight several challenges that, as one reviewer noted, "must be improved if these programs are to become truly responsive to the needs of a broad array of disadvantage families with young children and, in turn, produce stronger, more consistent, and sustainable outcomes."⁹² These include:

- Evaluations of various home visiting programs, including the NFP, highlight several challenges that, as one reviewer noted, "must be improved if these programs are to become truly responsive to the needs of a broad array of disadvantage families with young children and, in turn, produce stronger, more consistent, and sustainable outcomes."⁹² These include:
- Developing and delivering the services in the context of the environment in which the families live
- Integrating the changing economic environment (particularly the demise of traditional welfare and the pressure for new mothers to return to the workforce) into program development
- Developing strong relationships and collaboration with other service providers in the community
- Providing sensitivity and respect for each family's cultural traditions and values
- Recognizing the need for flexibility in terms of the number, frequency, duration, and focus of visits to correspond to the individual family needs
- Engaging other family members, including fathers and other children

As of 2013, the Department of Health and Human Services (HHS) recognized 14 home-visiting program models that met criteria for being an "evidence-based model" for families with young children, including the NFP and HFA models.⁹⁴

That year, the Advisory Committee on Infant Mortality for HHS recommended enhancing the role of home visiting programs in supporting prenatal health, calling it as an "important part of any national strategy to reduce infant mortality."⁹⁵

Since the MIECHV began in 2010, it has been implemented in 544 communities in 50 states, the District of Columbia, and 5 US territories to serve about 15,000 families.⁹⁶ In 2014, Congress extended funding through March 2015.

Eighteen home-visiting programs serving 25 localities in Virginia have received more than \$5.7 million in MIECHV funding.⁹⁷

Using Pay-for-Success to Scale Up Home Visiting Programs

Pay for Success (PFS) financing involves a partnership between philanthropic and business entities (investors) and governments to provide performance-based investments in social programs, with payments made to the investors from cost avoidance savings that governments enjoy as a result of the PFS project, or because the project meets certain prespecified outcome improvements.¹¹

PFS encourages investments in cost-saving preventive services to reduce the need for more costly remediation; establish a framework for sustained multi-year collaboration between public, non-profit and for-profit actors to help solve complex social problems; and bring market discipline to government decisions about which programs to expand while using rigorous evaluation to advance our knowledge of which interventions are most effective.

Figure 5 describes a PFS structure.

For a brief review of PFS social impact finance, see Appendix B: Pay for Success Social Impact Finance Basics: Organization, Funds Flows and Examples.

"Success" within the PFS model is based on two ideas: <u>cost</u> <u>avoidance</u> and <u>outcome improvement</u>.

Riker's Island Project: Addressing NYC Adolescent Incarceration

- Goldman Sachs funds the project's delivery and operations through a \$9.6 million loan to MDRC;
- Bloomberg Philanthropies provides a \$7.2 million grant to MCRD to guarantee a portion of the investment;
- MDRC oversees the day-to-day implementation of the project and manages the Osborne Association and Friends of Island Academy, the two non-profit service providers that deliver the intervention;
- The Vera Institute of Justice, an independent evaluator, determines whether the project achieves the targeted reduction in re-incarceration;
- The Department of Correction pays MDRC based on reduced re-admissions and the associated cost savings and MDRC then pays the private investor.

"Cost avoidance" refers to actual reductions in government operating costs resulting from an intervention. One example is a reduction in hospital NICU costs associated with fewer preterm and LBW infants, which frees up funds for "success payments" to investors. Cost avoidance savings not paid to investors can be retained by the government entity.

"Outcome improvement" refers to measured improvements in pre-identified outcomes resulting from the intervention. These outcomes are usually not immediately monetizable. For example, this could be a reduction in child abuse cases, or simply a reduction in the number of preterm and LBW infants. Outcome improvements justify participation by philanthropies and governments and include a wider range of short-term and long-term economic and social benefits.^{11,98} Because outcome improvements can generally be accurately measured, they provide a concrete basis for determining success payments.

The two measures of success are not mutually exclusive. In fact, the most effective PFS projects combine elements of both.

New York City's Rikers Island

The first PFS project in the United States involved nearly \$18 million in loans from Goldman Sachs and the Bloomberg Foundation to scale up an intervention program designed to reduce recidivism among teenagers incarcerated at New York City's Rikers Island. The intervention focuses on personal responsibility education, training, and counseling. The investment bank will recoup the full amount if recidivism drops 10%; more if the drop is larger.⁹⁹

Scaling Pre-K for Low-Income Kids in Salt Lake City—1

- Goldman Sachs makes a \$4.6 million, 5% loan to United Way of Salt Lake.
- J.B. Pritzker makes a \$2.4mm 5% subordinated loan

to United Way of Salt Lake, reducing risk to the senior lender if the preschool program proves to be ineffective.

• United Way of Salt Lake is the "intermediary" and

oversees the implementation of the project and is also responsible for managing repayments to the private investors.

Imprint Capital serves as social investment banker.

Figure 5: Pay for Success Structure





Salt Lake City, Utah, Granite City Preschool Project

The first early childhood PFS project was initiated in Salt Lake City, Utah in 2013 by the Salt Lake United Way, Goldman Sachs, J.B. Pritzker, and the Granite School District Preschool, based on feasibility research that Voices for Utah Children conducted.

Scaling Pre-K for Low-Income Kids in Salt Lake City—2

- Voices for Utah Children provides financial structuring, research and analytic support
- Granite School District and others provide the preschool program to low-income 3 and 4 year olds
- Early Intervention Research Institute, Utah State University, is the "third-party evaluator"
- Park City Community Foundation acts as the Performance Account Manager, providing an independent "performance account" to hold repayment funds

The investors loaned \$7 million to the United Way of Salt Lake to implement the Utah High Quality Preschool Program in two school districts. Success payments depend on meeting targets related to decreased use of special education. The payments will be made only through the 6th grade for each student, with government entities capturing any additional savings afterwards.¹⁰⁰

Scaling Pre-K for Low-Income Kids in Salt Lake City—3

After initial funding, subsequent investments will be made based on the availability of repayment funds from public entities that are realizing cost savings as a result of the program.

Through 6th grade

- Success payments, equal to 95% of special-ed cost avoidance, will be used to pay 5% annual interest and repay senior and subordinate debt principle.
- Success fees, equal to 40% of special-ed cost avoidance, will be paid to investors after debt principle has been repaid.

After 6th grade, 100% of all special-ed cost avoidance will be retained by Utah

Several other localities are exploring their own PFS early childhood programs, including the states of Ohio and South Carolina.

Case Study: South Carolina Pay-for-Success Nurse Family Partnership

South Carolina ranks 45th in the nation in terms of child wellbeing. The state has several successful several home visiting programs, but they serve less than 600 of the 11,200 eligible, high-risk mothers a year.

To get the benefits of home visiting, the state is considering the using a PFS model to increase the availability of these programs. A 2013 study determined that it was feasible to use PFS financing to scale up programs such as the NFP.¹⁰¹

However, the authors also noted: "No single outcome would produce enough savings to cover the cost of the entire program." In other words, the short-term costs savings from a reduction in preterm births and the associated medical costs would not be enough to provide a positive return on investment to private investors. Yet because such outcomes are, in turn, good predictors of long-term results that can provide significant cost avoidance savings to governments (as shown in the NFP studies described above), the program can, over time, provide appropriate returns on investment provided.

Study authors suggested that South Carolina set percentage reductions in 1 or 2 outcomes as measured against a control group over a 4- to 6-year contract term to obtain the necessary funding required to scale up the program. State and local governments, then, would retain the additional savings over the years through reductions in disability, need for special education, child abuse, substance abuse, and crime, among other indicators.

Challenges to Implementing PFS Projects

The potential for private investment in early childhood programs comes from mediating expensive social and educational issues like child abuse, special education, and crime. Yet government budgets operate on a short-term basis, making it difficult, particularly in these days of budget cuts, to scale up early childhood programs to meet the ever-growing demand.¹⁰⁰ There are several challenges to implementing a PFS project successfully, especially with respect to early childhood intervention programs. They include:

- Disjointed or insufficient acquisition and sharing of data in individual child outcomes
- Unclear returns on the PFS investment project or intervention
- Delays between the PFS intervention investment and the return
- Difficulty in linking government cost reductions or revenue gains solely to the PFS investment intervention
- Multiple government jurisdictions with conflicting priorities
- Child migration among jurisdictions
- Resistance to paying PFS investors from public cost savings or revenue gains
- Shortage of high-quality intervention providers who are also familiar and comfortable with providing service under PFS models
- Insufficient personnel or data to administer and evaluate PFS program performance
- Incentive inconsistencies among the parties to the PFS financing
- Carefully selecting outcomes that indicate success, so as not to inadvertently provide incentives to deny children services

In addition, investors require:

- Strong state and local business, philanthropic and government support
- Government commitments that extend beyond election cycles
- Rigorous statistical demonstrations of historical and projected intervention benefits
- Sound legal foundations for PFS funding organizations

- Clear enforceable contracts among PFS participating entities
- Loans, bonds or other PFS assets with terms familiar to investors
- Good working relationships with the investment underwriting, institutional and foundation sectors

Implementing a Pay-for-Success Home Visiting Program in Virginia

The Virginia government conducted an analysis in 2010 of unmet needs in Virginia's home visiting programs and concluded that increasing the availability of these interventions would help the state meet national and state measures around prenatal care, LBW and prematurity, breastfeeding, immunizations, teen births, and childhood injury and hospitalization.³³⁸

However, the analysis also found that there is a significant unmet need for additional home visiting services in Virginia. An estimated 82.6% of high-risk women (73,439) with children under age 5 need these services, yet do not receive them.³⁸

The report also identified several needs and gaps in home visiting programs in the state, including:³⁸

- The absence of intensive home visiting services or limited services for teenage parents; fathers of all ages, but particularly young men; families with children over 3 years of age; Spanish-speaking families; parents with more than one child; grandparents raising grandchildren; women experiencing perinatal depression; parents struggling with substance abuse; diverse cultural groups; families just above the poverty level who are not eligible for the Women's, Infants', and Children's' feeding program, Medicaid, food stamps, child care scholarships, and job training programs; homeless families or those with very unstable housing and multiple moves within a year; and families with a child who has developmental delays or chronic illness.
- Regional differences in the availability of home visiting programs.
- Lack of resource optimization. For instance, only a few communities have common intake procedures

and referral agreements so that a family is assessed for their particular needs and then referred to the appropriate home visiting program.

Implementing Home Visiting Programs through Medicaid

Any PFS home visiting program in Virginia will likely be implemented through the state's Medicaid program, with grants going to existing, evidence-based home-visiting programs throughout the state.

Medicaid finances a third of all births in Virginia, 45% nationally. Like most state Medicaid systems, Virginia's is under considerable financial stress as a result of the recession, an aging population, and an influx of new enrollees who learned they were eligible after applying for health insurance through the ACA.

Thus, states are searching for "hot spots" of spending to address. One such area is NICU stays for LBW, preterm, and other infants.^{102,103} Estimates put the average cost for a NICU baby at \$15,100 with an average length of stay of 12.9 days versus \$600 and a 1.9 day length of stay for full-term infants with no complications.¹⁰⁴

Medicaid programs also bear the brunt of the additional costs from adverse birth outcomes, since socioeconomically disadvantaged women (those most likely to be on Medicaid) are more likely to give birth to preterm and LBW infants and to have higher-risk pregnancies themselves.¹⁰⁵

Virginia's Medicaid program operates under a risk-based, capitated managed care model, which provides clear incentives for the state's Medicaid managed care plans to implement home visiting programs, at least in the short term. Seven managed care plans now contract with the state (Table 6), and managed care is available in nearly all regions.

The managed care model encompasses two programs: Medallion II, for those with incomes up to 133% of the federal poverty level (FPL), and Family Access to Medical Security Insurance (FAMIS), the state's version of the Children's Health Insurance Program, which covers pregnant women and children with incomes between 133% and 200% of the FPL. Benefits to pregnant women are provided through pregnancy and for 60 days post-partum.

Nearly 9% of infants born to women in the Medicaid program in 2012 were preterm, a slight increase over the

8.7% in 2011. In 2012, 8.7% of infants were LBW, also an increase over the previous year. Meanwhile, rates of preterm and LBW infants were higher for women who were not enrolled in FAMIS or Medicaid throughout their pregnancy, but who were covered by one of the programs when they delivered. The preterm birth rate in this group, for instance, was 11.5%.¹⁰⁶

These rates vary widely throughout the state, with several counties reporting LBW rates between 18% and 21%. Data for preterm births was not available on a county-by-county basis.¹⁰⁶

Medicaid Cost Avoidance Savings from Home Visiting

If successful, a PFS program could return significant savings for Virginia's Medicaid managed care organizations and, eventually, the state's Medicaid system as well as other state entities.

Data from 30 NFP evaluation reports estimated that if state Medicaid programs fully funded the program, they would reap savings beyond the cost by the time the child turned 5, saving an estimated \$2.30 per dollar invested by age 18.⁸⁰ When savings for Child Protective Services, police, special education, food stamps, and TANF are added, total savings come to \$4.40 for every state dollar invested and \$2.90 for every federal dollar invested.⁸⁰

As the author wrote: "NFP offers a mother lode of Medicaid savings," and, he continued, "seems a good candidate for social impact funds."⁸⁰

The state of Minnesota has taken notice of the savings, with all 12 of its Medicaid managed care plans providing home visiting as a service even though it is not a required benefit.¹⁰⁷ They individually contract with the states 91 local health departments to provide the services.

Challenges with Medicaid Financing of Early Childhood Home Visiting Programs

Though complex, Medicaid can be used to pay for home visiting. A 2012 report from the Pew Center on the States highlights a variety of strategies to do so.¹⁰⁷ Other states have implemented various approaches, including targeted case management, administrative case management, enhanced prenatal benefits, traditional medical assistance services, and managed care. Other options include:

Figure 6:





Source: Miller, T. R. (September 2012). Nurse-Family Partnership Home Visitation: Costs, Outcomes, and Return on Investment. Executive Summary. H.B.S.A., Inc., PIRE

Figure 7:

Virginia Medicaid Expenditures 2013 Enrollment vs. Expenditures for SFY 2013 19% 7% 48% Disabled and Elderly 19% Parents. Pregnant Women Caregivers and Children 54% 23% Expenditures Enrollment 1,147,788 ŚĠ.7 Billion Source: Virginia Department of Medical Assistance Services

- Medicaid preventive services
- Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) services, which requires that states provide children with any medically necessary health care services identified through screenings and diagnosis even if they are not available to adults
- 1915b Freedom of Choice waivers, which enable states to selectively contract with providers providing

TABLE 6: Contracted Managed Care Organizations in Virginia Medicaid Program

Anthem HealthKeepers Plus CoventryCares of Virginia INTotal Health (Inova Health System Plan) Kaiser Permanente MajestaCare (Health Plan of Carilion Clinic) Optima Family Care (Sentara Health System Plan) Virginia Premier Health Plan (VCU Health System Plan)

they can show a cost savings

- A 1915c Home and Community Based Services waiver, which provides certain services to a defined target population in the state
- Benchmark plans, which target special populations by need, geography, and risk
- Funding in combination with other sources, including block grants, general revenue funds, and private funding. For instance, a family home visiting program in Minnesota provided through local health departments are funded via TANF, Title V, state general funds, local taxes, Medicaid, and other sources, including grants.

Virginia Medicaid managed care providers point to a number of specific disincentives to participate in early health PFS projects including:

- The method for initial allocations of Medicaid patients in a region.
- The disappearance, or "churning", of Medicaid patients and reappearance of them when they need care. A way needs to be found for health care providers and PFS intermediaries to get "credit" for the absence of Medicaid charges during periods when patients are off the Medicaid roll.
- Immediate downward adjustments in Medicaid service payments by Virginia's Department of Medicaid Assistance Services as soon as the

department learns that a service or patient group is costing less. A process needs to be developed that enables health care providers and PFS intermediaries to earn a return on successful PFS projects and continue operating them. Perhaps phasing-in lower health costs over five to ten years could be considered.

Scaling Up Virginia Prenatal Counseling with Pay-for-Success Finance

As this paper reports, decades of research on home visiting programs shows that prenatal counseling and support can improve the health and birth outcomes of expectant, lowincome, at-risk women, reduce healthcare costs, and improve long-term outcomes in the children born to these women, including reduced child welfare referral, abuse and neglect prosecution, public school special education and adolescent crime, drug use, and teenage pregnancy and their attendant costs.

As the South Carolina feasibility research explains, these benefits – cost avoidance and outcome improvements -- are large enough to justify a combination of near-term private and longer-term public financing.

In this section, we look at a nationally recognized and financially successful home-visiting, prenatal counseling program for which there is detailed cost data and documented near-term results. The program is Partners in Pregnancy, a joint effort of the Virginia Comprehensive Health Investment Project (CHIP) and Sentara Healthcare, a large healthcare system based in southeastern Virginia.

Virginia Comprehensive Health Investment Project (CHIP)

CHIP is a statewide network of 7 regional programs serving 27 localities. The program offers voluntary parent education and health-focused home visiting for low-income pregnant women, young children and their families. CHIP serves families whose children face serious threats to a healthy future: poverty, chronic medical conditions, and lack of insurance. The CHIP of Virginia network includes local programs in 27 Virginia communities serving 3,100 children and 400 pregnant women.¹⁰⁸

As explained in CHIP information, the program operates in three areas:

• Medical home. CHIP is committed to the philosophy

Figure 8: Partners in Pregnancy Framework



PnP Program Framework

Source: Ruiz RJ, Fullerton J, Dudley DJ. The interrelationship of maternal stress, endocrine factors and inflammation on gestational length. Obstetrical and Gyn Survey. 2003;586:415-428; Lutgendorf SK, Costanzo ES. Psychoneuroimmunology and health psychology: an integrative model. Brain, Behavior, and Immunity, 2003;17:225-232.

that the promotion of wellness and the improvement of health for expectant women, infants and children, beginning with care provided in their home and through a medical home model that is accessible, continuous, comprehensive, family centered, coordinated, and compassionate. Traditionally, children from low-income families do not receive care in their homes but instead receive fragmented, limited, and sporadic services from clinics and hospital emergency rooms. CHIP sites work with families and communities to ensure that each child (0-6) and their older siblings are able to receive care in their home.

- Health supervision. CHIP provides coordinated health supervision that promotes wellness, prevents illness and injury, and enhances normal growth and development. These CHIP services complement the efforts of the medical home.
- Family support. CHIP is committed to addressing the complex social needs through partnering with families and other community programs. CHIP family support services build on the strengths of caregivers to provide for the total well-being of their children.

In 2003, CHIP received a grant from the Commonwealth Fund to partner with Sentara Health System's Medicaid managed care organization, OPTIMA Health Plan, on a quality enhancing initiative to improve outcomes for highrisk pregnant women and their infants enrolled in Virginia's Medicaid system. The outcomes of that project, described below, form the basis for the PFS program described here.

The pilot program, called Partners in Pregnancy (PnP), is a community-based pregnancy care partnership that combines the strengths of NFP and Healthy Families. Nurses and parent educators provide home visitations, coordinate medical care, link families to community resources, offer education around prenatal and infant care, and encourage self-care and advocacy for this vulnerable population.

The project enrolled 84 mothers into the intervention group and compared them to a similar, albeit non-randomized cohort of 59 mothers. The initial investment was \$244,808. A financial analysis of the program by researchers at the University of North Carolina (UNC) estimated that the program saved \$6.3 million in hospital costs and avoided 5,800 days in the NICU during the 21-month survey period.¹⁰⁹ As the program's medical director and founder, David Levin, MD, noted at the time, "This kind of program can greatly reduce taxpayer costs

TABLE 7: Virginia Utilization Measures: Intervention and Optima Control Results

Utilization	Intervention Mom N = 83	Intervention Baby N=80	Opt Control Mom N=80	Opt Control Baby N=59
Admissions/1000	1,582.7	821.6	1,429.2	823.4
Days/1000	4,302.2	4,382.0	4,476.7	7,808.1
NICU Days/1000	NA	3,085.6	NA	6,416.8
Office visits per person	3.7	9.7	3.7	9.2
ER visits per month	2.0	1.5	1.5	1.5
Home Visits per person	0.3	0.3	0.1	0.8
Prescriptions per person	1.2	1.5	1.2	1.7

Source: Greene SB, Kilpatrick K, Reiter K, et al. Better Payment Policies for Quality of Care: Fostering the Business Case for Quality Phase I – Medicaid Demonstrations. Final Report – Site Summaries. The Cecil G. Sheps Center for Health Services Research & the Department of Health Policy and Administration at the University of North Carolina at Chapel Hill. 2007.

for Medicaid, while improving the health of the newborns."110

The statistical foundation of the PnP project is subject to almost every criticism of non-randomized trials, and before it could be replicated as a PFS project, longitudinal analyses with larger and independently selected samples would be needed. The one criticism it is not subject to is judgment based use of the data.

Despite the fact that neither the intervention group nor the control group were randomly selected, Sentara continues to provide PnP services because doing so improves infant health outcomes. In doing this, Sentara is relying on the data from the project combined with its business judgment based on long experience with low-income patients. Favorable results from a randomized control trial (RTC) analysis would no doubt have been sufficient to persuade Sentara to offer PnP services, but were not absolutely necessary. The fact that CHIP is similar to an NFP-based intervention, and there are RTC analyses showing NFP's effectiveness spanning decades, no doubt figured in Sentara's decision. However, all that was necessary were results from a comparative analysis that, together with Sentara's long healthcare experience, indicated that continuing to offer PnP services would improve infant health and makes good business sense in whatever context Sentara uses.

Sentara's decision reveals something very important about

the evidence standards necessary to undertake PFS social impact finance projects. The only thing actually necessary is evidence sufficient to persuade investors to write a check. If, in their business or philanthropic judgment the evidence is good enough to put their money at risk to provide an intervention that could reduce government health and education costs, and the other aspects of the project look good, they can and should go forward.

The PnP project generated a series of important findings:109

- CHIP babies spent 44% fewer days in the hospital than the control group, with the average number of NICU days for preterm deliveries in the CHIP group 3,085 NICU days per 1,000 compared to 6,416 per 1,000 in the control group. This represented an average savings of \$5,000 per day, or a net savings of \$1.5 million for the PnP cohort.
- Overall per-m ember-per-month (PMPM) costs for the CHIP group were \$671 (\$432 for the mother and \$239 for the infant) compared to \$952 for the control group (\$413 for the mother and \$539 for the infant), for an average savings of \$23,604 per participant.
- Twenty-seven percent of mothers reduced or stopped smoking during their pregnancy. In addition,

TABLE 8.1:



TABLE 8.2: Virginia Operating Costs

Costs	Baseline	Year 1	Year 2
Personnel	\$22,213	\$161,475	\$52,799
Office	\$180	\$9,264	\$7,300
Equipment	\$0	\$0	\$0
Other Direct	\$0	\$0	\$0
Indirect	\$0	\$0	\$0
Total	\$22,393	\$170,739	\$60,099

Source: Greene SB, Kilpatrick K, Reiter K, et al. Better Payment Policies for Quality of Care: Fostering the Business Case for Quality Phase I – Medicaid Demonstrations. Final Report – Site Summaries. The Cecil G. Sheps Center for Health Services Research & the Department of Health Policy and Administration at the University of North Carolina at Chapel Hill. 2007.

participants attended 88.5% of scheduled prenatal visits, and 81% used stress management techniques.

• The program generated a return on investment of 1.26.

Tables 8.1, 8.2 and 8.3 provide detailed cost data from the UNC analysis.¹⁰⁹

It's important to realize that the net savings did not consider long-term costs avoided such as the reduced need for early intervention, special education, and life-long medical care associated with preterm and/or LBW babies, which would primarily accrue to the state and local government.

In 2004, PnP received a national award from the Disease Management Association of America (DMAA), as well as a national study grant from the Center for Health Care Strategies to develop it as business case for quality in Medicaid management programs.¹¹⁰

The program has been scaled up and continues to operate as part of Optima, with participants who complete the participation criteria earning a healthcare debit card up to \$200.

Assessing PFS Feasibility of a Partners in Pregnancy Program

Assessing feasibility of a PFS program, however, involves a more complex assessment than the simple benefit cost ratio

calculation provided in the UNC analysis. It requires at a minimum that the present value of the success payments, (that is, the percent of cost avoidance savings actually paid to the intermediary) expressed as a return on investment, be competitive with returns available in the market for investments of comparable risk. Based on the PnP project's total cost avoidance, what might the success payment be? This depends on the success payment percentage.¹¹¹

The main determinants of the success payment percentage are the uncertainty about the accuracy of the analyses of past performance and evaluations of current performance, and uncertainty about compliance with the contracts among the parties to the PFS project. Clearly, entities such as government agencies, school districts, and healthcare providers will not want to pay more than the actual amount of achieved cost avoidance to "investors" who provide the capital to fund an intervention. In fact, they will likely demand some margin to accommodate measurement and compliance uncertainties.

Given the uncertainties, a margin of 10% to 20% of cost avoidance is generally thought to be needed. Accordingly, expecting success payments to range from 90% to 80% of evaluator-confirmed cost avoidance is reasonable. For Optima's PnP program, an 80% success payment would result in an annualized return on investment of about 11% -- less than the 26% calculated by the UNC researchers, but still a very attractive return. The main reason for the difference is that the

TABLE 8.3: Detailed Cost Data for Partners in Pregnancy Program, Data from Appendix 1

VA - Sentara Health Management

QEI - High Risk Pregnancy and Child's First Year of Life

Utilization and Membership	Age Statistics		Members in Claims	Average Member
	Min	Мах		
Intervention MOM: 10/2003 - 07/2005	11	43	84	70
Intervention BABY: 06/2004 - 03/2006				
Control MOM: 10/2003 - 07/2005	14	40	83	55

Control BABY: 06/2004 - 04/2006

Utilization Measures	Intervention		Control	
	МОМ	BABY	МОМ	BABY
Admissions/1000	1582.7	821.6	1429.2	823.4
Days/1000	4302.2	4382	4476.7	7808.1
NICU Days/1000		3085.6		6416.8
Office Visits/person	3.7	9.7	3.7	9.2
ER visits/person	2	1.5	1.5	1.5
Home visits/person	0.3	0.3	0.1	0.8
Prescription/person	1.2	1.5	1.2	1.7
PMPM Payments	Intervention			
	МОМ	% Total	BABY	% Total
Inpatient	\$175.78	40.7	\$144.51	60.6
Outpatient	\$52.19	12.1	\$9.48	4
Office	\$131.13	30.3	\$58.09	24.3
ER	\$32.87	7.6	\$14.34	6
Home	\$11.06	2.6	\$1.21	0.5
Pharmacy	\$25.67	5.9	\$6.56	2.8
Other	\$3.58	0.8	\$4.44	1.9
Total	\$432.28	100%	\$238.63	100%

Source: Greene SB, Kilpatrick K, Reiter K, et al. Better Payment Policies for Quality of Care: Fostering the Business Case for Quality Phase I – Medicaid Demonstrations. Final Report – Site Summaries. The Cecil G. Sheps Center for Health Services Research & the Department of Health Policy and Administration at the University of North Carolina at Chapel Hill. 2007.

Figure 9:



Sentara Optima PnP: Improving Birth and Infant Health

26% return reflects the provision of project funds from noninvestor sources, so that the monies do not need to be repaid. Essentially, this means that 100% of cost avoidance savings can be considered to benefit society.

As mentioned above, in the PnP program, the success payment percentage is effectively 100%. Sentara funded the program with Optima serving as the intermediary and Sentara's internal accounting and audit staff serving as the evaluator. Figure 9 provides a flow chart of the project organization.

Excel Spreadsheet Model of PFS Feasibility

To make it easier to understand and assess the potential feasibility of an early health intervention, we developed a spreadsheet model that can accommodate a variety of health intervention features and data and is able to handle funding from a variety of private and public sources via an intermediary such as a regional United Way. The spreadsheet is available on the ReadyNation website at www.ReadyNation.org/PFS

The spreadsheet presents project assumptions and results, intervention analysis, and cash flow analysis under individual tabs. Assumption parameters can be adjusted to examine different operating and funding possibilities. The spreadsheet contains the data from the PnP project. To examine the feasibility of a different program, the user will need to remove the Optima data and input month-by-month medical treatment expense data. Space is provided for inputting project specific expense details.

Spreadsheet Assessment of PnP Feasibility

Assumptions and parameters of the Optima PnP program shown in Table 8. The model incorporates all the data in the UNC study associated with the Sentara Optima Intervention and Control samples. Though we attempted to process the UNC study data as precisely as possible, we were not able to replicate the UNC estimated cost avoidance and social benefit cost ratio. The UNC and spreadsheets are close but not equal. The spreadsheet estimate and the UNC study reported amounts are highlighted in the spreadsheet results tables.

Funding: 100% from a Senior Lender or an MCO

The difference in estimated cost avoidance, not surprisingly, has a large effect on feasibility. As shown in Table 10, the Optima project, according to UNC, is a true winner from a societal standpoint with a benefit cost ratio of 1.26. However, the spreadsheet's calculations show the PnP project has a benefit cost ratio of 1.12.

From a PFS standpoint, assuming that Sentara has a 5% cost of

capital, provides all the capital to fund the project, and receives 100% of the cost avoidance as a success payment, the return on Sentara's investment is 21.5% per UNC's analysis and 11.7% per the spreadsheet's calculations.

Funding: 80% from a Senior Lender or MCO, and 20% from Government

The South Carolina feasibility study concludes that scaling-up NFP requires participation by state government. If we adjust the funding to include a mix of private Sentara capital and state government investment, the results change in ways consistent with the South Carolina findings.

Assuming Sentara provides 80% of the needed capital, or \$202,918, the spreadsheet calculated return on investment for Sentara is 11.2%. (Tables 11 and 12)

If the state puts up 20% of the needed capital, or \$50,730 to fund the project, and keeps 20% of the cost avoidance savings, an amount equal to \$57,154, the state's return on investment is also 11.2%. Note that this is the financial return and does not include the well-documented follow-on benefits to the state and taxpayers that accrue from quality prenatal care.

Funding: 75% from Senior Lender or MCO, 5% from Philanthropic PRIs, & 20% from Government

Including funding from a philanthropy in the form of an interest bearing Program Related Investments (PRI), does not change the fundamental social benefit cost relationship. But it does change the investment returns of the investors who are repaid from success payments. (Tables 13 and 14)

Reducing the amount of funding from senior lenders or MCO to 75% and adding a 5% PRI investor, while keeping the government's contribution at 20%, increases the return to the senior lender/MCO group, the investors who are repaid from success payments, to 13.2%. The state's return is reduced to 6.1%. The reduction is the result of adding PRI capital on which interest and principal has to be paid. The repayment of principal in the last period reduces the amount of cost avoidance accruing to the state as residual.

The investment return to the PRI investor is their contract rate of 5%.

TABLE 9: Optima PnP General Operating Assumptions MCO					
Intervention cohort demographics					
Number of mothers in one cohort					84
Number of children – prenatal, infant and toddler – in one	cohort				83
Expected % of children who will leave MCO membership	each year				0%
Number of cohorts (prenatal months, age-1 year) receiving in	ntervention p	oer year			1
Intervention program cost					
Program length in months (9 mos pregnancy plus 12 mos	infant & tode	dler)			21
Cost of providing intervention to one cohort over prograr	n length (UN	C Study)			\$253,648
Cost of providing intervention to one mother and child (L	NC Study)				\$3,020
Healthcare cost difference between intervention and non-in	ervention po	opulation			
Average healthcare cost of a non-intervention recipient m	other or child	d (Interventior	n Analysis)		\$793,555
Average healthcare cost of an intervention recipient moth	er or child (Ir	ntervention Ar	nalysis)		\$506,381
Per individual intervention and non-intervention healthca	re costs diffe	erence = <u>Cost A</u>	<u>Avoidance</u>		\$287,174
Total cost avoidance over program length (Cash Flow Analysis)				\$287,174	
Total cost avoidance over program length (UNC Study)				\$317,504	
Success Payment paid from Cost Avoidance					
Success payment percent of cost avoidance payable to intermediary and/or MCO					100%
Project Establishment Cost					
Feasibility research (one-time cost paid for by MCO, local	ponsors and	l/or philanthro	ру)		
Intermediary/MCO set-up (one-time cost paid for by MCO	, local sponse	ors and/or phil	anthropy)		
Project Operating Expenses (on-going cost paid for by interr	nediary or Mo	<u>CO)</u>			
Total operating costs not including intervention costs over	r program lei	ngth (per UNC	Study)		\$0
Total operating costs including intervention costs over pro-	ogram length	ı			\$253,648
Interest cost over program length (Cash Flow Analysis)					\$0
Total operating, intervention, and interest costs over pro	gram length				\$253,648
Funding Needs					
Total intermediary and/or MCO operating costs not inclue	ling interest e	expense			\$253,648
Interest Rate and Target Return on Investment Assumptions					
Discount rate Per	year	3%	Per program month		0.25%
Interest rate payable on senior loans or MCO cost of capit	al		Per year		0%
Interest rate payable on subordinate loans			Per year		6.0%
Interest rate payable on philanthropic PRI assets			Per year		5.0%
Interest rate payable on local and state government loans			Per year		3.0%
Interest rate payable on federal loans			Per year		0.0%
Target return on investment of success payment recipient	s		Per year		10.0%

TABLE 10: PnP Funding – 100% Funding from Success Payment Recipients (Senior and subordinate lenders or MCO)

F	unding Source Assumptions		
	Share of capital provided by success payment recipients (lenders or MCO)	\$253,648	100.0%
	Share of capital provided by subordinated lenders	\$0	0.0%
	Share of capital provided as philanthropic PRIs	\$0	0.0%
	Share of capital provided as philanthropic grants	\$0	0.0%
	Share of capital provided by state government	\$0	0.0%
	Share of capital provided by federal government	\$0	0.0%

TABLE 11: PnP Results – 100% Funding from Success Payment Recipients

Project Results (from Cash Flow Analysis and UNC Study)		
Number of additional prenatal, infant and toddler children served by scaling up inter	rvention	83
Amount of cost avoidance as reflected in lower healthcare costs (Cash Flow Analy	\$287,174	
Amount of cost avoidance as reflected in lower healthcare costs (UNC Study)		\$317,504
Total payments made to provide intervention		\$253,648
Capital required to scale-up intervention		\$253,648
Capital provided by MCO or senior lenders		\$253,648
Capital provided by subordinated lenders		\$0
Capital provided by philanthropic PRI		\$0
Capital provided by philanthropic grant		\$0
Capital provided by state government		\$0
Capital provided by federal government		\$0
Capital contributed without repayment (philanthropic grants and state & federal	l government)	\$0
Capital advanced with required repayment (lenders and philanthropic PRIs)		\$253,648
Financial Feasibility		
Cash flow feasibility: Are total success payments greater than total capital call	ls?	Yes
Margin of cash flow feasibility		\$33,526
Target return feasibility: Is the return to success payment recipients greater than	their target return?	Yes
Target return on investment of success payment recipients		10.0%
Return on investment of success payment recipients		11.7%
Margin of target return feasibility		1.7%
Net Present Value and Benefit Cost Ratio	Spreadsheet	UNC Study
NPV of total cost avoidance	\$275,997	\$308,256
NPV of total program costs	\$247,447	\$244,808
Societal benefit to cost ratio	1.12	1.26
NPV of success payments and interest payable to success payment recipients	\$276,438	\$308,256
NVP of senior capital call	\$247,447	
Cash return on senior/MCO invested capital	11.7%	21.5%
NPV of invested capital and interest payable to PRI investors		
Cash return on PRI invested capital (No PRI investment)		
NPV of cost avoidance kept by government		

TABLE 12: Optima PnP General Operating	Assumptions MCO-Mix of 80% Senior Ler	nder or MCO and 20% Government Funding
--	---------------------------------------	--

Intervention cohort demographics					
Number of mothers in one cohort				84	
Number of children – prenatal. infant and toddler – in one cohort			83		
Expected % of children who will leave MCO membership each year			0%		
Number of cohorts (prenatal months age-1 year) receiving intervention per year				1	
Intervention program cost					
Program length in months (9 mos pregnancy plus 12 mos infant & toddler)			21		
Cost of providing intervention to one cohort over pr	ogram length (UNC	C Study)			\$253,648
Cost of providing intervention to one mother and ch	ild (UNC Study)				\$3,020
Healthcare cost difference between intervention and ne	on-intervention po	<u>pulation</u>			
Average healthcare cost of a non-intervention recipi	ent mother or child	l (Interventior	Analysis)		\$793,555
Average healthcare cost of an intervention recipient	mother or child (In	tervention Ar	alysis)		\$506,381
Per individual intervention and non-intervention hea	althcare costs differ	rence = <u>Cost A</u>	voidance		\$287,174
Total cost avoidance over program length (Cash Flov	v Analysis)				\$287,174
Total cost avoidance over program length (UNC Study)				\$317,504	
Success Payment paid from Cost Avoidance					
Success payment percent of cost avoidance payable to intermediary and/or MCO			80%		
Project Establishment Cost					
Feasibility research (one-time cost paid for by MCO, I	ocal sponsors and	or philanthro	ру)		
Intermediary/MCO set-up (one-time cost paid for by MCO, local sponsors and/or philanthropy)					
Project Operating Expenses (on-going cost paid for by i	ntermediary or MC	<u>:0)</u>			
Total operating costs not including intervention costs over program length (per UNC Study) \$0			\$0		
Total operating costs including intervention costs over program length			\$253,648		
Interest cost over program length (Cash Flow Analysis)			\$1,403		
Total operating, intervention, and interest costs over program length			\$255,051		
Funding Needs					
Total intermediary and/or MCO operating costs not including interest expense			\$253,648		
Interest Rate and Target Return on Investment Assumptions					
Discount rate	Per year	3%	Per program month		0.25%
Interest rate payable on senior loans or MCO cost of	capital		Per year		0%
Interest rate payable on subordinate loans			Per year		6.0%
Interest rate payable on philanthropic PRI assets			Per year		5.0%
Interest rate payable on local and state government	loans		Per year		3.0%
Interest rate payable on federal loans Per year			0.0%		
Target return on investment of success payment reci	pients		Pervear		10.0%

TABLE 13: PnP Funding – Mix of 80% Senior Lender or MCO and 20% Government Funding

Funding Source Assumptions				
\$202,918	80.0%			
\$0	0.0%			
\$0	0.0%			
\$0	0.0%			
\$50,730	20.0%			
\$0	0.0%			
	\$202,918 \$0 \$0 \$0 \$0 \$50,730 \$0			

TABLE 14: PnP Results – Mix of 80% Senior Lender or MCO and 20% Government Funding

Results (from Cash Flow Analysis and UNC Study)		
Number of additional prenatal, infant and toddler children served by scaling up intervention		
Amount of cost avoidance as reflected in lower healthcare costs (Cash Flow Analysis)		
Amount of cost avoidance as reflected in lower healthcare costs (UNC Study)		
Total payments made to provide intervention		
Capital required to scale-up intervention		\$253,648
Capital provided by MCO or senior lenders		\$213,205
Capital provided by subordinated lenders		\$0
Capital provided by philanthropic PRI		\$0
Capital provided by philanthropic grant		\$0
Capital provided by state government		\$50,730
Capital provided by federal government		\$0
Capital contributed without repayment (philanthropic grants and state & federal ge	overnment)	\$50,730
 Capital advanced with required repayment (lenders and philanthropic PRIs)		\$202,918
Financial Feasibility		
Cash flow feasibility: Are total success payments greater than total capital calls?		
Margin of cash flow feasibility		
Target return feasibility: Is the return to success payment recipients greater than their target return?		Ves
	target retain.	
Target return on investment of success payment recipients		10.0%
Target return on investment of success payment recipients Return on investment of success payment recipients		10.0% 11.2%
Target return on investment of success payment recipients Return on investment of success payment recipients Margin of target return feasibility		10.0% 11.2% 1.2%
Target return on investment of success payment recipients Return on investment of success payment recipients Margin of target return feasibility Net Present Value and Benefit Cost Ratio	Spreadsheet	10.0% 11.2% 1.2% UNC Study
Target return on investment of success payment recipients Return on investment of success payment recipients Margin of target return feasibility Net Present Value and Benefit Cost Ratio NPV of total cost avoidance	Spreadsheet \$275,997	10.0% 11.2% 1.2% UNC Study \$308,256
Target return on investment of success payment recipients Return on investment of success payment recipients Margin of target return feasibility Net Present Value and Benefit Cost Ratio NPV of total cost avoidance NPV of total program costs	Spreadsheet \$275,997 \$248,787	10.0% 11.2% 1.2% UNC Study \$308,256 \$244,808
Target return on investment of success payment recipients Return on investment of success payment recipients Margin of target return feasibility Net Present Value and Benefit Cost Ratio NPV of total cost avoidance NPV of total program costs Societal benefit to cost ratio	Spreadsheet \$275,997 \$248,787 1.11	10.0% 11.2% 1.2% UNC Study \$308,256 \$244,808 1.26
Target return on investment of success payment recipients Return on investment of success payment recipients Margin of target return feasibility Net Present Value and Benefit Cost Ratio NPV of total cost avoidance NPV of total program costs Societal benefit to cost ratio NPV of success payments and interest payable to success payment recipients	Spreadsheet \$275,997 \$248,787 1.11 \$220,079	10.0% 11.2% 1.2% UNC Study \$308,256 \$244,808 1.26 \$246,605
Target return on investment of success payment recipients Return on investment of success payment recipients Margin of target return feasibility Net Present Value and Benefit Cost Ratio NPV of total cost avoidance NPV of total program costs Societal benefit to cost ratio NPV of success payments and interest payable to success payment recipients NPV of senior capital call	Spreadsheet \$275,997 \$248,787 1.11 \$220,079 \$197,957	10.0% 11.2% 1.2% UNC Study \$308,256 \$244,808 1.26 \$246,605
Target return on investment of success payment recipients Return on investment of success payment recipients Margin of target return feasibility Net Present Value and Benefit Cost Ratio NPV of total cost avoidance NPV of total program costs Societal benefit to cost ratio NPV of success payments and interest payable to success payment recipients NPV of senior capital call Cash return on senior/MCO invested capital	Spreadsheet \$275,997 \$248,787 1.11 \$220,079 \$197,957 11.2%	10.0% 11.2% 1.2% UNC Study \$308,256 \$244,808 1.26 \$246,605 21.5%
Target return on investment of success payment recipients Return on investment of success payment recipients Margin of target return feasibility Net Present Value and Benefit Cost Ratio NPV of total cost avoidance NPV of total program costs Societal benefit to cost ratio NPV of success payments and interest payable to success payment recipients NPV of senior capital call Cash return on senior/MCO invested capital NPV of invested capital and interest payable to PRI investors	Spreadsheet \$275,997 \$248,787 1.11 \$220,079 \$197,957 11.2%	10.0% 11.2% 1.2% UNC Study \$308,256 \$244,808 1.26 \$246,605 21.5%
Target return on investment of success payment recipients Return on investment of success payment recipients Margin of target return feasibility Net Present Value and Benefit Cost Ratio NPV of total cost avoidance NPV of total program costs Societal benefit to cost ratio NPV of success payments and interest payable to success payment recipients NPV of invested capital and interest payable to PRI investment) NPV of investment on PRI invested capital (No PRI investment)	Spreadsheet \$275,997 \$248,787 1.11 \$220,079 \$197,957 11.2%	10.0% 11.2% 1.2% UNC Study \$308,256 \$244,808 1.26 \$246,605 21.5%
Target return on investment of success payment recipients Return on investment of success payment recipients Margin of target return feasibility Net Present Value and Benefit Cost Ratio NPV of total cost avoidance NPV of total program costs Societal benefit to cost ratio NPV of success payments and interest payable to success payment recipients NPV of senior capital call Cash return on senior/MCO invested capital NPV of invested capital and interest payable to PRI investment) NPV of cost avoidance kept by government	Spreadsheet \$275,997 \$248,787 1.11 \$220,079 \$197,957 11.2% \$55,020	10.0% 11.2% 1.2% UNC Study \$308,256 \$244,808 1.26 \$246,605 21.5% \$0
Target return on investment of success payment recipients Return on investment of success payment recipients Margin of target return feasibility Net Present Value and Benefit Cost Ratio NPV of total cost avoidance NPV of total program costs Societal benefit to cost ratio NPV of success payments and interest payable to success payment recipients NPV of senior capital call Cash return on senior/MCO invested capital NPV of cost avoidance kept by government NPV of state capital call	Spreadsheet \$275,997 \$248,787 1.11 \$220,079 \$197,957 11.2% \$55,020 \$49,489	10.0% 11.2% 1.2% UNC Study \$308,256 \$244,808 1.26 \$246,605 21.5% \$0
Target return on investment of success payment recipients Return on investment of success payment recipients Margin of target return feasibility Net Present Value and Benefit Cost Ratio NPV of total cost avoidance NPV of total program costs Societal benefit to cost ratio NPV of success payments and interest payable to success payment recipients NPV of senior capital call Cash return on senior/MCO invested capital NPV of cost avoidance kept by government NPV of state capital call Cash return on govt invested capital	Spreadsheet \$275,997 \$248,787 1.11 \$220,079 \$197,957 11.2% \$55,020 \$49,489 11.2%	10.0% 11.2% 1.2% UNC Study \$308,256 \$244,808 1.26 \$246,605 21.5% \$0

TABLE 15: Optima PnP	General Operating	Assumptions MCO	- Mix of 75% Senior I	Lender or MCO, 5% PRI,	& 20% Govt Funding
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Intervention cohort demographics				
Number of mothers in one cohort				84
Number of children – prenatal, infant and toddler –	83			
Expected % of children who will leave MCO membership each year			0%	
Number of cohorts (prenatal months, age-1 year) received	ving intervention p	er year		1
Intervention program cost				
Program length in months (9 mos pregnancy plus 12 mos infant & toddler)				21
Cost of providing intervention to one cohort over pr	ogram length (UNC	C Study)		\$253,648
Cost of providing intervention to one mother and ch	nild (UNC Study)			\$3,020
Healthcare cost difference between intervention and n	on-intervention po	pulation		
Average healthcare cost of a non-intervention recipi	ent mother or child	l (Interventior	Analysis)	\$793,555
Average healthcare cost of an intervention recipient	mother or child (In	tervention Ar	alysis)	\$506,381
Per individual intervention and non-intervention he	althcare costs diffe	rence = <u>Cost A</u>	voidance	\$287,174
Total cost avoidance over program length (Cash Flow	v Analysis)			\$287,174
Total cost avoidance over program length (UNC Study)			\$317,504	
Success Payment paid from Cost Avoidance				
Success payment percent of cost avoidance payable to intermediary and/or MCO			80%	
Project Establishment Cost				
Feasibility research (one-time cost paid for by MCO, local sponsors and/or philanthropy)				
Intermediary/MCO set-up (one-time cost paid for by MCO, local sponsors and/or philanthropy)				
Project Operating Expenses (on-going cost paid for by intermediary or MCO)				
Total operating costs not including intervention costs over program length (per UNC Study) \$0				\$0
Total operating costs including intervention costs over program length			\$253,648	
Interest cost over program length (Cash Flow Analysis)			\$1,987	
Total operating, intervention, and interest costs over program length			\$255,635	
Funding Needs				
Total intermediary and/or MCO operating costs not including interest expense \$25			\$253,648	
Interest Rate and Target Return on Investment Assumptions				
Discount rate	Per year	3%	Per program month	0.25%
Interest rate payable on senior loans or MCO cost of	capital		Per year	0%
Interest rate payable on subordinate loans			Per year	6.0%
Interest rate payable on philanthropic PRI assets			Per year	5.0%
Interest rate payable on local and state government	loans		Per year	3.0%
Interest rate payable on federal loans			Per year	0.0%
Target return on investment of success payment rec	ipients		Per vear	10.0%

TABLE 16: PnP Funding – Mix of 75% Senior Lender or MCO, 5% PRI, & 20% Govt Funding

Funding Source Assumptions		
Share of capital provided by success payment recipients (lenders or MCO)	\$190,236	75.0%
Share of capital provided by subordinated lenders	\$0	0.0%
Share of capital provided as philanthropic PRIs	\$12,682	5.0%
Share of capital provided as philanthropic grants	\$0	0.0%
Share of capital provided by state government	\$50,730	20.0%
Share of capital provided by federal government	\$0	0.0%

TABLE 17: PnP Results – Mix of 75% Senior Lender or MCO, 5% PRI, & 20% Govt Funding

Project Results (from Cash Flow Analysis and UNC Study)		
Number of additional prenatal, infant and toddler children served by scaling up intervention		
Amount of cost avoidance as reflected in lower healthcare costs (Cash Flow Analysis)		
Amount of cost avoidance as reflected in lower healthcare costs (UNC Study)		
Total payments made to provide intervention		\$253,648
Capital required to scale-up intervention		\$253,648
Capital provided by MCO or senior lenders		\$190,236
Capital provided by subordinated lenders		\$0
Capital provided by philanthropic PRI		\$12,682
Capital provided by philanthropic grant		\$0
Capital provided by state government		\$50,730
Capital provided by federal government		\$0
Capital contributed without repayment (philanthropic grants and state & federal governmen	t)	\$50,730
Capital advanced with required repayment (lenders and philanthropic PRIs)		\$202,918
Financial Feasibility		
Cash flow feasibility: Are total success payments greater than total capital calls?		Yes
Margin of cash flow feasibility		\$15,085
Target return feasibility: Is the return to success payment recipients greater than their target	return?	Yes
Target return on investment of success payment recipients		10.0%
Return on investment of success payment recipients		13.2%
Margin of target return feasibility		3.2%
Net Present Value and Benefit Cost Ratio	Spreadsheet	UNC Study
NPV of total cost avoidance	\$275,997	\$308,256
NPV of total program costs	\$249,345	\$244,808
Societal benefit to cost ratio	1.11	1.26
NPV of success payments and interest payable to success payment recipients	\$210,004	\$246,605
NPV of senior capital call	\$185,585	
Cash return on senior/MCO invested capital including interest	13.2%	29.6%
NPV of invested capital and interest payable to PRI investors	\$12,937	\$0
Cash return on PRI invested capital	5.0%	5.0%
NPV of cost avoidance kept by government	\$52,501	\$0
NPV of state capital call	\$49,489	
Cash return on govt invested capital	6.1%	0.0%

A PFS Action Plan for Virginia

This paper explains why Virginia must invest in youth human capital if it is to restore past growth. To be effective such an investment initiative needs to start prenatally, especially in light of the profound impact early health has on later adult productivity and the staggering costs of preterm and low birth weight infants on Virginia taxpayers.

Despite the fact that nurse home visiting programs have conclusively shown that they can reduce the short- and longterm effects of poor birth outcomes, a lack of commitment to early child development in Virginia has resulted in insufficient funding to provide adequate prenatal and infant home visiting services, with the result that taxpayers bear needlessly high costs and inadequate human capital development.

The evidence indicates that Pay for Success privatepublic financing arrangements could be used to increase Virginia's human capital development. Prenatal counseling, in particular, with appropriate combinations of business, philanthropic and government funding, could be scaledup with a goal of reaching every high-risk woman in the state. Infant health, school readiness, and long-term adult productivity would be improved.

There are several barriers to successfully implementing PFS finance, and numerous unknowns. The barriers include:

- Limited data on the effectiveness of early health interventions operating in Virginia. Sound comparison studies are needed of treated and untreated mothers and infants.
- 2. Limited funding to acquire and analyze intervention data. Intervention providers need funding to pay for data acquisition and analysis.
- 3. Absence of a legislative or regulatory framework for state involvement in PFS projects.
- 4. Disincentives for healthcare providers to participate in early health PFS projects including:
 - a. The method for initial allocations of Medicaid patients in a region.
 - b. The disappearance, or "churning", of Medicaid patients and reappearance of them when they need care. A way needs to be found for health care providers and PFS intermediaries to get "credit" for the absence

of Medicaid charges during periods when patients are off the Medicaid roll.

c. Immediate downward adjustments in Medicaid service payments by Virginia's Department of Medicaid Assistance Services as soon as the department learns that a service or patient group is costing less. A process needs to be developed that enables health care providers and PFS intermediaries to earn a return on successful PFS projects and continue operating them. Perhaps phasing-in lower health costs over five to ten years could be considered.

To move forward, we suggest that Virginia business and policy leaders systematically address the barriers and unknowns in the following ways:

- Convene a working group of about 20 early childhood PFS advocates to meet regularly to identify challenges and anticipate and overcome obstacles. This group should come under the auspices of the governor or lieutenant governor's office or a major state-wide nonprofit such as the Virginia Chamber of Commerce, the Virginia Early Childhood Foundation, or the United Way of Virginia. One model for this committee is the Early Learning Council appointed by former Governor Mark Warner in 2005. Regardless of how the group is convened, members should include a broad spectrum of business, finance, philanthropic, early health, early education, daycare, and government representatives.
- 2. If the working group determines that PFS approaches can be successfully used in Virginia, educate and build understanding and support for PFS finance of a large, broadly diversified group of PFS advocates, including business leaders, investors, philanthropists and foundations, early child service providers (from prenatal health through prekindergarten), state officials, researchers, and media.
- 3. Determine whether there are state and federal laws, regulations, or practices that prevent effective utilization of PFS financing in Virginia. For example, the following questions arise:
 - a. Can prenatal home visiting PFS projects be established under current Virginia DMAS arrangements?

- b. What regulatory or statutory authority is necessary to ensure that there is no "clawback" of potential payments to support projects when Medicaid costs are reduced?
- c. Are governance or licensure changes necessary for managed care organizations to operate prenatal home visiting PFS projects?
- 4. Enact legislation and change policies to modernize current practices to align with successful PFS implementation. This includes removing any disincentives in the current fee-for-service model and alleviating concerns about immediate reduced capitation payments as medical costs fall.
- 5. Issue requests for proposals (RFP) to educate and obtain applications from private and public stakeholders managing early childhood programs that could use PFS financing to scale-up their operations. The information required should include data and longitudinal demonstrations of performance about activities that, if scaled up, could
 - a. Reduce the burden on taxpayers
 - b. Enhance opportunities for high quality early childhood education and home visiting providers to improve and expand their business models, as well as provide market growth opportunities for other providers to become high quality providers
 - c. Improve the life success prospects of Virginia children, and
 - d. Make the state more attractive to talented young adults and new businesses while strengthening its workforce.
- 6. Obtain funding to carry out feasibility evaluations of promising respondents to the RFP.
- 7. Arrange business, philanthropic, and public funding for interventions with strong feasibility results and high likelihoods of success.

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Appendices

Appendix A: Notes on Virginia's Workforce Challenge: Demographic and Income Trends

Major factors that contributed to Virginia's 50-year "golden age" have slowed, and some, like Virginia's dependency on federal spending, are now working in reverse. The result is a sharp drop in state government revenues, marking the first time in memory that Virginia annual tax collections declined when the US was not in an economic recession. At deeper levels the challenges are demographic, and addressing them requires focusing on workforce development, which in turn means starting at the beginning – infant and family wellbeing and early education – to raise the most team-ready productive young adults in the world and to strengthen Virginia's attractiveness to good businesses and talented young adults from around the world.

Recognizing this and the demographic and employability challenges Virginia faces, the Virginia Chamber of Commerce put early childhood at the top of its strategic plan for the state – 2014 Blueprint Virginia.¹⁰ The plan represents the combined work of local and regional chambers and more than 600 organizations across the state. The goal – start now to build a globally competitive workforce, and do it from the earliest moments of a Virginia child's life.

The Chamber focused Blueprint Virginia on early childhood because in the past decade, the science of human brain development has shown that the foundations for STEM skills and the teamwork capabilities needed for job success are established in the first five years of life.¹⁸

Virginia's workforce challenge: Job openings but not enough job-ready applicants

There are about 4.7 million job openings in the U.S.¹² but employers say they cannot fill many of them because of a "skills gap."¹³ This shortage of employable people, and especially people with the skills modern businesses and governments require, is a drag on growth.

According to Indeed.com, the job search website, there are currently more than 100 thousand job openings in Virginia.¹⁴ Again the obstacle to filling many of them is a shortage of qualified, particularly STEM skilled, applicants. "You can't work with a basic high school diploma today," said Brett Vassey, president and CEO of the Virginia Manufacturers Association." Sixty-five% of our occupational demand over the next five years are positions that require middle-level skills."¹⁶

Several major U.S. states are deeply concerned. New York has a population of about 19.7 million and estimates that if current education and labor market trends continue, the state will face a deficit of 350,000 workers for skilled jobs by 2020 – about 1.8% of the state's population. These are the jobs requiring more than a high school diploma but less than a 4-year degree.¹⁷

Virginia is no different. Virginia's population is about 8.3 million, and over the next ten years about 500 thousand seasoned older workers will retire, but only about 340,000 employable young adults will enter the labor force. This is a deficit of about 140,000, approximately 1.7% of the state's population.

Demographics and Employability

For Virginia the problem is a combination of demographics and employability. According to CareerBuilder in 2012 over 50% of Virginians employed in skilled trades were 45 or older. Currently a 21% of Virginia's workforce is qualified for retirement.¹⁶ As we will discuss in greater detail below, a 2009 Defense Department survey indicated that far more than half of U.S young adults age 18 to 24 cannot be employed by most businesses because they lack high school degrees, clean police records or adequate physical fitness.¹⁵

The situation will get worse in the years to come if strong actions are not taken. Declining birth rates, weakening inmigration, and the possible un-employability of more than half of Virginia's young adults, means Virginia will not have enough productive working age people to replace retiring employees and support economic growth.

Virginia's Job-Ready Gap

The math is simple. Virginia's total population is about 8.3 million. Of these, about 1.1 million will reach working age over the next ten years.¹¹² Even if we assume Virginia's young adults are healthier, more lawful and better educated than the other young adults in the 2009 Defense Department study, and have the high school degrees, clean police records and physical fitness private and public employers need, over the next ten years new young adult job entrants will total only about 340 thousand.¹⁵

At the other end of the age spectrum, about 1 million of Virginia's total population are 54 to 65 years old.¹¹³ This is the

bulk of the Baby Boom generation. About half of Virginia's total population, 4 million, is employed. This is Virginia's workforce and the foundation of Virginia's nearly \$470 billion GDP. Almost 500 thousand, however, are 54 to 65 years old, and we can safely assume that all but a handful will leave the workforce over the next ten years.

The Urgency of Workforce Development

Regarding near-term economic conditions, Secretary of Finance Richard Brown, a Virginia budget official for nearly 40 years, said, "You've got something different happening here…"¹ Stephen Fuller, director of the Center for Regional Analysis at George Mason University, commented regarding the usual powerhouse Northern Virginia counties, "The region has stopped growing. High wage jobs and most new jobs are paying below the average for all jobs."²⁰

The reasons for this have been building for several decades. Virginia is experiencing weaker young adult employability and federal spending cuts. These factors together with demographic aging, and declining birth-rates and in-migration, are leading to a situation in which almost certainly there will not enough ready-for-work young people to meet the state's human resource needs. Virginia Chamber of Commerce business leaders know that unless Virginia can build the human capital it needs to compete nationally and globally, current demographic and economic trends will continue and perhaps intensify.

Historically the counties that contributed most to Virginia growth were in Northern Virginia. Fairfax County, Arlington, and Alexandria have for decades been consistently in among the ten wealthiest and fastest growing counties in the nation. But that strength depended heavily on federal procurement. In the past three years, federal contracting has declined \$11 billion in Northern Virginia. David Versel of the George Mason Center for Regional Analysis stressed, "14% of our federal procurement economy has evaporated in the last 3 years."¹⁹

Versel added that since its peak in 2010, federal employment has dropped 5%, or 22,000 jobs. The area is now facing 22,000 fewer federal jobs than existed three and a half years ago. Versel also stressed that the private economy has not rebounded from the recession, "As of February of this year, we've actually only added back 170,000 jobs from the end of the recession. We lost 178,000 jobs during the recession. On a net basis, we are down 8,000 jobs from where we were six years ago in 2008 when the recession began."¹⁹

Statewide, federal spending has been hugely important for Virginia. The cutbacks that began in 2011 will continue far into the future. The impact of federal "sequestration" provides full insight into the scale of Virginia's dependence on federal spending. Job losses from sequestration were largest in the largest US state – California. However, though Virginia's population is far smaller than California's – 8.2 million people versus 38 million – Virginia's dependence on government non-defense and defense spending, resulted in job losses from federal sequestration and other budget cutting that were almost as large as California's despite having 1/4th the number of people. Virginia's total job losses amounted to 154,118, and California's 167,022. The next highest state was Texas with 118,287.¹¹⁴

Statewide Personal Income is Weakening

Virginia's current conditions are not solely the result of federal budget trends, nor are they recent.

The rate of growth of personal income rose strongly in the 1970s and 1980s as the Baby Boomers entered the labor force. Since the 1970s, however, personal income growth has been trending down, and in each major recession the falloff has been deeper.

Young adult employability is at risk

Of all the dimensions that matter for economic and personal income growth, the most important is the employability of young adults. As noted earlier, the 2009 Department of Defense study showed that during the Great Recession, when millions of young adults sought jobs in the armed services, about 75% of them could not qualify to be a US Army Private. They could not qualify because they had criminal records, health problems such as obesity, and no high school degree.¹⁵

Virginia has about 830,000 young adults between the ages of 18 and 24. If they are like the young adults studied by the Defense Department, more than 600,000 of them lack the education, fitness or police records needed to qualify for Armed Service employment. This means these people cannot qualify for most private or public sector jobs either. The competitiveness implications for Virginia, together with declining Federal spending and softening population growth rates, are enormous.

Very importantly, the Generals and Admirals who prepared that DOD report point out that the capabilities that lead to

¹ Michael Martz, "Larger state shortfall means more budget cuts" Richmond Times-Dispatch, Thursday, July 10, 2014 6:45 pm. http://www.timesdispatch. com/news/state-regional/larger-state-shortfall-means-more-budget-cuts/ article_9425218a-0870-11e4-8094-001a4bcf6878.html

Virginia Personal Income: Quarterly Percent Changes 1953-2013



Armed Service fitness are established before the age of five. Within these years, the most important months are the earliest when a child's brain, social interaction capacities and key personality traits such as trust and persistence are occurring fastest.

Virginia labor force growth is slowing and workers are aging

Payroll job growth reached its peak in the twenty-five years from the late 1960s through the early 1980s. There were surges in growth following recessions, but the peaks were generally not as high as earlier ones, and dips in growth during recessions were generally deeper, indicating weakening conditions.

Similarly, the number of employed Virginians as a percent of total residents has been declining since the 1970s, and in each recession the percent employed probed new depths.

The decline in the percent of employed residents is partly explained by population aging. As shown on the next page, the portion of the population that represents new job entrants and core employees – the all-important age 25 through 54 share – is declining and the portion consisting of age 65+ is growing.



Virginia Payroll Job Growth: Annual Percent Change 1944 - 2013

Source: U.S. Census Bureau (Population Estimates) and GMU Center for Regional Analysis



Virginia Residents: Percent Employed 1977 - 2013

Percent Change in Age Group Share of Total Virginia Population



Age Group Share of Total Virginia Population



Source: U.S. Census Bureau (Population Estimates) and GMU Center for Regional Analysis

Population growth is slowing

Natural increase (births less deaths) and net migration account for 100% of population growth, but the proportion that each accounts for varies from year to year. In the 1970s Boomer generation family formation caused natural increase to dominate.

During Virginia's early 1980s "Golden Years", net in-migration by businesses and talented people attracted to the state, dominated and contributed to more than half of state's growth. As new-comers became settled and Boomers moved into full maturity in the 1990s, and family formation got underway, the trend changed with natural increase once more on the ascendance.¹¹⁵

While net migration into the state increased somewhat in 2012, the trend is down, and the amounts were swamped by the natural decline in total population resulting from more deaths than births.







Source: U.S. Census Bureau (Population Estimates) and GMU Center for Regional Analysis





Source: U.S. Census Bureau (Population Estimates) and GMU Center for Regional Analysis



Virginia Population Growth: Annual Amounts

Source: U.S. Census Bureau (Population Estimates) and GMU Center for Regional Analysis

But Virginia is not unique. Slowing population growth and more rapid aging is occurring across the U.S. and worldwide.

In 2013 the first wave of "Baby Boomers" was somewhere around the age of 68. Then come Gen X (1960s to the early 1980s).

Following them is Gen Y (1980s to the early 2000s), the "Millennials" or "Echo Boomer" children of the Boomers.

The first wave of the generation after the Millennials, so-called Generation Z, is much smaller.

Complicating all of this is the low birthrate for women who are in what are traditionally considered prime childbearing years.

The expected surge of births from the large "Echo Boom" cohort of women in their late 20's and 30's, has simply failed to materialize.

The U.S. is not alone. The growth rate of the world population is slowing. This is critically important. The worldwide growth surge that took place in the second half of the last century was unprecedented and accounts for a major part of the prosperity experienced during that time. To a significant degree, a world economy that organized itself to sell to and accommodate the needs of a population growing as fast as the one following WW2, would be disappointed by the growth rates seen in the last decade or so and which will most likely continue long into the future.

Virginia's Estimated Population, 2013



Source: The Census Bureau



Source: Wikipedia: "Demographics of the United States" http://en.wikipedia.org/wiki/Demographics_of_the_United_States





Source: Wikipedia: "Demographics of the United States" http://en.wikipedia.org/wiki/Demographics_of_the_United_States



Appendix B. Pay for Success Social Impact Finance Basics: Organization, Funds Flows and Examples



Flow of Funds in a PFS Project (arrows)



Putting it all together—A PFS Project



Rikers Island Recidivism Cognitive Behavioral Therapy Project

The nation's first social impact finance project was initiated in the summer of 2012 by the Bloomberg Foundation, Goldman Sachs, and MDRC. The project implements a cognitive behavioral therapy program for 16- to 18-year-olds detained at New York City's Rikers Island with the goal of reducing the high recidivism rate for this population by focusing on personal responsibility education, training, and counseling.

Riker's Island Project: Addressing NYC Adolescent Incarceration

- 1. Goldman Sachs funds the project's delivery and operations through a \$9.6 million loan to MDRC;
- 2. Bloomberg Philanthropies provides a \$7.2 million grant to MCRD to guarantee a portion of the investment;
- 3. MDRC oversees the day-to-day implementation of the project and manages the Osborne Association and Friends of Island Academy, the two non-profit service providers that deliver the intervention;
- 4. The Vera Institute of Justice, an independent evaluator, determines whether the project achieves the targeted reduction in re-incarceration;
- 5. The Department of Correction pays MDRC based on reduced re-admissions and the associated cost savings and MDRC then pays the private investor.

Rikers Island: Addressing NYC Adolescent Incarceration



Salt Lake City, Utah, Granite City Preschool Project

The first early childhood PFS social impact finance project in the U.S. was initiated in Salt Lake City, Utah by the Salt Lake United Way, Goldman Sachs, J.B. Pritzker and the Granite School District Preschool, based on feasibility research done by Voices for Utah Children.

Scaling Pre-K for Low-Income Kids in Salt Lake City—1

- Goldman Sachs makes \$4.6 million, 5% loan to United Way of Salt Lake
- J.B. Pritzker makes \$2.4 mm 5% subordinated loan to United Way of Salt Lake, reducing risk to the senior lender if the preschool program proves to be ineffective
- United Way of Salt Lake is the "intermediary" and oversees the implementation of the project and is also responsible for managing repayments to the private investors.
- Imprint Capital serves as social investment banker.

Scaling Pre-K for Low-Income Kids in Salt Lake City—2

- Voices for Utah Children provides research and analytic support
- Granite School District and others provides the preschool program to low-income 3 and 4 year olds
- Early Intervention Research Institute, Utah State University, is the "thirdparty evaluator"
- Park City Community Foundation acts as the Performance Account Manager, providing an independent "performance account" to hold repayment funds

Scaling Pre-K for Low-Income Kids in Salt Lake City—3

- After initial funding, subsequent investments will be made based on the availability of repayment funds from public entities that are realizing cost savings as a result of the program.
- Through 6th grade
 - Success payments, equal to 95% of special-ed cost avoidance, will be used to pay 5% annual interest and repay senior and subordinate debt principle.
 - Success fees, equal to 40% of specialed cost avoidance, will be paid to investors after debt principle has been repaid.
- After 6th grade, 100% of all special-ed cost avoidance will be retained by Utah





Establishing Feasibility

The most critical part of developing a PFS project is the feasibility research that establishes financial viability.

Feasibility analysis is the first step in PFS Finance

- What must feasibility analysis cover? Ten essential items...
- Are randomized control trials needed? Short answer is no...
- How do you find interventions worthy or feasibility studies? RFIs, surveys and assessments...

The feasibility study that justifies investing in a PFS project, is like a home mortgage appraisal...

- Mortgage lenders don't make a loan based on the average value of homes in a city; they make a mortgage on a home based on a careful appraisal of the value of that specific home.
- PFS feasibility analysis provides information to investors on a specific intervention and its effects on the performance of a specific category of children in a specific region.

Discussions to date have identified 10 essential elements feasibility research must document.

The ten items feasibility studies must analyze...

- 1. <u>The intervention and its recipients and non-</u><u>recipients</u>
- 2. <u>Other interventions</u> recipients may have been exposed to earlier
- 3. Data about recipients and non-recipients
- 4. <u>Longitudinal analyses</u> of recipient and nonrecipient, post-intervention performance
- 5. <u>Cost avoidance</u> by specific government or other entities
- 6. <u>Outcome improvements</u> sought by county, state, federal & other entities
- 7. <u>Workability of contracts</u> with agencies, providers & evaluators
- 8. Ability of <u>third-party evaluators</u> to confirm cost avoidance and outcome improvements
- 9. Likely funding sources and capital structures
- 10. Likely <u>time path of success payments</u> and return of capital

Are randomized control trial (RCT) results needed to support a PFS project?

The short answer is no.

However, careful longitudinal outcome comparisons of the performance of actual local intervention recipients and non-recipients, are absolutely necessary

Feasibility study statistical findings regarding familiar RCT-backed interventions, need only be strong enough to provide funders with reasonable assurance that they will get their money back.

The statistical standard for PFS is not what's necessary for scientific proof, only what is needed to satisfy business judgment