Investing in the Early Years

The Costs and Benefits of Investing in Early Childhood in New Hampshire

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Key Findings

- A sizable share of young children in New Hampshire (ages 0 to 5) face risks in early childhood because of low income and other factors that may compromise healthy development.
- Children who experience low income and other early-life adversities enter school with lower levels of readiness than their peers in higher-income families or with fewer adverse experiences. For New Hampshire, these patterns result in considerable gaps in student achievement and attainment by income level, with consequences for the productivity of the future workforce.
- Public investments in young children in New Hampshire—such as home visiting in the first few years of life, subsidized child care, and early learning programs—are not funded to reach all income-eligible children and their families, nor do they to reach higher up the income ladder where children still face risks in early childhood.
- A growing body of evidence documents benefits in multiple domains from home-visiting models that serve at-risk mothers, begin prenatally, and continue through the first few years of the child's life. The strongest evidence for sustained benefits comes from the Nurse-Family Partnership (NFP) program. Our benefit-cost analysis for New Hampshire of an NFP program that would serve first-time economically disadvantaged mothers shows a return of about $4 to $6 for every dollar invested.
- Extensive research has documented the short- and longer-term benefits of participating in scaled-up high-quality preschool programs, particularly for children in low- to moderate-income families. Our benefit-cost analysis for New Hampshire of a high-quality, one-year, voluntary preschool program that would be available to children in families with income up to three times the federal poverty level indicates a positive return of about $2 for every dollar invested, with an even higher return for a program targeted at the lowest-income children.

In recent years, a confluence of research has called attention to the importance of investments in early childhood, from home visiting programs that start during the prenatal period to high-quality preschool one or two years before kindergarten entry. A first line of research is from leading developmental theories in disparate disciplines, including psychology, neuroscience, and economics, that have highlighted the importance of the early years in promoting children's cognitive, social, emotional, behavioral, and physical development, with consequences for lifelong health and well-being.[1] A second strand of research provides extensive empirical evidence from rigorous evaluations regarding the effectiveness of early interventions—both smaller-scale model programs and large scale ones implemented at the national, state, and local levels.[2] A third component is the mounting evidence base regarding the economic returns from investments in high-quality early childhood programs, with benefits that accrue to program participants and to society as a whole.[3] Indeed, investments in effective early childhood programs have been singled out for their economic development benefits in terms of their impact on the skills and productivity of the future workforce.[4]

Motivated by this same evidence base, stakeholders in the public and private sectors in New Hampshire have been focused on advancing investments in young children, from birth to kindergarten entry, especially for the state's most vulnerable children. Nationally, New Hampshire ranked fourth in 2016 on the Annie E. Casey Foundation's index of child well-being,[5] but that bright picture conceals significant pockets of poverty and disadvantage, especially for young children. As of 2015, about 12,000 children under age 6 (or 12 percent of that age group) lived in families with income below the federal poverty level (FPL).[6] Further, the young child poverty rate has been on an upward trajectory (consistent with the national trend), having stood at 9 percent at the time of the 2000 decennial census (see Figure 1).

Figure 1. Trend in Young Child Poverty Rate for New Hampshire and the United States (1999–2015)
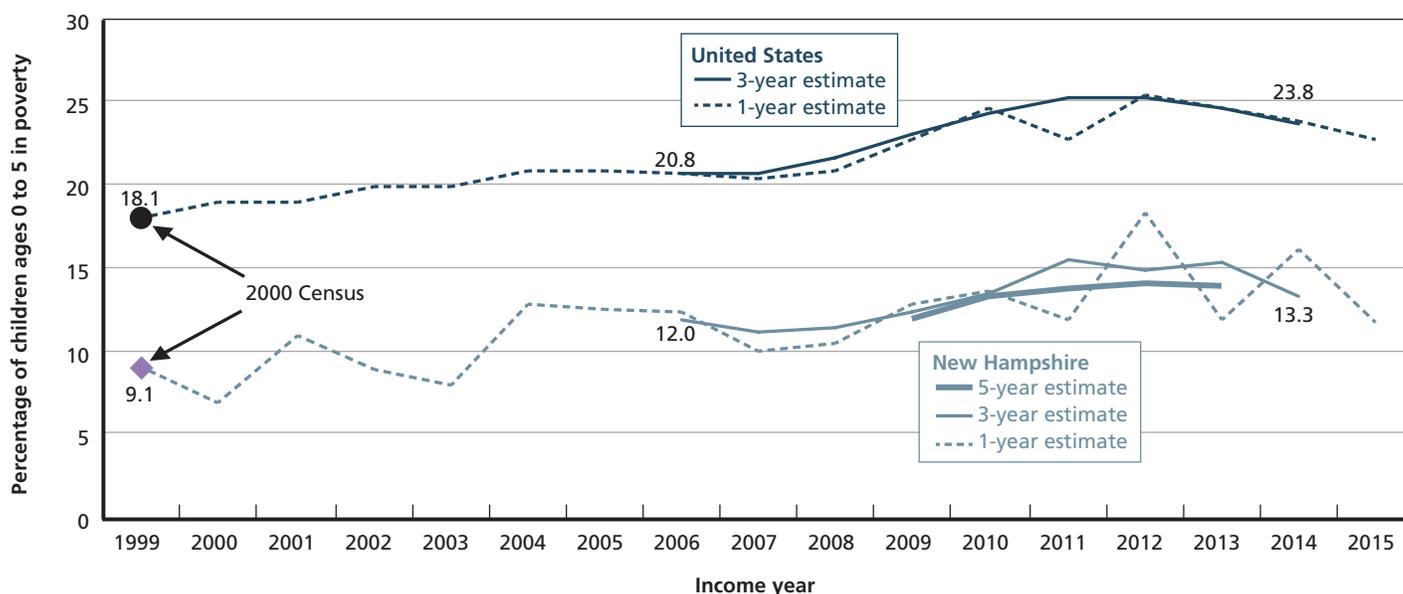
SOURCES: For 2005 to 2015: U.S. Census Bureau, *American FactFinder*, website, undated, Table B17001. As of January 28, 2017: https://factfinder.census.gov/
For 2000 to 2004: Annie E. Casey Foundation, *KIDS COUNT Data Center*, website, undated. As of January 28, 2017: http://www.datacenter.kidscount.org/
NOTES: All estimates are based on the American Community Survey (ACS) except for 1999 which is based on the 2000 Census. Given the relatively small population in New Hampshire, estimates of the young child poverty rate based on a single-year ACS have more measurement error compared with the estimates for the United States. Estimates averaged over 3 or 5 surveys (plotted based on the middle year in the pooled data) are more reliable for discerning the trend.
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Other indicators captured in the KIDS COUNT database show sizable numbers of children in New Hampshire at risk of compromised development.[7] Estimates indicate, for example, that 21 percent of children under age 6 are at moderate to high risk of developmental, behavioral, or social delays. Home investments in children's learning may be limited: 11 percent of New Hampshire children younger than than age 6 are read to fewer than three days per week. Other indicators for all children demonstrate various stressors in children's lives that can affect their development. For example, recent estimates indicated that 26 percent of New Hampshire children live in households with a high housing cost burden (that is, more than 30 percent of monthly income was spent on housing costs); 17 percent live in households that are food insecure; and 23 percent have experienced two or more adverse childhood experiences (ACEs).[8] These early-life and ongoing disadvantages in childhood have consequences for children in terms of lower levels of readiness for school, diminished educational outcomes once they enter school, and less successful outcomes in the labor market, family life, and civic life upon reaching adulthood. One telling indicator is that just 77 percent of economically disadvantaged New Hampshire high school students

graduate on time within four years.[9] Boosting the high school graduation rate for the state is critical, given the forecast for a state economy by 2020 in which 68 percent of jobs will require a postsecondary credential or degree.[10]

Despite the need, New Hampshire has been slower than other states to increase investments in early childhood programs. For example, under the federal Maternal, Infant, and Early Childhood Home Visiting (MIECHV) Program, New Hampshire implements the Healthy Families America (HFA) home visiting model, but, as discussed later in this report, the reach is modest (about 250 families annually).[11] New Hampshire remains one of eight states without a state-funded preschool program (although special education preschool services are available to children with disabilities through federal funding under Part B of the Individuals with Disabilities Education Act [IDEA]).[12] Federal child care subsidies are available to low-income working families, but the cost of child care relative to family income, especially in single-parent families, is high.[13] Although a statewide voluntary quality rating and improvement system (QRIS) is in place and covers all licensed center- and home-based providers at the first level, relatively few centers and almost no family child care (FCC) providers have attained

the second or third (highest) rating tiers.[14] In sum, there is scope both to increase access to early childhood programs and to raise the quality of those currently provided.

In recognition of the opportunity to expand early childhood investments, important groundwork has been laid in terms of conducting a statewide needs assessment;[15] building infrastructure within and across the public and private sectors for collaboration and policy change—for example, establishing Spark NH (the state Early Childhood Advisory Council) and outreach efforts to the business community and public at large; developing a comprehensive plan for early childhood;[16] and establishing an early childhood policy agenda.[17] The goal of this study is to build upon this foundation by conducting an economic analysis of the costs and benefits of investing in evidence-based early childhood programs targeted toward at-risk children. In particular, this report seeks to contribute the following:

1. an assessment of the landscape of current investments in early childhood programs in the state

2. a synthesis of the research evidence on the benefits and economic returns of three strategies for early intervention—namely, home visiting in the first few years of life, high-quality child care for young children, and high-quality preschool

3. an analysis of the costs and benefits of statewide investments in those early childhood programs for at-risk children that have evaluation evidence that is amenable to economic analysis.

For the third component, our economic analysis of the costs and benefits of proven intervention strategies draws on research evidence of programs implemented in other parts of the United States because none of the evaluation research for these types of interventions have been conducted in New Hampshire. Where possible, data specific to New Hampshire are used to determine the composition of the at-risk population that would be served, account for the existing level of services in the state, and employ state-specific estimates of the expected cost of program implementation and expected value of the resulting outcomes.

The report proceeds in five sections. The next two sections begin by profiling the early childhood landscape in New Hampshire, first in terms children at risk and then in terms of current public-sector investments in three early childhood interventions of interest: home visiting in the first few years of life, high-quality child care, and high-quality preschool. Next,

we review the evidence of favorable impacts from participation in these three interventions. We then present our estimates of the costs, benefits, and economic returns for two of the three early intervention strategies, considering the sensitivity of the results to alternative assumptions. A final section summarizes the results and identifies implications for policy. Technical details of the analyses are documented in a separate appendix available online.

YOUNG CHILD POPULATION IN NEW HAMPSHIRE

With the growing recognition of the importance of the first five years of life for healthy child development in multiple domains—cognitive, social and emotional, behavioral, physical—our analysis is focused on children in New Hampshire from birth to kindergarten entry. In support of the economic analysis, we assemble the demographic information necessary to measure the size of the young child population in the state. From that population, we identify the target populations of interest for each intervention, such as annual births to low-income mothers and the size of each kindergarten entry cohort with family income below poverty (or some multiple of poverty).

Size of the Young Child Population

Data from the ACS document that, in 2015, there were nearly 78,000 children ages 0 to 5 in the state (see Table 1). Excluding those enrolled in kindergarten or higher grades, we estimate that close to 70,000 children are in the age range of interest.[18] For purposes of modeling, we assume that each annual cohort of children consists of about 12,800 children. These annual cohorts may be defined based on year of birth or on school-entry cohorts (that is, the group of children eligible to enter kindergarten in the same cohort based on the kindergarten cutoff date).[19]

During the first five years, children might face a variety of risk factors that can leave them vulnerable to compromised development. We focus first on one key risk factor: low family income. Because we are interested in interventions that begin before birth and into the first few years of life, we also focus on additional risk factors at birth. Given our interest in targeted interventions, these data help to define the at-risk population that could benefit most from effective early childhood programs.

Table 1. Estimated Number of Children in New Hampshire—in Total and Excluding Children in Kindergarten (2015)

Indicator	All Children	Excluding Children Enrolled in School
Total	77,992	69,712
Less than age 1	12,784	12,784
Age 1	12,612	12,612
Age 2	12,994	12,994
Age 3	12,717	12,717
Age 4	13,487	13,227[a]
Age 5	13,398	5,378[a]

SOURCES: Author's analysis of 2011–2015 ACS Public Use Microdata Sample (PUMS) file and U.S. Census Bureau, undated, Table PEPSYASEX.
NOTES: The second column excludes children enrolled in kindergarten or a higher grade based on data on school enrollment by age computed from the 2011–2015 ACS PUMS file.
[a] Imputed.

Children at Risk Because of Low Family Income

Programs targeted toward low-income children typically base eligibility on income relative to the FPL. The U.S. Census Bureau determines the FPL, which is actually a series of annual income thresholds—intended to capture the minimum resources adequate to meet a family's basic needs—that vary with family size and the number of dependent children.[20] For example, as of 2015, a family with one adult and two children is defined as living in poverty if their annual cash income before taxes falls below $19,096 (see Figure 2).[21] Two times the FPL (or 200 percent of FPL) is often used to define low family income.[22]

It has long been recognized that the FPL establishes a low bar that is not consistent with the resource requirements for an adequate standard of living.[23] Furthermore, the FPL does not reflect variations in the cost of living across the country. Another approach is to consider the level of income that would allow a family to meet their needs and be self-sufficient (for example, not reliant on means-tested transfers). One such measure is the annual income thresholds for families with varying compositions

Figure 2. Federal Poverty Level and Estimated Self-Sufficiency Budget by Family Composition for New Hampshire (2015)
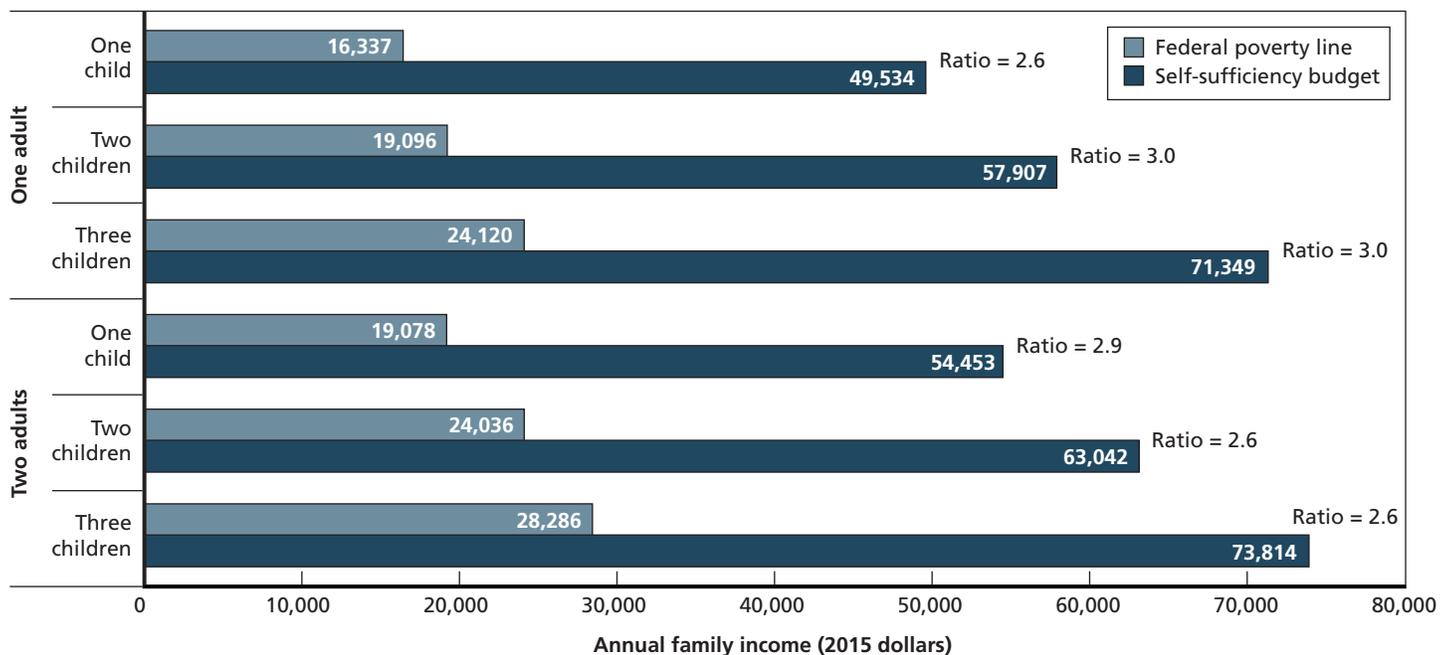
SOURCES: U.S. Census Bureau, 2016; Glasmeier, 2017.
NOTE: The self-sufficiency budgets for families with two adults assume that both adults are working.

calculated for New Hampshire by the Massachusetts Institute of Technology (MIT).[24] These budget-based thresholds account for the costs in New Hampshire for food, housing, child care, health care, transportation, and other basic necessities, as well as taxes, adjusted based on the number of adults and children. According to the MIT calculator, a family in New Hampshire with one adult and two children would need an annual income of $57,907 as of 2015 to achieve this level of self-sufficiency, an income level that is three times the FPL (see Figure 2).[25] At this level of income, for example, a family would have sufficient income to be able to pay for the cost of a high-quality child care or preschool program for one child. The ratio between the FPL and self-sufficiency budget thresholds ranges from about 2.6 to 3.0 for the family configurations shown in Figure 2.[26]

In New Hampshire, several targeted (that is, means-tested) programs that serve children or families with children recognize that public assistance programs must reach higher up the income scale than the FPL, given the high cost of health insurance, health care, and child care. For example, the Children's Medicaid program provides free health and dental coverage for children in families with net income up to 196 percent of FPL. The Expanded Children's Medicaid program reaches even farther, to 318 percent of FPL. As discussed later, subsidized child care in New Hampshire, known as Child Care Scholarship, is available for children in families with income up to 250 percent of FPL. With the self-sufficiency standard in mind and the thresholds used in these other targeted programs for vulnerable children, we define at-risk children based on family income using thresholds of 100, 200, and 300 percent of FPL for the remainder of this report.

The ACS provides information on family incomes for the population of children younger than age 6 as of 2015 (see Table 2). Across that age range, about 12 percent lived in

families with income that falls below the FPL. Although New Hampshire has one of the lowest child poverty rates in the United States, in each annual cohort of about 12,800 children, around 1,500 will be counted as living in poverty using the FPL. Given that the FPL falls well below the level of income that would be required for an adequate standard of living, it is worth nothing that about 30 percent of the state's youngest children had family income below 200 percent of FPL. Measured against the self-sufficiency standard of about 300 percent of FPL, 45 percent of New Hampshire children under age 6 would be counted as have income below an adequate standard of living. That equates to about 5,800 children in each annual cohort who are living with family income that does not reach self-sufficiency standard of three times FPL.

Children at Risk at Birth

Based on birth certification data assembled by the Centers for Disease Control and Prevention (CDC), there were about 12,400 births in New Hampshire in 2015 (see Table 3), which is slightly below the Census Bureau estimate of the number children younger than age 1 in 2015 (see Table 1). Of those total births, key subgroups that may have been at risk in terms of a healthy pregnancy and subsequent healthy child development include babies with low birth weight, born to teen mothers, and born to unmarried mothers. Other groups that are not routinely counted include babies born to women who are homeless or abusing drugs and/or alcohol.

For these key subgroups, the CDC reports that 6.9 percent of babies born in New Hampshire in 2015 (nearly 900 babies) were classified as low birth weight. Based on state birth rates in 2015 of 10.9 births per 1,000 teens ages 15 to 19, we estimate that about 550 births were to teen mothers, most of whom were

Table 2. Estimated Distribution of Children Ages 0 to 5 in New Hampshire by Income Relative to the FPL

Indicator	Percentage Distribution of Children Ages 0 to 5		Numerical Distribution of Single-Year Cohort of 12,800 Children	
	Percentage	Cumulative Percentage	Number[a]	Cumulative Number
Family income relative to the FPL				
<100	11.8	11.8	1,510	1,510
100–199	18.2	30.0	2,330	3,840
200–299	15.0	45.0	1,920	5,760
300 and above	55.1	100.0	7,040	12,800
Total	**100.0**	—	**12,800**	—

SOURCES: U.S. Census Bureau, undated, Table B17024; author's calculations.
NOTES: Percentage distributions might not total 100 percent because of rounding.
— = not applicable.
[a] Imputed estimates rounded to nearest 10.

Table 3. Birth Statistics for New Hampshire (2015)

Indicator	Number of Births	Percentage of All Births
Total births	12,433	—
Births classified as low birth weight (< 2,500 grams)	858[a]	6.9
Births to teenage mothers age 15 to 19	555[a]	4.5
Births to unmarried mothers	4,227[a]	34.0
Births to mothers with less than 12 years of education[b]	818	7
Births to mothers who smoked during pregnancy[b]	1,685[a]	13.7
Births by income-to-poverty ratio of mother		
Up to 100 percent of FPL	1,497[a]	12.0
Up to 100 to 199 percent of FPL	2,249[a]	18.1
Up to 200 to 299 percent of FPL	1,971[a]	15.9
300 percent of FPL and above	6,716[a]	54.0

SOURCE: Author's analysis of Annie E. Casey Foundation, 2017; 2011–2015 ACS PUMS file; and CDC, "Stats of the States," web page, January 17, 2017. As of January 28, 2017: https://www.cdc.gov/nchs/pressroom/stats_of_the_states.htm

NOTES: Imputations are made based on the CDC-reported rates of teen births, nonmarital births, and low birth weights, and the distribution of income-to-poverty for children ages 0 in New Hampshire in the 2011–2015 public use microsample data for the ACS.

— = not applicable.

[a] Imputed.

[b] Data for 2014.

first-time mothers.[27] The CDC also reports that 34 percent of New Hampshire births (about 4,200) in 2015 were to unmarried mothers. Other risk factors include mothers with less than 12 years of education (7 percent of births) and mothers who smoked during pregnancy (14 percent of births). Finally, although birth certificates do not report the income levels of the mothers, we estimate—based on ACS data on the distribution of income for New Hampshire infants under the age of 1—that about 1,500 births (12 percent of total births in the state) were to women with incomes below FPL. About 45 percent of all births were to mothers whose income was 300 percent of FPL or less. There is considerable overlap in these various groups—teenage mothers are likely to be unmarried and have low education and low income. The bottom line is that as many as one in three children born in New Hampshire could be considered at risk in terms of a healthy birth outcome or in terms of children being born into low-resource environments.

Other Risk Factors

Beyond measures of income and circumstances at birth, there are an array of other indicators of risk that are relevant for New Hampshire and often belie the state's otherwise relatively high ranking on indicators of family, maternal, and child well-being. For example, although New Hampshire is rated third in the United Health Foundation's state rankings of the health of women and children, it ranks near the bottom for such indicators as excessive drinking by women ages 18 to 44 (22 percent

of that population, for a state rank of 40th, where a larger rank is a worse outcome) and lifetime incidence of intimate partner violence (40 percent of women, state rank of 41st). In the midst of the opioid crisis, the state also ranked 40th in the number of drug deaths (17 per 100,000 women ages 15 to 44).[28] These unfavorable behaviors and outcomes for women translate into risks that their children face, either through compromised pregnancies or in the stressors these children are likely to face in the early years.

It is also important to keep in mind that children often experience more than one risk factor, which intensifies their vulnerability. According to data from the National Center for Children and Poverty, 37 percent of New Hampshire children from birth to age 5 face one or two of the following direct and indirect measures of low-resource families: low income (less than 200 percent of FPL), low parental education, teen mother, unmarried parent, unemployed parent(s), a large family, and no English speakers in the household. Eleven percent of young children in New Hampshire experience three or more of these risks.[29]

Consequences of Growing Up in Poverty

An extensive body of research has documented the short- and longer-term consequences for children of growing up in poverty or with low family income.[30] As a result of limited family resources, parents and caregivers are not able to invest in their children's health and development in the same way that middle- and upper-income families can. For example, these children are

more likely to be living in housing that is unsafe or unhealthy, with exposure to lead and other neurotoxins, as well as various environmental factors that trigger asthma and other health problems. They are also more likely to be living in neighborhoods with higher levels of crime and violence and attending schools with diminished resources. These and other factors produce stressors, often call toxic stress, that can rewire the architecture of the brain and thereby affect learning and behavior.[31]

During the school-age years, the consequences of growing up in a low-income household are readily evident. New Hampshire does not have a statewide school readiness assessment, but data from other states clearly show that children living in families with low income and other early adversities enter school with lower levels of readiness than their peers in higher-income families or with fewer adverse experiences.[32] The differences in school outcomes by family income are manifested in student achievement test scores and, eventually, in high school graduation rates (see Table 4). For example, for the 2015–2016 school year, 61 percent of New Hampshire students statewide in grades 3 to 8 were assessed as proficient in English language arts; 49 percent were proficient in mathematics. The rate of proficiency was 10 to 13 percentage points lower for those students classified as economically disadvantaged. (The rate of proficiency was not reported for those students who were not economically disadvantaged, but the gap would be even wider than the comparison with the average.)

The 2015 National Assessment of Educational Progress (NAEP)—known as the nation's report card—shows an equally striking gap for New Hampshire students' proficiency in reading and mathematics based on family income (below versus above 185 percent of FPL) as of both grade 4 and grade 8, ranging from 24 to 29 percentage points depending on the subject and grade. For low-income New Hampshire students entering high school, 77 percent will graduate on time in four years, compared with 93 percent of those who are in the higher income group. The students who are economically disadvantaged constitute nearly 30 percent of public school students in New Hampshire, so the educational achievement and attainment shortfalls affect a substantial share of the state's future workforce.

These educational differences translate into differential outcomes on other life-course outcomes, including health, labor market performance, and other aspects of adult functioning. For example, although data are not available specifically for New Hampshire, research using nationally representative data sources indicates that children who are born into a family living in poverty and who spend multiple years living in poverty have worse outcomes in adulthood, such as a reduced likelihood of graduating from high school, a higher incidence of having a teen nonmarital birth, and a reduced rate of being consistently employed in adulthood.[33] Although such unfavorable outcomes are more prevalent for children in families with income below FPL, the incidence remains high for children in families with low income

Table 4. Student Performance Measures for New Hampshire by Family Economic Status

Indicator	Total	Economically Disadvantaged	Non- Economically Disadvantaged
2015–2016 statewide student assessment			
Percentage proficient in English language arts, grades 3 to 8	61	38	—
Percentage proficient in mathematics, grades 3 to 8	49	39	—
2015 NAEP assessment			
Percentage proficient in reading, grade 4	46	26	54
Percentage proficient in mathematics, grade 4	51	31	60
Percentage proficient in reading, grade 8	45	27	51
Percentage proficient in mathematics, grade 8	46	25	53
2014–2015 four-year adjusted cohort graduation rate	88	77	93[a]

SOURCES: 2015–2016 State Assessment Results: New Hampshire Department of Education (NHDoE), "New Hampshire Students Show Improvement on State-wide Assessment Results," web page, November 1, 2016. As of January 28, 2017: http://www.education.nh.gov/news/assessment-results-15-16.htm; NAEP: NCES, "NAEP State Profiles," web page, undated. As of January 28, 2017: https://nces.ed.gov/nationsreportcard/states/; Graduation Rate: NHDoE, "Cohort Graduation and Dropout Rate" data file, "Dropouts and Completers" web page, February 22, 2016. As of January 28, 2017: http://www.education.nh.gov/data/documents/cohort_report_14-15.xlsx

NOTES: For the New Hampshire statewide assessment, proficient is defined as level 3 or 4, meaning the student meets or exceeds the achievement-level benchmarks. For the NAEP, economically disadvantaged refers to those students eligible for a free or reduced-price lunch (that is, below 185 percent of FPL). — = not reported.

[a] Imputed. The graduation rate is not reported for the non–economically disadvantaged group. This estimate was made assuming 29 percent of high school students were economically disadvantaged, which is the percentage of all New Hampshire K–12 public school students who are eligible for a free or reduced-price lunch.

(up to two times the poverty level) or even up to the middle of the income distribution. For example, at a national level, the dropout rate for youth ages 16 to 24 is about 10 percent for those in the lowest quartile of family income (i.e., the bottom 25 percent), but still 7 percent for those in the next income quartile.[34]

These and other adverse outcomes ultimately have economic consequences for the individual, such as lower lifetime earnings, but society will bear the costs as well, through a lower tax base and higher costs for social welfare programs and crime. For example, estimates for the United States indicate that childhood poverty reduces U.S. annual gross domestic product by 4 percent as a result of the reduced productivity and lost economic output associated with lower levels of educational attainment, the increased cost to the health care system because of diminished health, and the cost of crime that would be expected to result because of lower educational attainment.[35] The lifetime cost to society of one high school dropout, discounted to age 18, is estimated to be $480,000 to $720,000, accounting for lost productivity (earnings and fringe benefits) and losses associated with outcomes affected by educational attainment, such as poorer health.[36]

CURRENT PUBLIC INVESTMENTS IN EARLY CHILDHOOD PROGRAMS

Before conducting an analysis of increased early childhood investments in New Hampshire, it is important to understand the current baseline level of funding and participation in the early childhood interventions being modeled. We focus on three areas of current early childhood investment in the state: home visiting; early learning programs, including preschool; and subsidized child care. Note that we do not cover funding for children with special needs through IDEA Part B and Part C, which provide early childhood services to children with an Individualized Family Service Plan (IFSP) or Individualized Education Plan (IEP).[36] Table 5 summarizes the features of the publicly funded early childhood programs we examine, while Table 6 tabulates the funding and reach of each program. These two tables serve as a reference for the discussion that follows.

Maternal, Infant, and Early Childhood Home Visiting Program

Based on an extensive base of evaluation findings documenting multiple benefits from well-designed home visiting programs serving at-risk mothers and children, the federal government has been investing in such programs since 2008.[38] A significant expansion of federal support came with the establishment of the MIECHV Program as part of the 2010 Affordable Care Act (ACA). The MIECHV Program allocates formula-based grant funds to states and territories to implement voluntary home visiting models that seek to improve maternal and child health, prevent child abuse and neglect, advance positive parenting, and promote child development and school readiness. Seventy-five percent of funds must be used for evidence-based models. As of federal fiscal year (FFY) 2016, 17 programs using such models were identified as effective—including HFA and NFP, which are considered in this study. Up to 25 percent of funds may be used for promising approaches that are subject to rigorous evaluation. Eligibility is based on a local needs assessment that identifies the most-vulnerable populations and the communities where they live.

Home Visiting New Hampshire (HVNH)—administered by the New Hampshire Department of Health and Human Services (NHDHHS) Maternal and Child Health Section (MCHS)—has funding through the MIECHV Program and implements the HFA model in disadvantaged communities throughout the state.[39] The program builds on earlier pilot programs in the state dating back to 1997. The program prioritizes a number of at-risk groups, including pregnant adolescents, new mothers under the age of 25, women pregnant with their first child, women at risk for having health problems during their pregnancy, and pregnant women or mothers with substance abuse problems. Women are served during pregnancy or soon after birth and continue for the first three years of the child's life, although the participant may voluntarily leave the program prior to that milestone.

After a revision in the funding formula, HVNH received $2.983 million in formula-based funding under MIECHV for FFY 2016—up from $1 million in the prior fiscal year—and served 325 families. This new formula is expected to produce a more stable level of funding in the future.

Early Head Start and Head Start

The federally funded and administered Head Start has its origins in 1965 in the federal War on Poverty. The program provides free (no family fee) comprehensive education, health, nutrition, and social services to disadvantaged 3- and 4-year-olds for one or two years before kindergarten entry. When Head Start was reauthorized in 1994, Early Head Start was added to provide fully subsidized part- or full-time care and other supports for pregnant women and their children under age 3. Both pro-

Table 5. Features of Publicly Funded Early Childhood Programs in New Hampshire

Feature	MIECHV Program	Early Head Start	Head Start	Title I	District Preschool	Child Care Scholarship
Program type	Home visiting	Home visiting/ early learning	Preschool	Preschool	Preschool	Child care subsidy
Funding source (Administrator)	Federal (NHDHHS)	Federal (U.S. Department of Health and Human Services [USDHHS])	Federal (USDHHS)	Federal (school districts)	Local and federal IDEA (NHDoE and districts)	Federal and state (NHDHHS)
Funding type	Grants (formula-based and competitive)	Slots	Slots	Flexible	Slots	Vouchers
Ages of children served	Prenatal to age 3	Birth to age 3	One or two years before kindergarten	One or two years before kindergarten	One or two years before kindergarten	Ages 0 to 13
Maximum income for family of three, dollars	Not applicable	20,160[a]	20,160[a]	Not applicable	Not applicable	50,400
Maximum income for a family of three, percentage of FPL	Not applicable	100[a]	100[a]	Not applicable	Not applicable	250
Other eligibility criteria	One or more risk factors[b]	None	None	None	IEP for special education services	Parent(s) employed
Delivery settings[c]	Home	Home and centers	Centers	Public schools	Public schools	Licensed home- and center-based providers; license-exempt home-based providers
Part-, school-, or full-day	Not applicable	Part-, school-, or full-day	Part-, school-, or full-day	Part- or school-day	Part- or school-day	Hours based on parents' need for care
School versus calendar year	Not applicable	Both	Both	School year	School year	Calendar year
Program standards beyond licensing	Not applicable	Yes	Yes	Yes	No	Yes

SOURCES: Author's analysis of program documentation from NHDHHS, USDHHS, and NHDoE.

NOTE: Program features are as of July 1, 2016. Part-day programs are typically three to four hours per day; school-day programs are about six hours per day; full-day programs are typically more than six hours per day.

[a] Up to 10 percent of enrolled children may be over the maximum income threshold.

[b] Priority populations, required by the federal legislation, include families with low income, pregnant women less than age 21, families with a history of child abuse or neglect or interactions with child welfare services, families with a history of substance abuse or in need of substance abuse treatment, families with users of tobacco products in the home, families that have a child or children with low student achievement, families that have a child or children with developmental delays or disabilities, and families that include individuals serving or formerly served in the armed forces.

[c] Specific to children ages 0 to 5.

Table 6. Funding and Service Levels for Publicly Funded Early Childhood Programs in New Hampshire (2014–2015)

Program	Fiscal Year	Funding, in Millions of Dollars	Families/Children Served	Funding per Child Served, in Dollars
MIECHV Program	2014–2015	$1.000[a]	233 families	$4,292
Early Head Start	2014–2015	$4.679	22 pregnant women 363 children	$12,890
Head Start	2014–2015	$11.838	581 3-year-olds 720 4-year-olds	$9,099
Title I	2014–2015	$1.700	Not available	Not available
Local district preschool	2014–2015	Not available	3,557 children[b]	Not available
Child Care Scholarship	2014–2015	$17.907[c]	3,630 children[c]	$4,933[d]
Total		**$37.124**	**—[e]**	

SOURCES: MIECHV: Maternal and Child Health Bureau, Heath Resources and Services Administration, *Home Visiting Program: State Fact Sheets*, website, January 2017. As of January 28, 2017: https://mchb.hrsa.gov/maternal-child-health-initiatives/home-visiting/home-visiting-program-state-fact-sheets
Early/Head Start: W. Steven Barnett and Allison H. Friedman-Krauss, *State(s) of Head Start: 2016*, New Brunswick, N.J.: National Institute for Early Education Research, 2016;
Title I: Barnett, Friedman-Krauss, et al., 2016;
District Prekindergarten: NHDoE, "Preschool Enrollments" data file, "Attendance and Enrollment Reports," web page, February 6, 2015. As of January 28, 2017: http://www.education.nh.gov/data/documents/preschool14_15.xls
Child Care Scholarship: Office of Child Care, U.S. Department of Health and Human Services, "CCDF Expenditures for FY 2015 as of 9/30/15," web page, January 20, 2017. As of January 28, 2017: https://www.acf.hhs.gov/occ/resource/ccdf-expenditures-for-fy-2015-as-of-9-30-2015; Office of Child Care, U.S. Department of Health and Human Services, "FY 2015 CCDF Data Tables (Preliminary)," web page, November 1, 2016. As of January 28, 2017: https://www.acf.hhs.gov/occ/resource/preliminary-fy2015
NOTES: — = not applicable.
[a] Formula-based funding amount.
[b] As of 2014–2015, there were 2,072 special education enrollments, which equates to 58 percent of the local district enrollments. Thus, most of these enrollments are for special education students funded through IDEA and other funds.
[c] Total federal and state expenditures in FY 2015 were $32.7 million. The funding amount shown is expenditures for direct services, exclusive of administration and quality set asides and pro-rated for the share of all children served who were ages 0 to 5 (estimated to be 66 percent). That same share is applied to the average monthly enrollment of 5,500 children to estimate the number of children ages 0 to 5 served per month.
[d] This is the average voucher amount per child based on average monthly enrollment. The voucher amount for any given child will be based on the child's age, the hours of care, and the provider selected by the parent.
[e] The enrollment counts are not unduplicated. Some children in Early Head Start and Head Start also receive Child Care Scholarships.

grams are administered through grants directly from the federal government to providers, where most Early Head Start programs were added to existing Head Start grantees. Both types of grantees may operate center- or home-based models and provide programming on a part- or full-day basis. The two programs operate under an integrated set of federally defined performance standards that provide detailed requirements regarding program features. To qualify for Early Head Start or Head Start, most families must have incomes below 100 percent of FPL. (Programs are allowed to enroll up to 10 percent of families with income above the poverty thresholds.)

In New Hampshire, Early Head Start is delivered by three agencies in the state that operate both home- and center-based programs in four counties (Belknap, Merrimack, Lower Strafford, and Hillsborough). Funding in FFY 2015 was about $4.7 million and served 22 pregnant women and 363 infants and toddlers (out of a total funded enrollment of 385 children).[40] Given that each annual age cohort has approximately 1,500

children with family income below poverty levels, the Early Head Start program reached roughly 8 percent of income-eligible children (363 children divided by 1,500 times three cohorts). Funding per child served was nearly $12,200 in FFY 2015.

Five New Hampshire agencies serve as Head Start grantees and deliver programs throughout the state, almost universally in center-based settings. As of FFY 2015, funding for Head Start stood at $11.8 million, and the program served about 580 and 720 3- and 4-year-olds, respectively. Again, with about 1,500 children in each annual cohort living in families with income below poverty thresholds, the Head Start program in New Hampshire reached about 39 percent and 48 percent of income-eligible 3- and 4-year-olds, respectively. Average funding per child for Head Start in FFY 2015 was about $9,100.

Early Head Start and Head Start programs may operate for a part-day (up to six hours per day), a school-day (at least six hours), or a full-day (at least ten hours). As of the 2014–2015 program year, about 29 percent of Early Head Start programs

in New Hampshire were operating a school day, a share that is below the national average of 42 percent. In the case of Head Start, although 91 percent of participants attended for five days a week, only 6 percent were enrolled in a school-day program. Ten percent of Head Start children attended a double session, presumably to achieve full-day coverage so the child's parent or parents could work. Eleven percent of children in Head Start and 29 percent of children in Early Head Start received a child care subsidy, which is another way to extend the program hours.

A major policy objective for the Early Head Start and Head Start programs in recent years has been to improve quality. Initiatives include increased educational requirements for teachers, the use of the Classroom Assessment Scoring System (CLASS) to monitor program quality and identify programs that must compete for renewed funding, and technical assistance to programs and professional development for staff to improve quality. For the first time, Early Head Start and Head Start grantees must recompete for funding if they do not meet the designated quality thresholds.

The phased-in requirement for teachers to have a bachelor's degree has been effective, particularly for Head Start. Across the state as of FFY 2015, 36 percent of Early Head Start teachers and 66 percent of Head Start teachers had a bachelor's degree. But average salaries for Early Head Start and Head Start teachers with a college degree—at $34,500 and $25,400, respectively—fell well below the rate of about $58,500 for a public school elementary teacher. The average CLASS score for New Hampshire programs exceeded the research-based benchmark (5.5 on a 7-point scale) for high-quality programs in the Emotional Support domain (6.0 on average) but was just below the benchmark for the Classroom Organization domain (5.4 on average). The score on the Instructional Support domain, one of the strongest predictors of child development, was just equal to the benchmark score of 3.0.

Title I

Title I of the 1965 Elementary and Secondary Education Act allocates federal funds to state and local education authorities that serve a high proportion of low-income students at risk of educational failure. Title I Part A preschool funding is available to high-poverty schools to support school-wide programs or targeted assistance programs and can be used to support fully subsidized part- or full-day ECE programs. Although some states and localities have a history of using Title I Part A funds for this purpose, the 2002 No Child Left Behind Act explicitly encouraged the use of Title I funds for preschool education. The relatively flexible Title I funds, which require quality standards similar to Head Start, can be used for 3- and 4-year-olds. In New Hampshire, data available from the National Center for Education Statistics (NCES) indicate that almost 1,000 students were served, although the Title I funds may have been used to enhance existing slots, rather than create new ones.

Subsidized Preschool

According to the 2015 *State of Preschool Yearbook*, 42 states had established a state-funded preschool program for 4-year-olds and, in some cases, for 3-year-olds as well.[41] New Hampshire remains one of eight states that have yet to dedicate state funds to expanding access to and raising the quality of one- or two-year preschool programs. As noted in the *Yearbook*, the NHD-HHS has oversight over early care and learning programs from birth to kindergarten entry, including preschool programs. The NHDoE administers the certification for early childhood education teachers from birth to grade 3.

Although the state has not established a publicly funded program, a number of school districts use Title I, IDEA Part B, and other district funds to operate local preschool classrooms. In some cases, the focus is exclusively on children with disabilities, while in other programs, the district operates inclusive classrooms that integrate special education students with their typically developing peers. Data from NHDoE indicate that 3,557 children were enrolled in public school preschool programs as of the 2015–2016 school year, with programs offered in 88 districts across the state. The data do not differentiate between regular and special education enrollments, but the bulk of the enrollments are expected to be the latter, supported with IDEA funds. There is no centralized source of information that tracks the federal or local funding allocated to the public preschool programs or other program features, such as hours per day and weeks per year or indicators of program quality.

Subsidized Child Care

Federal funds also support the Child Care and Development Fund (CCDF) block grant program, which was initially established to provide child care support for participants in the federal cash welfare program now called Temporary Assistance for Needy Families (TANF). As part of the 1996 federal welfare reforms and subsequent legislation, funds have expanded to provide subsidized child care for families with low income

regardless of TANF participation. The demand for child care has grown over time as more parents are employed, even when their children are young. Data from the ACS, for example, show that more than 54,000 children from ages 0 to 5 in New Hampshire (70 percent) have all available parents in the labor market (see Table 7).

In New Hampshire, the joint federal- and state-funded voucher-based child care subsidy program is called the Child Care Scholarship program and is administered by the NHD-HHS Child Development Bureau. A family is eligible if it demonstrates a need for care based on a parent's or parents' employment or search for work, or their participation in education and training. Income eligibility extends to 250 percent of FPL. As income rises, families contribute a cost share that ranges from 4.75 percent of gross income, when income is below 100 percent of FPL, to a maximum cost share of 20 percent of family income, when income reaches 220 to 250 percent of FPL.

Vouchers for non-school-age children may be used with licensed centers and family child care homes or with license-exempt family, friend, and neighbor care. The program reimburses providers based on a weekly standard rate that is set at the 50th percentile of the most recent market rate survey. If the provider charges more than the reimbursement rate, the provider can ask the family to make up the difference as a co-pay.

The Child Care Scholarship program is available for children from birth to age 13, although 66 percent of the children in New Hampshire with subsidies on average in a given month in FFY 2015 were younger than age 5. Applying that share to the CCDF funding for direct services indicates that an estimated $17.9 million supported about 3,600 children younger than age 5 per month, on average. Service statistics for the same year indicate that 87 percent of children from birth to age 12 used their voucher in a licensed center. Including licensed family child care homes, 92 percent of vouchers were used in a regulated setting. Most vouchers were awarded for employment reasons (82 percent), but some parents were in job search, training, or education (13 percent), and the remainder were cases involving child protective services.[42]

As national research pointed to the often low levels of quality in many child care and early learning programs, the federal and state governments have been focused on quality improvement. Quality rating and improvement systems (QRISs) are now in the planning or operational stage in all 50 states in an effort to measure, support, and incentivize quality improvement in early learning programs, especially those serving disadvantaged children. New Hampshire's QRIS defines three quality tiers. All programs that meet state licensing requirements are in the first tier. These requirements specify minimum structural features—such as the staff-child ratio and group size (for example, 1-to-12 and 24 children in preschool-age programs) and staff education and training requirements (for example, teachers are required to complete a two-year vocational training course). Licensed providers may apply to be in a second tier known as Licensed Plus. Programs with this designation have been evaluated on eight categories based on a document review;[43] no observational assessment of program quality is made, as is common with many other state QRISs.[44] Licensed programs that are accredited by the National Association for the Education of Young Children (NAEYC) are assigned to the top tier.

As of 2016, among center-based programs serving young children, about 70 percent (378 programs) were at the lowest tier (licensed), 19 percent (101 programs) at the middle tier (Licensed Plus), and 11 percent (59 programs) at the top tier (NAEYC-accredited).[45] Thus, little is known about quality, beyond licensing, for the vast majority of providers. Licensed Plus and NAEYC-accredited programs, respectively, receive a 5-percent and 10-percent increase in their reimbursement under the Child Care Scholarship program, recognizing the higher cost associated with higher quality.

Table 7. Estimated Number of Children in New Hampshire Ages 0 to 5 with Employed Parents (2015)

Indicator	Children Ages 0 to 5	
	Number	Percentage
Children living with two parents and both are in the labor force	36,213	46.4
Children living with their mother only and she is in the labor force	12,857	16.5
Children living with their father only and he is in the labor force	5,311	6.8
Total	54,381	69.7

SOURCE: U.S. Census Bureau, undated, Table B23008.

NOTE: The percentage is calculated based on 77,992 children ages 0 to 5 in 2015, as shown in Table 1.

Infrastructure to Support Early Childhood Programs

In support of the state's early learning and care programs, New Hampshire has established key building blocks that support a high-quality early learning system. In addition to the QRIS, these steps include the establishment of Spark NH as the state Early Childhood Advisory Council to identify needs and coordinate early childhood services across public-sector agencies. In addition, NHDHHS, in partnership with NHDoE and other stakeholders, had previously established and recently updated the state's Early Learning Standards.[46] The latest standards cover the full range of developmental domains: social and emotional development; language development and emergent literacy; cognitive development in the domains of early numeracy, science and social studies, and approaches to learning; and physical development and health and are aligned with the kindergarten readiness indicators.

New Hampshire also has a well-defined early childhood professional development system (PDS) that specifies the core knowledge and competencies required to work with children from birth to age 8 and a set of career lattices associated with credentials for family child care, teacher, master teacher, administrator, and master professional. In addition, the NHDoE has an Early Childhood Education Teacher certificate that requires at least a bachelor's degree along with other qualifications related to skills, competencies, and knowledge obtained through coursework and field experience.[47] More than a dozen two- and four-year higher education institutions in the state have approved curricula aligned with the PDS.

The state's QRIS and these other infrastructure elements have been supported with quality set-aside funds out of the CCDF program, amounting to about $3.1 million in FFY 2015.

Potential Reach of Early Childhood Programs

New Hampshire has a relatively low child poverty rate. But when accounting for the income required for a family to achieve an adequate standard of living, 30 to 45 percent of the state's children are living in families with low to moderate incomes that do not fully support their needs. Populations that could be targeted for additional early childhood investments are those with family income below 100 percent, 200 percent, and 300 percent of FPL. For infants and toddlers (ages 0 to 2), about 18,600 children would be targeted with a 300-percent cutoff (see Table 8). For preschoolers (ages 3 to 4), the target population would be nearly 13,300 children if the 300 percent of FPL threshold were used.

Given that HVNH HFA and Early Head Start serve just a few hundred children each, they would reach just 5 to 7 percent of children in households with income up to 100 percent of FPL (see Table 8). Their reach would be even smaller if thresholds of 200 or 300 percent of FPL were used instead to define the target population. As a larger program, Child Care Scholarships for infants and toddlers reach about one in three children in poverty, but would serve fewer than one in 10 if the target population was defined as income up to 300 percent of FPL.

For the programs that serve 3- and 4-year-olds, a larger number of children are served. Even so, the Head Start pro-

Table 8. Potential Reach of Publicly Funded Early Childhood Programs in New Hampshire by Age Group

| Measure	Number of Children Served in FFY 2015	Number or Percentage Served[a]		
		Family Income Up to 100% FPL	Family Income Up to 200% FPL	Family Income Up to 300% FPL
Infants and Toddlers (Ages 0, 1, 2)				
Target population	—	5,144	12,967	18,568
Program				
HVNH HFA	233	4.5	1.8	1.3
Early Head Start	363	7.1	2.8	2.0
Child Care Scholarships	1,705[b]	33.1	13.1	9.2
Preschoolers (Ages 3, 4)				
Target population	—	3,361	8,575	13,257
Program				
Head Start	1,301	38.7	15.2	9.8
Local district preschool	3,557	105.8	41.5	26.8
Child Care Scholarships	1,925[b]	57.3	22.4	14.5

[a] Defined as the number of slots divided by the number of children.
[b] Estimated based on the distribution of children served per month by age.

gram reaches just 39 percent of children living in poverty. Although the local district preschool program could serve all 3- and 4-year-olds living in poverty, it is important to keep in mind that, in many cases, those programs are currently designed to provide a free, appropriate public education for preschool-age children with disabilities regardless of family income. Child Care Scholarships are available to families with incomes up to 250 percent of FPL, but they reach only about one in five children using a 200-percent FPL threshold.

The publicly funded early childhood programs we have examined thus far are targeted toward lower-income families and their children, in recognition of their greater need. In the case of preschool program participation, however, there is still a gap in participation rates based on family income. Specifically, the ACS includes a question about enrollment in school for everyone age 3 and older, and the response options include being in nursery school or preschool. Tabulations using microdata for New Hampshire demonstrate that there is a strong income gradient in preschool participation rates (see Figure 3). Among 3-year-olds, the estimated preschool participation rate nearly doubles in moving from children with family income below the FPL (21 percent) to children with family income at 300 percent of the FPL or higher (41 percent). This similar gradient is seen for 4-year-olds, where participation ranges from just 44 percent for children with family income below FPL to nearly 80 percent for children in families with income more than three times FPL. This is a potentially narrow measure

Figure 3. Estimated Preschool Participation Rate by Family Income Relative to the FPL (2011–2015)
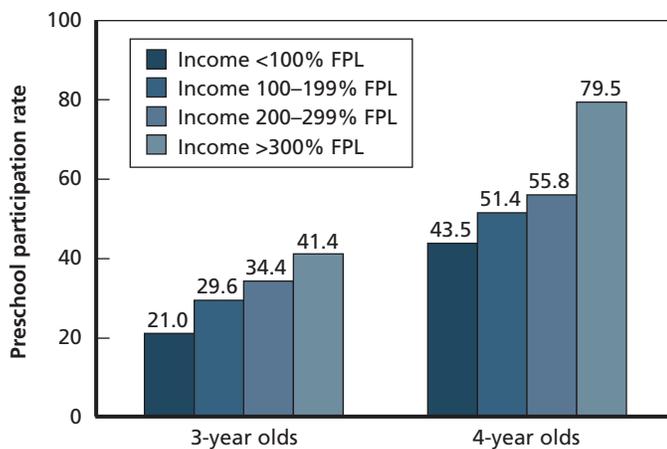
SOURCES: Author's analysis of the 2011–2015 ACS PUMS.
NOTES: The preschool participation rate is measured as the percentage of children in the age group enrolled in nursery school or preschool in the past three months.
RAND RR1890-3

of enrollment in preschools and other types of early learning programs. Nevertheless, it suggests there is a sizable difference in preschool participation rates across family income tiers.

In sum, most of the early childhood programs currently in place in New Hampshire are not funded to reach all income-eligible children and their families, nor are they funded to reach higher up the income ladder where children still face risks in early childhood that could compromise their development. The differentials in enrollment in early learning programs among 3- and 4-year-olds demonstrates that there is a need to provide greater access to high-quality early childhood programs for young children in low- to moderate-income families. Further, particularly for early learning and care programs, there is scope to improve program quality to ensure that the programs are as effective as possible.

EVIDENCE OF EFFECTIVENESS AND ECONOMIC RETURNS OF SELECTED EARLY CHILDHOOD INVESTMENTS

A full array of early childhood interventions have been subjected to formal evaluations using rigorous designs such as randomized control trials (RCTs) and other quasi-experimental methods that provide confidence that causal effects of the program are being measured.[48] In this section, we provide a brief review of the evidence of effectiveness and economic returns for the three types of early childhood programs that we consider: home visiting in the first few years of life; high-quality child care, particularly for infants and toddlers; and high-quality preschool. We do so both to illustrate the evidence of effectiveness and to determine whether the evidence base will support an economic analysis.

Home Visiting in the First Few Years of Life

Home visiting from the prenatal period to the first few years of a child's life has been considered an evidence-based early intervention for more than three decades.[49] Most recently, an extensive literature review, known as Home Visiting Evidence of Effectiveness (HomVEE), was conducted as part of the MIECHV Program. The review provides a useful background for our summary.[50] Under the MIECHV Program, evidence of effectiveness requires that (1) at least one high- or moderate-quality impact study found a favorable and statistically significant impact in two or more of the eight outcome domains prioritized for the program; or (2) at least two high-

or moderate-quality impact studies with nonoverlapping samples found one or more favorable and statistically significant impacts in the same domain.

In particular, both the HFA and NFP programs that are our focus have been designated as evidence-based models that can be implemented with MIECHV funds. HFA is designed to serve parents with various risk factors, such as single parenthood; low income; adverse childhood experiences, including child maltreatment; and issues with substance abuse, mental health, and domestic violence. Sites implementing the HFA model determine which specific populations they will target. The model is designed to begin prenatally or within three months of the child's birth and continue until the child reaches age 3 to 5 years. The hour-long home visits are expected to occur at least weekly until the child is six months old, and visits may be less frequent thereafter. In addition, sites provide screenings and assessments to determine whether families are at risk for child maltreatment or other adverse childhood experiences; they also provide routine screening for child development and maternal depression. Sites may also elect to offer other such services as father involvement programs or parent support groups. The HFA National Office provides technical assistance, training, and accreditation services in support of effective model implementation. This flexibility means that HFA programs will vary in the populations they target and the bundles of services they offer. The same variation is reflected in the program models with rigorous evaluation.

After testing with alternative populations, NFP designated its target population as first-time low-income mothers. The NFP model requires that participants begin with home visits in the prenatal period (no later than the 28th week of pregnancy) and expects visits to continue for two years after the child's birth. The program has a well-structured curriculum that includes weekly home visits during the first month of services and then visits every other week until the baby arrives. Weekly visits then resume for six weeks, then shift to every other week until 20 weeks of age, and finally the visits are monthly until the child reaches age two. During the visits, the NFP nurse works with the expecting mother to improve her pregnancy outcomes. Visits after the birth follow the developmental milestones of the child, while also working with the mother to address her needs and develop a plan for self-sufficiency. Support for program implementation is offered by the NFP National Service Office (NSO) to ensure that the model is implemented with fidelity.

Variants of the HFA program model—as implemented in various places including Arizona, Hawaii, New York, and Oregon—have been evaluated using RCTs, with follow-up of the enrolled children as far as age 7. NFP has been evaluated using a succession of RCTs, all following the same model, starting with its initial implementation in Elmira, New York, and then continuing with trials in Memphis, Tennessee, and Denver, Colorado. Participants in the Elmira trial have been followed to age 19 of the focal child. As a result, according to the HomVEE literature review, 12 HFA studies and 19 NFP studies were classified as highly rated evidence for use in the effectiveness review. That review shows that HFA has evidence of effectiveness in four of the eight domains required by MIECHV, while NFP has evidence in six of eight domains (see Table 9). In assessing the evidence base, it is important to acknowledge that most programs

Table 9. Summary of Evidence of Effectiveness for HFA and NFP Home Visiting Models Based on the HomVEE Review

Outcome	HFA Evaluations		NFP Evaluations	
	Favorable Effect	No Effect	Favorable Effect	No Effect
Child development and school readiness	9	34	6	65
Child health	0	9	5	26
Family economic self-sufficiency	0	3	4	16
Linkages and referrals	1	1	0	0
Maternal health	0	2	8	18
Positive parenting practices	3	5	5	18
Reductions in child maltreatment	1	14	7	18
Reductions in juvenile delinquency, family violence, and crime	0	1	0	5

SOURCE: Administration for Children and Families, "Effectiveness Research," web page, U.S. Department of Health and Human Services, undated. As of January 28, 2017: http://homvee.acf.hhs.gov/models.aspx
Results last updated July 2016 (HFA) and May 2016 (NFP).
NOTE: Effects are for the outcome measures classified as primary by the HomVEE review.

demonstrate effectiveness in only a few of the eight domains, and many programs find no statistically significant findings on indicators in other domains.

Given the multiplicity of evaluations for HFA and NFP and the mix of findings, a meta-analysis is a useful approach for synthesizing the results. The Washington State Institute of Public Policy (WSIPP), as part of its effort to conduct benefit-cost analyses for an array of social programs for the state legislature, has conducted such an analysis that shows relatively modest effect sizes for HFA, the largest being a reduction in low birth weight found in one study (effect size of 0.5) (see Table 10).[51] The NFP effect sizes tend to be larger (up to 0.7), and, because of the longer-term follow-up in the Elmira trial, the program has evidence of longer-run impact.

Research has also considered the cost to deliver each program. In 2015 dollars, estimates for the HFA model range from $3,800 to 4,300 per year, which means a larger cost per family depending on the total years of participation. NFP, which delivers services for 1.7 years on average, has cost estimates ranging from about $7,400 per family to more than $10,000 per family.[52] NFP costs per year of service tend to be higher because the program is more intensive and because of the

requirement that home visitors be registered nurses, compared with other models, such as HFA, that typically rely on paraprofessionals, who usually have lower salaries.

In addition to the impact findings, both programs have been the focus of benefit-cost analyses. One advantage for NFP for an economic evaluation is the measurement of longer-term outcomes in the Elmira trial, many of which are more readily translated into dollar benefits. In the case of HFA, the WSIPP model estimates that the program produces a return of $1.21 for every dollar invested based on the results presented in Table 10.[53] Benefit-cost analyses of specific HFA programs, including those in Oregon and New York, have not found a positive economic return except for very specialized populations (that is, women with at least one substantiated child protective services report).[54] NFP is estimated by WSIPP to produce a return of $1.61, but the WSIPP model substantially reduces the meta-analysis effect sizes reported in Table 10.[55] Other benefit-cost analysis of NFP that do not discount the magnitude of the measured evaluation impacts find returns that range from $2.88 to $6.20, with larger benefit-cost ratios based on program impacts with more-targeted populations.[56]

Table 10. Summary of Impacts for HFA and NFP Home Visiting Models Based on WSIPP Meta Analysis

Outcome	WSIPP HFA Meta-Analysis Results		WSIPP NFP Meta-Analysis Results	
	Number of Studies	Effect Size	Number of Studies	Effect Size
For the Participating Child				
Crime	—	—	2	−0.700*
Test scores	4	0.013	3	0.059
Child abuse and neglect	7	−0.135	2	−0.626*
K–12 grade repetition	1	−0.015	3	0.130
K–12 special education	1	−0.216	3	0.030
Disruptive behavior disorder symptoms	—	—	2	−0.208*
Internalizing symptoms	2	−0.160	3	−0.229*
Externalizing behavior symptoms	2	−0.065	—	—
Low birth weight births	1	−0.511*	—	—
For the Participating Mother				
High school graduation	—	—	2	0.035
Employment	—	—	3	0.036
Crime	—	—	1	−0.034
Public assistance	3	−0.016	3	−0.054
Substance abuse	—	—	3	−0.080
Food assistance	—	—	3	−0.054
Major depressive disorder	3	−0.069	—	—
Illicit drug abuse or dependence	1	0.021	—	—
Problem alcohol use	1	−0.166	—	—

SOURCE: WSIPP, undated.
NOTE: * = effects where p < 0.05. — = not measured.

High-Quality Child Care for Infants and Toddlers

As a result of the increased labor force participation of women and growth in single parenthood (among other factors), a substantial share of infants and toddlers in the United States are regularly cared for by someone other than their parents. As of 2012, for example, about 46 percent of children who were less than 1 year old had a regular source of care in a center or home setting.[57] That percentage increases to 51 percent and 57 percent for children ages 1 and 2, respectively. Research in the 1990s demonstrated that the quality of care from birth to age 3, as hypothesized, was related to children's school readiness,[58] but relatively few children at these ages experienced good to excellent care.[59] Thus, a key research and policy objective has been to identify effective models of high-quality care for infants and toddlers or to identify interventions that can raise the quality of care in existing programs, especially for at-risk children.

In terms of programs for infants and toddlers that incorporate child care services (rather than home visiting or parent education), relatively few have been the focus of rigorous evaluation. The Abecedarian program, implemented in the early 1970s in one site in North Carolina, is often held up as a model birth-to-5 intervention with rigorous evidence of effectiveness based on an experimental evaluation. Indeed, with long-term follow-up to around age 35, the program has demonstrated significant favorable impacts during the school-age years and through adulthood, including increased educational attainment, higher adult earnings, reduced contact with the criminal justice system, and improved health. The short- and longer-term impacts produce an estimated benefit-cost ratio of 2.5 in one study and 6.3 in another.[60] However, the Abecedarian program provided intensive, full-day, year-round care from soon after birth until kindergarten entry for a very disadvantaged population, at a cost of about $18,500 per child per year (in 2014 dollars). It is not clear that the same benefits would be realized when implemented with today's cohorts or when operating at scale.

Early Head Start—which serves pregnant low-income women and provides services in a home-based model, center-based model, or combined approach after the child is born—is another potential program model and one that has been implemented across the United States, albeit at a smaller scale than the Head Start program because of lower funding. A national RCT of Early Head Start, conducted for 17 programs distributed across the county, did not show particularly strong or lasting effects on children's development based on follow-up through grade 5, although some subgroups experienced moderate effects by that grade.[61] During the intervention, when children were ages 2 or 3, favorable impacts were found for cognitive and language skills, aggressive behaviors, parental engagement, and immunizations—and some of these effects persisted to age 5, two years after the program ended. However, by age 5, there were no significant or meaningful effects on achievement-related school readiness skills in aggregate or for subgroups of children defined by the program model or risk groups. Achievement effects were evident for children who participated in a formal preschool program, such as Head Start, after their Early Head Start experience. In interpreting these findings, it is important to keep in mind that Early Head Start, while governed by federal Head Start Performance Standards, still allows considerable discretion at the local level in terms of how the program is implemented, including such features as the curricula used and the intensity of program services. Estimates from the WSIPP benefit-cost analysis model indicate that Early Head Start costs about $11,000 per child. Based on the evaluation evidence through grade 5, the program does not produce positive net benefits (i.e., the benefit-cost ratio is less than one), largely because the impact estimates are so small.[62]

Other research has focused on strategies for increasing the quality of care provided to infants and toddlers in center- and home-based settings. However, there are few rigorous evaluations of such interventions, and those that have been conducted often do not produce the desired impact on children's development. For example, the Program for Infant/Toddler Care (PITC), which offers 10 to 18 months of direct training of caregivers in center- and home-based settings, as well as on-site coaching, is exceptional in having an experimental evaluation that measured the impact of the professional development program on children's outcomes. The PITC model did not show any effects on children's development six months after full delivery of the intervention (an average of 23 months after randomization).[63] Other evaluation research has demonstrated that various strategies to support the professional development of ECE classroom staff can raise program quality, but few studies go on to measure the impact on children's development, even in the short term.[64] In essence, research on the effectiveness of high-quality care and education programs for infants and toddlers that are scalable, as well as professional development supports for the staff who work with these youngest children, remains at an early stage.

High-quality, full-day, year-round child care for infants and toddlers not only has the potential to promote school readiness and other beneficial impacts for participating children, it might also generate benefits for the child's parents (typically

the mother) in terms of participation in the labor force and employment-related outcomes. If the availability of subsidized child care just affects the timing of when to resume working after the child's birth but not the decision to work, then we would expect to see a convergence as the child ages between those who had access to subsidized care in the early years and those who did not. If, on the other hand, access to subsidized care affects the decision about whether to work and even supports the mother in obtaining further education and training, we would expect to see a more sustained impact on maternal employment and earnings.

The evaluation of the Abecedarian program is one of the few experimental studies to demonstrate an impact of an early childhood program on caregiver employment. The findings indicate that the earnings gains for the primary caregiver (typically the mother) persisted after the child had entered kindergarten.[65] The experimental evaluation of the Infant Health and Development Program (IHDP)—which provided free center-based care for the first three years of life for a targeted population of babies with low birth weight in the mid-1980s—found higher employment rates for mothers of the lower birth weight group, starting when the child reached age 3 and continuing through age 18, although the effect on earnings was not measured.[66] These two studies provide supporting evidence that the availability of full-day, year-round care can boost the mother's employment (and maybe even her human capital) through additional education and/or greater labor market experience. Other evidence comes from quasi-experimental studies that estimate effects on maternal employment when children become eligible for public education programs, either preschool or kindergarten. These studies show mixed findings, with one earlier study using data from 1980 estimating an increase in maternal employment when their child becomes eligible for public kindergarten, while another, more recent study using data from the 2000s to study the effects of the Oklahoma and Georgia universal preschool programs finds no maternal employment effect.[67] It is possible that subsidized care for infants and toddlers has a stronger effect compared with subsidized care for preschool-age children.

High-Quality Preschool

Research on the effectiveness of preschool programs offered one or two years before kindergarten entry spans more than 50 years, with well-known evaluations of such model programs as the Perry Preschool Project dating to the early 1960s. Over time, additional evidence of preschool program impacts

has accumulated from evaluations of scaled-up programs implemented at the national, state, or local level. We focus on the evidence from those real world programs with rigorous experimental and quasi-experimental evaluations, drawing on a recent RAND synthesis.[68] In total, the study examined the evaluation findings for one national program (Head Start), 11 state-funded programs (Arkansas, Georgia, Michigan, New Jersey, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, Washington, and West Virginia), and three district-level programs (Boston; Chicago; and Tulsa, Oklahoma). These 15 programs served children on a targeted or universal basis for one or two years before kindergarten entry.

The RAND study demonstrated that there are multiple examples of scaled-up preschool programs with rigorous evaluations that show improvements in school readiness for participating children (see Table 11). Improvements were found in readiness skills related to mathematics, vocabulary, and reading, with effect sizes in the small to moderate range. Favorable impacts have been demonstrated for part- and full-day preschool programs, as well as one- and two-year programs, but the research is not definitive about the comparative effectiveness of these options.[69] Effective programs include both those that are delivered through public schools and those that use a mixed delivery system, with both public school providers and community-based providers, such as Head Start programs and nonprofit or for-profit private center-based programs. Further, while most of the scaled-up programs evaluated to date are targeted toward low-income children, universal programs, such as the state-funded program in Oklahoma and district-funded program in Boston, demonstrate that children across the income spectrum can benefit, although the impacts tend to be larger for more-disadvantaged children.

Where studies have followed children into the school-age years or beyond (and fewer evaluations have such longer-term follow-up data), there is a tendency for impacts on student achievement to fade over time, as children who did not experience preschool catch up to their peers who did. That is not always the case, however, as programs in Michigan, New Jersey, Washington state, and Chicago have shown continued achievement benefits for preschool participants into the elementary grades or even as late as grade 8. In addition, other measures of school performance—such as special education use, grade repetition, and high school graduation—show continued improvement in the few studies that have measured these later outcomes, indicating that the broader

Table 11. Summary of Evidence of Impacts for the High-Quality Preschool Programs Examined in the RAND Review

Outcome	Number of Studies with Favorable and Significant Effects	Range of Significant Effects[a]
School readiness		
Mathematics skills	10 of 13 studies	0.17–0.51
Vocabulary skills	7 of 11 studies	0.17—0.44
Letter-word identification skills	5 of 5 studies	0.32—1.05
Spelling skills	3 of 3 studies	0.24—0.64
School performance		
Reading achievement in grades 3, 4, or 5	3 of 3 studies	0.18—0.24
Mathematics achievement in grades 3, 4, or 5	3 of 4 studies	0.16—0.29
Reading achievement in grade 8	1 of 1 studies	0.24
Mathematics achievement in grade 8	1 of 1 studies	0.23
Special education use by grades, 3, 5, or 12	3 of 3 studies	6 to 15 percentage-point decrease
Grade retention by grades 3, 5, 10, or 12	3 of 3 studies	8 to 15 percentage-point decrease
High school graduation rate	2 of 2 studies	6 to 14 percentage-point increase
Other outcomes at older ages		
Any substance abuse (excluding alcohol)	1 of 1 studies	5 percentage-point decrease
Any arrest	1 of 1 studies	6 percentage-point decrease

SOURCES: Karoly and Auger, 2016.

NOTE: The number of studies with a favorable impact are compared with the number of studies that measured that outcome.

[a] Range shows effect sizes unless otherwise indicated. For the school performance outcomes, not all studies with a statistically significant effect reported an effect size.

educational benefits from a high-quality preschool program can be sustained to older ages, with associated longer-term economic benefits. Finally, the Chicago Child-Parent Centers (CPC) program has followed preschool participants to age 28 and documented significant reductions in substance use and arrests; these are outcomes that result in cost savings in addition to the benefits to participants themselves.

The programs with strong evidence of impact on school readiness and later outcomes, while varying to some degree in the intensity of the program (for example, hours per day), in the curriculum used, and in other structural features, all have aspects that are consistent with a high-quality program. For example, all of the programs reviewed with strong effects employed a lead teacher with at least a bachelor's degree, had group sizes of about 20 children, and had a staff-child ratio of 1-to-10. On the other hand, when the evidence of impact has been weaker, such as for Tennessee's state-funded preschool program, quality standards have been less rigorous, and independent observation-based assessments of quality show lower scores.

The cost of the effective preschool programs vary to some extent because of differences in the program structure and local salaries and prices for other goods and services. Based on national prices and 2015 dollars, budget-based estimates of pre-

school program costs indicate that a high-quality program— where each classroom has a teacher-child ratio of 1-to-10 and is staffed with a lead teacher who has a bachelor's degree and is compensated at parity with public school teachers—ranges from $4,700 per child for a part-day (three hour) program to $8,500 per child for a school-day (six-hour) program.[70] Reported costs for specific state and district preschool programs with rigorous evidence of impact—all of which employ teachers with at least a bachelor's degree and pay public school salaries— indicate that expenditures for a high-quality program can be even higher, such as $10,700 per child in Tulsa, Oklahoma, or $15,200 per child in New Jersey.[71]

High-quality preschool programs with evidence of impact have also been evaluated in terms of their costs and benefits. An analysis of the Tulsa school district's implementation of the state's universal preschool program estimates a return ranging from about $2.82 for every dollar invested for more-advantaged students (those with family income above 185 percent of FPL) to $3.09 per dollar invested for students eligible for a free lunch (that is, family income is below 135 percent of FPL). WSIPP's benefit-cost model shows a return of $2.63 for every dollar spent on Head Start (based on a meta-analysis) and $4.20 for every dollar spent on state and district preschool programs for low-income 3- and 4-year-olds. A

benefit-cost analysis of the Chicago CPC program, based on follow-up data through age 28 and with projections of future benefits, showed a return of $10.80 for every dollar invested. This latter return may be more aspirational, given that the program evaluation is for a cohort of children who attended the program in the early 1980s, and had impacts that might not be replicated in today's environment.[72] Thus, a range of $2 to $4 in benefits to society for every dollar invested is a more realistic estimate of the expected returns from a high-quality program.

COSTS AND BENEFITS OF EARLY CHILDHOOD INVESTMENTS FOR NEW HAMPSHIRE

Not all early childhood programs are amenable to an economic analysis. Critical elements include (1) an estimate of program costs, (2) a rigorous evaluation demonstrating the causal effect of the program on one or more outcomes, and (3) outcomes than can be expressed in terms of dollar benefits. Based on the review of the evidence in the preceding section, we conducted an economic analysis of the costs and benefits of two targeted early child programs: a home visiting intervention modeled on NFP and a one-year high-quality preschool program modeled on such scaled-up publicly funded programs as those implemented statewide in Oklahoma or districtwide in Boston. For home visiting, we focus on the NFP model because it has evaluation evidence for a consistent target population and program model that could be replicated in New Hampshire. We do not model the HFA program as implemented in New Hampshire because its potential effects cannot be extrapolated from the HFA programs that have been evaluated in other states, given differences across HFA programs in the populations served and program services.[73]

For each modeling effort, we follow standard benefit-cost analysis methods that have been used in other studies of the economic returns to early childhood programs and best practice guidelines more generally.[74] However, because we are conducting a prospective analysis of a future program (as opposed to assessing the costs and benefits of a previously implemented program), we need to employ a number of assumptions. We provide a brief overview of the general approach before turning to the specific assumptions for the home visiting program and the preschool program. Additional technical details are provided in a separate appendix available online.

Overview of the Benefit-Cost Analysis Methodology

As noted above, the benefit-cost analysis methodology requires an estimate of the program cost, estimates of the expected program impacts, and economic values associated with program impacts that are not already measured in dollars. The stream of costs for the program by year for a given participant are added up and compared with the stream of expected benefits through time, where both costs and benefits in future years are discounted to the present (called present-value dollars), using a 3-percent discount rate, to account for the future value of money.

For our analysis, we take the societal perspective, meaning that we account for the costs and benefits that accrue to the program participants themselves, to the public sector (that is, taxpayers), and to the rest of society at large. We account for the current level of services (the status quo) and model the incremental costs and benefits associated with the increased number of participants in the early childhood program. (This issue is more relevant for the preschool program, given the existing funding streams discussed earlier.) Finally, we do not model any one-time transition cost that may be required to implement a new program, such as new facilities, workforce development, or other aspects of program implementation. Thus, the estimates can be considered those that would be realized in a steady state, after any one-time implementation costs are borne. Likewise, we do not include the system-level costs, such as for overall program administration or ongoing monitoring and evaluation. Such costs would be expected to be a modest increment to the per-child costs of program delivery that we do account for. Given that we are conservative in the potential benefits that we include, this omission is not expected to substantially affect the estimated returns.

In presenting results, we report present-value costs, benefits, and net benefits, as well as the benefit-cost ratio (total benefits divided by total cost). The estimates are shown both on a per-child basis and for an annual cohort of children in New Hampshire. In the case of the home visiting program, the results can be thought of as the costs and benefits for each annual cohort of children born in the state who are eligible for and choose to participate in the targeted program. For the targeted preschool program, the results represent the annual cohort of children who are eligible to enter kindergarten in any given year. In both cases, we assume a cohort size of 12,800 children based on the demographic analysis presented earlier.

Costs and Benefits of Investing in Home Visiting

Assumptions Regarding Costs and Benefits

We model statewide implementation of a home visiting model targeted to low-income first-time mothers with the following parameters:

- The NFP model is implemented with fidelity, including the employment of specially trained registered nurses with at least a bachelor's degree as home visitors and an average caseload of 25 families per home visitor.
- The program is available without cost on a voluntary basis to first-time mothers with income below 100 percent of FPL who are less than 28 weeks pregnant at the time of their first visit and continue in the program until the child reaches their second birthday. We assume that the program serves 100 mother-child pairs in each annual birth cohort, which represents an approximate participation rate of 17 percent among eligible first-time mothers with income below poverty.[75]

The model assumes that the current level of HFA services can continue alongside the NFP model since they involve different targeting mechanisms.

The cost per mother-child pair for the NFP program is estimated to be $4,947 per year in 2016 dollars. Based on an average participation of 1.7 years, the total cost per mother served is $8,410. This estimate is based on a sample budget worksheet provided by NFP for purposes of estimating the cost of a scaled-up program under the MIECHV program.[76] The budget is based on an implementing agency that employs eight nurse home visitors, one nurse supervisor, and one administrator. Staff salary levels are based on occupational wage data for New Hampshire as of May 2015, inflated to 2016 values. The model includes costs for materials and supplies, travel, facilities, administration, and services from the NFP NSO. With a caseload of 25 families per nurse, the implementing agency could serve 200 families at a point in time. With a multi-year program (1.7 years on average) and continuous program enrollment, each nurse would have a caseload that includes mother-child pairs spanning the prenatal period through the first two years of life.

The model accounts for benefits in multiple domains based on the NFP evaluation evidence from the trials in Elmira, Memphis, and Denver. From the societal perspective, these include the reduction in health services from fewer emergency room visits; savings in health, education, and child welfare sys-tem costs from reduced child abuse and neglect; savings from reduced welfare use on the part of mothers; increased earnings for the mother; and reduced criminal justice system costs and costs for crime victims resulting from the lower levels of criminal activity on the part of the mother and eventually the child. (For more information on this, see the online appendix.) We allow for possible attenuation of effects as a result of program scale-up. Our baseline preferred estimate assumes the program achieves 80 percent of the impact of NFP in the three trials (20 percent attenuation). As a more conservative alternative, we assume just 60 percent of the impact is realized (40 percent attenuation). As a less conservative assumption, we assume the same impact as the NFP trials (0 percent attenuation).[77]

Estimates of Economic Returns

These assumptions result in an estimate of a positive return to the NFP program under each set of assumptions (see Table 12). With the baseline assumptions, the per-child present-value cost of $7,929 is more than outweighed by the present-value benefits of $39,779, implying a return of $5.02 for every dollar invested. The major sources of benefits include savings from lower child abuse and neglect, reduced crime for both the mother and the child, and increased maternal earnings. With more-conservative assumptions about the attenuation of the impacts, the benefit-cost ratio drops to 4.1, whereas it reaches 5.9 when a less-conservative assumption is used instead.

Assuming that 100 mother-child pairs are served for each birth cohort, we can estimate the aggregate cost of the program and the aggregate net benefits (see Table 13). (The benefit-cost ratio remains the same whether we examine results per child or per cohort.) Under each scenario, the total investment per cohort would be about $800,000, where the costs would be distributed over 1.7 years on average.

Costs and Benefits of Investing in High-Quality Preschool

Assumptions Regarding Costs and Benefits

We model a statewide, targeted, voluntary preschool program for 4-year-olds (one year before kindergarten entry) with the following features.

- The program is offered in public schools or by community-based providers (e.g., Head Start providers or private non-profit or for-profit providers) following the same standards for quality.

Table 12. Benefit-Cost Summary Results per Child for NFP Home Visiting Model in New Hampshire

Summary Result	Model Assumption		
	Baseline: 20% Attenuation	More Conservative: 40% Attenuation	Less Conservative: 0% Attenuation
Present-value costs, in dollars	7,929	7,929	7,929
Present-value benefits, in dollars	39,779	32,500	47,057
From reduction in health services	313	234	391
From reduction in child abuse and neglect	13,130	9,848	16,413
From reduction in welfare system administrative cost	904	678	1,130
From reduction in criminal justice system costs	6,477	6,160	6,795
From reduction in tangible losses to crime victims	6,791	6,458	7,125
From increased maternal earnings	12,163	9,122	15,204
Net present-value benefits, in dollars	31,850	24,571	39,128
Benefit-cost ratio	5.02	4.10	5.93

NOTE: All cost and benefit estimates are from the societal perspective; i.e., those costs and benefits that accrue to the home visiting program participants, to the public sector, and to the rest of society at large. Amounts are in 2016 present-value dollars.

Table 13. Benefit-Cost Summary Results per Cohort for NFP Home Visiting Model in New Hampshire

Summary Result	Model Assumption		
	Baseline: 20% Attenuation	More Conservative: 40% Attenuation	Less Conservative: 0% Attenuation
Present-value costs, in thousands of dollars	793	793	793
Present-value benefits, in thousands of dollars	3,978	3,250	4,706
From reduction in health services	31	23	39
From reduction in child abuse and neglect	1,313	985	1,641
From reduction in welfare system administrative cost	90	68	113
From reduction in criminal justice system costs	648	616	680
From reduction in tangible losses to crime victims	679	646	712
From increased maternal earnings	1,216	912	1,520
Net present-value benefits, in thousands of dollars	3,185	2,457	3,913

NOTE: All cost and benefit estimates are from the societal perspective; i.e., those costs and benefits that accrue to the home visiting program participants, to the public sector, and to the rest of society at large. Amounts are in 2016 present-value dollars.

- The lead teacher in the classroom has a bachelor's degree and is paid a salary consistent with the salary for a public school kindergarten teacher; the assistant teacher has an associate's degree.
- Each classroom has a group size of 20 children and thus a ratio of one adult for every ten children.
- The program follows other high-quality practices consistent with those in proven models.
- The program offers preschool services for six hours per day (30 hours per week) and follows an academic-year calendar.
- The program is available, without cost, to children in families with annual income up to 300 percent of FPL. We assume that 80 percent of children in the eligible income

group would enroll in the voluntary program, a participation rate consistent with those of other publicly funded voluntary preschool programs.[78]

The cost per child for a preschool program with these features is estimated to be $9,309 in 2016 dollars. This estimate is based on the U.S. Department of Health and Human Services' *Provider Cost of Quality Calculator*.[79] The cost estimate assumes a program with four classrooms supported by three full-time administrative staff—director, curriculum director, and administrative assistant, along with the classroom staff. Salary levels for the program staff are based on occupational wage data for New Hampshire as of May 2015, inflated to 2016 values. The

cost model also accounts for fixed costs for the center (such as facilities, fees and permits, telecommunications, and annual audit), as well as costs that vary with the teacher (for example, fringe benefits, professional development) and with the child (for example, nutrition, educational supplies, administrative supplies, and insurance).

The model accounts for two types of benefits that have strong evidence from evaluations of scaled-up programs: returns to human capital and savings to the education system. In particular, we follow prior benefit-cost analyses of preschool programs that link school performance in the early grades with later success in the labor market based on causal estimates in the literature.[80] Our estimates of the impact of preschool participation come from the evaluation of Oklahoma's preschool program, although our baseline estimates assume the realized impact would be 80 percent of the impact found for Oklahoma. (As a sensitivity analysis, we consider an even more conservative assumption that just 60 percent of the impact found in Oklahoma would be realized and a less conservative assumption that 100 percent of the Oklahoma impact would be realized.) For a given attenuation assumption overall, we assume the same rate of impact as Oklahoma for children up to 200 percent of FPL but a further attenuated impact for children between 200 percent and 300 percent of FPL, based on the findings from Oklahoma's universal program. The savings to the education system account for reduced grade retention and special education use found in the literature, again with a baseline assumption of attention relative to earlier impact estimates. In addition, the education savings are assumed to apply only to children in families with income below 200 percent of FPL because such savings have not yet been documented for children in families with income above two times FPL. In addition, for children already estimated to be participating in preschool, we assume that they experience an increase in program quality, but the impact on human capital and education savings is discounted to be 50 percent of the assumed benefit for new preschool participants.

The model takes as its baseline the current preschool participation rate by income level, estimated to be 44 percent, 51 percent, and 56 percent for children in families with income below FPL, between 100 and 199 percent of FPL, and between 200 and 299 percent of FPL, respectively (see Figure 3). The model accounts for the children in the first income group already attending Head Start and therefore counts costs and benefits only for the additional children in that income tier who would be new preschool participants, assuming an 80-percent participation rate.

On the other hand, we do not assume that funds currently spent for 4-year-olds in the Child Care Scholarship program could be used to offset the cost of the preschool program. With a program that operates for a six-hour school day during the academic year, many low- and moderate-income families will still require child care for an extended day or during the summer months. We assume that the Child Care Scholarship program funds would subsidize those care needs for qualifying families.

Estimates of Economic Returns

With these assumptions, our estimates in the preferred baseline model show an overall positive rate of return for a program that serves children living in families with incomes up to 300 percent of FPL (see the last column of Table 14). With a per-child program cost of $9,309, the model estimates total benefits of $20,866, primarily in the form of future earnings benefits for the participating child as a result of improved educational performance and attainment. Net present-value benefits (benefits minus costs) equal nearly $11,600 per child, for a benefit-cost ratio of 2.24. Under more-conservative assumptions of impact, the benefit-cost ratio is 1.68, while less-conservative assumptions would indicate a ratio of 2.80.

We also consider the estimates of per-child benefits and returns separately for children in the three income tiers examined earlier: those with family income less than 100 percent of FPL, between 100 and 199 percent of FPL, and between 200 and 299 percent of FPL (see the first three columns of Table 14). For children in each income subgroup, the cost of the preschool program is the same. The variation in the benefits reflects our assumptions about larger impacts from preschool participation for the most economically disadvantaged children relative to peers with successively higher family incomes. Thus, in our baseline estimates, the per-child net present-value benefits are almost $20,000 per child for children with family income below poverty, about $12,800 per child for those considered near poor, and about $7,100 per child for those in the next income tier. This same pattern is evident for the results with more- and less-conservative assumptions, with estimates that overall are lower and higher than the baseline, respectively. Importantly, regardless of our assumptions, there is a positive social return for all children with family income below 300 percent of FPL and for children in each of the three income subgroups.

We also estimate the aggregate cost for the targeted preschool program for each annual cohort of children, assuming 12,800 children in each annual cohort and an 80-percent

Table 14. Benefit-Cost Summary Results per Child for a Targeted One-Year Preschool Program in New Hampshire

Summary Result	By Family Income Tier			
	< 100% of FPL	100–199% of FPL	200–299% of FPL	Total
a. Preferred baseline estimates (20-percent attenuation of preschool impacts)				
Present-value costs, in dollars	9,309	9,309	9,309	9,309
Present-value benefits, in dollars	29,237	22,103	16,402	20,866
From school readiness linked to earnings	27,648	21,021	16,402	20,135
From reduced grade retention	101	69	0	46
From reduced special education	1,488	1,014	0	684
Net present-value benefits, in dollars	19,928	12,794	7,093	11,557
Benefit-cost ratio	3.14	2.37	1.76	2.24
b. Estimates with more-conservative assumptions (40-percent attenuation of preschool impacts)				
Present-value costs, in dollars	9,309	9,309	9,309	9,309
Present-value benefits, in dollars	21,927	16,577	12,302	15,650
From school readiness linked to earnings	20,736	15,765	12,302	15,102
From reduced grade retention	76	52	0	35
From reduced special education	1,116	760	0	513
Net present-value benefits, in dollars	12,618	7,268	2,993	6,341
Benefit-cost ratio	2.36	1.78	1.32	1.68
c. Estimates with less-conservative assumptions (0-percent attenuation of preschool impacts)				
Present-value costs, in dollars	9,309	9,309	9,309	9,309
Present-value benefits, in dollars	36,546	27,629	20,503	26,083
From school readiness linked to earnings	34,560	26,276	20,503	25,169
From reduced grade retention	126	86	0	58
From reduced special education	1,860	1,267	0	855
Net present-value benefits, in dollars	27,237	18,320	11,194	16,774
Benefit-cost ratio	3.93	2.97	2.20	2.80

NOTE: All cost and benefit estimates are from the societal perspective; that is, those costs and benefits that accrue to preschool program participants, to the public sector, and to the rest of society at large. Amounts are in 2016 present-value dollars. For a family with one adult and two children, 100 percent, 200 percent, and 300 percent of FPL is annual income of $19,096, $38,192, and 57,288, respectively.

participation rate in the preschool program. These estimates show a total cost for all children with family income up to 300 percent of FPL of almost $37 million and total benefits of about $82 million, for a net benefit of nearly $46 million (see Table 15). The total net benefits for each annual cohort equals $25 million under more-conservative assumptions and $66 million, under less-conservative assumptions (results available in a separate appendix available online). Viewed for each income subgroup, the net benefits are highest (almost $24 million) for the middle income group—those with family income between 100 and 200 percent of FPL. This is because the lowest-income group has access to the Head Start program, so there are fewer children in that income subgroup to serve with a new preschool program. The third income group is also lower because of assumptions about attenuated impact.

It is important to note that these estimates are likely to be lower bounds on the potential economic returns, for several reasons. First, because there are fewer studies with evidence of longer-term impacts of scaled-up preschool programs on crime, we have not included potential benefits in that domain. The WSIPP model suggests the crime-related benefits could be as high as $4,000 per child for the lowest income group, which would increase the benefit-cost ratio for that group to 3.57 under the baseline assumptions. Second, given that studies of preschool program impacts generally do not focus on parental outcomes, we have not included those either. However, as

Table 15. Benefit-Cost Summary Results per Cohort for a Targeted One-Year Preschool Program in New Hampshire: Baseline Estimates

Summary Result	By Family Income Tier			
	< 100% of FPL	100–199% of FPL	200–299% of FPL	Total
Present-value costs, in thousands of dollars	5,062	17,349	14,299	36,709
Present-value benefits, in thousands of dollars	15,897	41,193	25,194	82,284
From school readiness linked to earnings	15,033	39,176	25,194	79,402
From reduced grade retention	55	128	0	183
From reduced special education	809	1,889	0	2,698
Net present-value benefits, in thousands of dollars	10,836	23,844	10,895	45,574

NOTE: All cost and benefit estimates are from the societal perspective; that is, those costs and benefits that accrue to preschool program participants, to the public sector, and to the rest of society at large. Amounts are in 2016 present-value dollars. For a family with one adult and two children, 100 percent, 200 per-cent, and 300 percent of FPL is annual income of $19,096, $38,192, and 57,288, respectively. See the online appendix for results under less-conservative and more-conservative assumptions.

noted earlier, there is suggestive evidence from the Abecedarian and IHDP RCTs, as well as quasi-experimental evidence, that providing access to a publicly funded high-quality preschool program may increase labor force participation (especially for mothers). Moreover, other research indicates that employers of adults with preschool-age children are likely to experience less absenteeism and job turnover, resulting in improved productivity of the members of the workforce with young children.[81]

CONCLUSIONS AND IMPLICATIONS FOR STATE POLICY

With the growing understanding of the importance of the first five years for child health and development and the consequences for children who face various early-life stressors, states have been seeking to expand their investments in early childhood programs, particularly those targeted to at-risk children. Such investments have been demonstrated to benefit children and their families in the short run (as children are better prepared to enter school) and in the longer term (as children perform better academically, increase their educational attainment, experience better labor market outcomes, and require fewer social services). Policymakers and the public view such programs as an important economic development strategy that boosts the human capital, and therefore the productivity, of the future workforce.[82]

This study has served to document that a sizable share of young children in New Hampshire face risks in early childhood that may compromise healthy development, with consequences for their success in school and beyond. Accounting for various risk factors at birth (such as a mother who is unmarried, a teenager, or living with low income), as many as one in three children in New Hampshire could be considered at risk at the time of their birth, either because of a poor pregnancy outcome (e.g., low birth weight) or because of low family resources in the early years. Accounting for the income required to achieve an adequate standard of living, 45 percent of the state's young children live in families with income that is below that threshold. Children who experience low income and other early-life adversities enter school with lower levels of readiness compared with their peers in higher-income families or with fewer adverse experiences. For New Hampshire, these patterns are manifested in considerable gaps in measures of student achievement and the high school graduation rate by income level.

New Hampshire has an existing base of programs—home visiting using the HFA model, Early Head Start, Head Start, and subsidized child care—from which to strategically expand investments in proven programs. Important infrastructure elements—such as early learning guidelines, a QRIS, and a professional development system for the early childhood workforce—are already in place. At the same time, public investments in young children currently in place in New Hampshire are not funded to reach all income-eligible children and their families, nor are they funded to reach higher up the income ladder where children still face risks in early childhood that may compromise their development. There is also scope to improve the quality of the available programs.

Our analyses demonstrate that New Hampshire can expect positive net social benefits from increasing investments targeted toward children in lower-income families, particularly in two types of voluntary programs for which the evaluation evidence supports an economic analysis—namely, home visiting following

the NFP model and high-quality publicly funded preschool. Our benefit-cost analysis for New Hampshire of an NFP program that would serve first-time economically disadvantaged mothers shows a return of about $4 to $6 for every dollar invested. We estimate that a high-quality, one-year, state-funded preschool program that would be available to children with family income up to 300 percent of FPL would generate a positive economic return of about $2 for every dollar invested, with a return of nearly $4 for every dollar invested for a program targeted at children in the lowest-income situations. Expanded investments in these two types of programs can be viewed as part of a continuum of early childhood investments designed to support low-income families with young children during the critical years before they enter school. Other early childhood investments, such as expanding access to high-quality child care for infants and toddlers, may also generate positive economic benefits, although the research evidence that would support quantifying those potential returns is more limited.

This study has not addressed issues that arise in the implementation of early childhood programs, such as the sources of public funds that would be used to pay for programs and aspects of program delivery. If New Hampshire were to move forward with new investments, the early childhood programs implemented in other states and localities can provide viable models and guidance for best practices on these issues. However, as policymakers in the public and private sectors in New Hampshire consider new investments in early childhood programs, research on child development, lessons from program evaluation, and experience with implementation in other communities supports the following general guidance.

Invest in program quality, maximize participation, and optimize the transition to the early elementary grades. The range of early childhood programs, from home visiting to preschool, that show short- and longer-term benefits arise from programs that are designed with quality in mind. That means that program costs can be sizable, but if less-intensive or less-rigorous programs are implemented instead, they are unlikely to replicate the range of benefits that come from high-quality programs. Another consideration is ensuring that the participating children and adults engage in the program as fully as possible. For home visiting programs, that means retaining families in the program for the full length of program services. In the case of preschool programs, that means that enrolled children have high rates of daily attendance.[83] To further capitalize on early childhood investments, it is important to have alignment between the early childhood system and the

K–12 systems, especially in the early elementary grades. Early learning standards are already in place to support this objective. Further coordination and alignment can take place around P–3 curricula, teacher professional development, and data systems.[84]

Consider an investment portfolio with a continuum of coordinated programs. Although our estimates suggest that the magnitude of the economic returns may be larger for a home visiting program than for a preschool program, that does not mean investments should be made only in the former and not the latter. For example, NFP and HFA can target different at-risk pregnant women and provide the optimal mix of services to meet the needs of each target population. Families in home visiting programs can benefit from high-quality child care if the parents need to work. High-quality preschool one or two years before kindergarten entry can further prepare their children to enter school ready to learn. Thus, policymakers should invest in a portfolio of evidence-based programs across the continuum of the early childhood years.[85]

Include resources to monitor the quality of program implementation, evaluate new program models, and engage in continuous quality improvement. Ensuring that early childhood programs are as effective as possible means engaging in an ongoing process of monitoring the quality of the program services delivered, assessing participant outcomes, and periodically evaluating program impacts relative to a valid comparison group. There is a growing appreciation for the importance of building a culture of learning and improvement that draws on qualitative and quantitative evaluation methods to provide ongoing feedback regarding process and outcomes that leads to further improvement and further evaluation.[86] Such a process of continuous quality improvement ensures that the resources invested in early childhood programs are as effective as possible. In establishing funding levels, funds should be set aside for this purpose.

Invest in integrated data systems to ensure that families and children can benefit from the continuum of offerings and to support monitoring and evaluation. A key infrastructure component for early childhood investments is an integrated data system that captures program participation and participant outcomes not only during early childhood, but also as children mature into the school-age years and beyond.[87] Such data systems can be used to monitor participation rates and identify populations that are not accessing program services. Integrated systems can also ensure a hand-off from participation in one program to another as children age. Data are also critical for the continuous quality improvement process described above.

NOTES

[1] Center on the Developing Child, *A Science-Based Framework for Early Childhood Policy: Using Evidence to Improve Outcomes in Learning, Behavior, and Health for Vulnerable Children*, Cambridge, Mass.: Harvard University, 2007; James J. Heckman, "The Economics, Technology, and Neuroscience of Human Capability Formation," Proceedings of the National Academy of Sciences, Vol. 104, No. 33, 2007, pp. 13250–13255; M. Rebecca Kilburn and Lynn A. Karoly, *The Economics of Early Childhood Policy: What the Dismal Science Has to Say About Investing in Children*, Santa Monica, Calif.: RAND Corporation, OP-227-CFP, 2008. As of February 13, 2017: http://www.rand.org/pubs/occasional_papers/OP227.html; Center on the Developing Child, *The Foundations of Lifelong Health Are Built in Early Childhood*, Cambridge, Mass.: Harvard University, 2010.

[2] Lynn A. Karoly, M. Rebecca Kilburn, and Jill S. Cannon, *Early Childhood Interventions: Proven Results, Future Promise*, Santa Monica, Calif.: RAND Corporation, MG-341-PNC, 2005; Lynn A. Karoly and Anamarie Auger, *Informing Investments in Preschool Quality and Access in Cincinnati: Evidence of Impacts and Economic Returns from National, State, and Local Preschool Programs*, Santa Monica, Calif.: RAND Corporation, RR-1461-CBC/UWGC, 2016. As of February 13, 2017: http://www.rand.org/pubs/research_reports/RR1461.html

[3] Noa Kay and Annie Pennucci, *Early Childhood Education for Low-Income Students: A Review of the Evidence and Benefit-Cost Analysis*, Olympia, Wash.: Washington State Institute for Public Policy, Doc. No. 14-01-2201, 2014; Eugene Steurle and Leight M. Jackson, eds., *Advancing the Power of Economic Evidence for Making Informed Investments in Children, Youth, and Families*, Washington, D.C.: National Academies Press, 2016.

[4] Arthur Rolnick and Rob Grunewald, "The Economic Case for Targeted Preschool Programs," in Edward Zigler, William S. Gilliam, and W. Steven Barnett, eds., *The Pre-K Debates: Current Controversies and Issues*, Baltimore, Md.: Brookes Publishing, 2011, pp. 22–26.; Timothy J. Bartik, *Investing in Kids: Early Childhood Programs and Local Economic Development*, Kalamazoo, Mich.: W.E. Upjohn Institute for Employment Research, 2011.

[5] Annie E. Casey Foundation, *The 2016 KIDS COUNT Data Book: State Trends in Child Well-Being*, Baltimore, Md., 2016. As of January 28, 2017: http://www.aecf.org/m/resourcedoc/aecf-the2016kidscountdatabook-2016.pdf

[6] Based on the American Community Survey. See U.S. Census Bureau, undated.

[7] Annie E. Casey Foundation, undated.

[8] ACEs include experiencing extreme economic hardship, experiencing family disorder leading to parental divorce or separation, living with someone who had an alcohol or drug problem, being a victim of or witness to neighborhood violence, living with someone who was mentally ill or suicidal, witnessing domestic violence in the home, having a parent who served time in jail or prison, being treated or judged unfairly due to one's race or ethnicity, and experiencing the death of a parent. A growing body of research documents a relationship between ACEs and measures of adult health and well-being. See Vincent J. Felitti and Robert F. Anda, "The Relationship of Adverse Childhood Experiences to Adult Health, Well-Being, Social Function, and Healthcare," in Ruth A. Lanius, Eric Vermetten, and Clare Pain, eds., *The Hidden Epidemic: The Impact of Early Life Trauma on Health and Disease*, Cambridge, United Kingdom: Cambridge University Press, 2010.

[9] See Table 4.

[10] This forecast led a coalition of public and private sector leaders of the New Hampshire Coalition for Business and Education to endorse a "65/25 goal": having 65 percent of the state's population hold a postsecondary credential or degree by 2025. New Hampshire Coalition for Business and Education, "NH Coalition Endorses 65/25 College Completion Goal for Workforce Enhancement," press release, July 31, 2015. As of January 28, 2017: http://www.nhcbe.org/nh-coalition-endorses-6525-college-completion-goal-for-workforce-enhancement/

[11] U.S. Department of Health and Human Services, Home Visiting Program: State Fact Sheets, web page, January 2017. As of January 28, 2017: http://mchb.hrsa.gov/maternal-child-health-initiatives/home-visiting/home-visiting-program-state-fact-sheets

[12] The other seven states are Idaho, Indiana, Montana, North Dakota, South Dakota, Wyoming, and Utah. W. Steven Barnett, Allison H. Friedman-Krauss, Rebecca Gomez, Michelle Horowitz, G. G. Weisenfeld, Kirsty Clarke Brown, and James H. Squires, *The State of Preschool 2015: State Preschool Yearbook*, New Brunswick, N.J.: National Institute for Early Education Research, 2016. As of January 28, 2017: http://nieer.org/research/state-preschool-2015

[13] Child Care Aware, *Parents and the High Cost of Child Care: 2015 Report*, Arlington, Va., 2015.

[14] BUILD Initiative, *QRIS Compendium*, website, October 31, 2016. As of January 28, 2017: http://qriscompendium.org/

[15] Spark NH, *Needs Assessment*, Concord, N.H., 2014.

[16] Spark NH, *New Hampshire Comprehensive Strategic Plan for Early Childhood, 2013–2016*, Concord, N.H., 2013.

[17] Spark NH, *A Framework for Action for New Hampshire's Young Children*, Concord, N.H., 2015.

[18] We use the 2011–2015 ACS public use microdata sample (PUMS) file to estimate the fraction of 4-year-olds and 5-year-olds in New Hampshire who are enrolled in kindergarten or a higher grade. The estimates are 2.0 percent for 4-year-olds and 59.9 percent for 5-year-olds.

[19] In New Hampshire, the cutoff date for kindergarten entry is set by school districts and ranges from August 15 to December 31.

[20] The FPL is adjusted annually with inflation and does not vary by geography. The federal government uses a simplified version of the poverty thresholds, known as the federal poverty guidelines, for purposes of defining eligibility for means-tested federal programs. For simplicity, we use the FPL as the poverty thresholds in our analysis. See Office of the Assistant Secretary for Planning and Evaluation, *2015 Poverty Guidelines: U.S. Federal Poverty Guidelines Used to Determine Financial Eligibility for Certain Federal Programs*, Washington, D.C.: U.S. Department of Health and Human Services, September 3, 2015. As of January 28, 2017: https://aspe.hhs.gov/2015-poverty-guidelines

[21] U.S. Census Bureau, *Poverty Thresholds for 2015 by Size of Family and Number of Related Children Under 18 Years*, Washington, D.C., 2016. As of January 28, 2017: http://www2.census.gov/programs-surveys/cps/tables/time-series/historical-poverty-thresholds/thresh15.xls

[22] Annie E. Casey Foundation, undated.

[23] Constance F. Citro and Robert T. Michael, eds., *Measuring Poverty: A New Approach*, Washington, D.C.: National Academies Press, 1995.

[24] Amy K. Glasmeier, *Living Wage Calculator*, website, Cambridge, Mass.: Massachusetts Institute of Technology, undated. As of January 28, 2017: http://livingwage.mit.edu/

[25] On a monthly basis, the required income for a family with one adult and two children in New Hampshire would cover rent ($1,070), food ($640), health insurance and health care costs ($540), child care ($960), transportation ($670), taxes ($550), and other miscellaneous expenditures ($390). See Glasmeier, 2017.

[26] The New Hampshire Fiscal Policy Institute (NHFPI) uses an alternative estimate, produced by the Economic Policy Institute, of the budget a family in New Hampshire needs to have an adequate standard of living. NHFPI also finds that the required budget is about three times the FPL. New Hampshire Fiscal Policy Institute, *Taking the Measure of Need in the Granite State*, Concord, N.H., 2016. As of January 28, 2017: http://nhfpi.org/research/state-economy/taking-the-measure-of-need-granite-state.html

[27] Estimates for 2014 indicate that 13 percent of births to mothers who were under the age of 20 were second or higher-order births. Annie E. Casey Foundation, undated.

[28] United Health Foundation, *America's Health Rankings 2016: Health of Women and Children Report*, Minnetonka, Minn., 2016.

[29] National Center for Children in Poverty, *Young Child Risk Calculator*, website, 2014. As of January 28, 2017: http://www.nccp.org/tools/risk/

[30] Jack P. Shonkoff and Deborah A. Phillips, eds., *From Neurons to Neighborhoods: The Science of Early Childhood Development*, Washington, D.C.: National Academies Press, 2000.

[31] Jack P. Shonkoff and Andrew S. Garner, "The Lifelong Effects of Early Childhood Adversity and Toxic Stress," *Pediatrics*, Vol. 129, No. 1, 2012, pp. e232–e246; Ross A. Thompson, "Stress and Child Development," *The Future of Children*, Vol. 24, No. 1, 2014, pp. 41–59.

[32] Jill S. Cannon and Lynn A. Karoly, Who Is Ahead and Who Is Behind? Gaps in Student Achievement in the Early Grades for California's Children, Santa Monica, Calif.: RAND Corporation, TR-537-PF/WKKF/PEW/NIEER/WCJVSF/LAUP, 2007. As of January 28, 2017: http://www.rand.org/pubs/technical_reports/TR537.html

[33] Caroline Ratcliffe and Signe-Mary McKernan, *Childhood Poverty Persistence: Facts and Consequences*, Washington, D.C.: The Urban Institute, Brief 14, 2010.

[34] National Center for Education Statistics, *Digest of Education Statistics*, Washington, D.C.: U.S. Department of Education, 2016, Table 219.75. As of January 28, 2017: https://nces.ed.gov/programs/digest/

[35] Harry J. Holzer, Diane Whitmore Schanzenbach, Greg J. Duncan, and Jens Ludwig, "The Economic Costs of Childhood Poverty in the United States," *Journal of Children and Poverty*, Vol. 14, No. 1, 2008, pp. 41–61.

[36] Mark A. Cohen and Alex R. Piquero, "New Evidence on the Monetary Value of Saving a High Risk Youth," Journal of Quantitative Criminology, Vol. 25, 2009, pp. 25–49. The estimate of $420,00 to $630,000 in 2007 dollars was inflated to 2015 dollars using the Consumer Price Index for All Urban Consumers (CPI-U).

[37] NHDHHS has oversight over IDEA Part C grants for infants and toddlers with an IFSP and administers the Family Centered Early Supports and Services Program with a combination of federal IDEA funds, federal and state Medicaid funds, state general funds, and private insurance. The NHDoE has oversight over the federal funds for the IDEA Part B programs for preschool-age. In federal fiscal year (FFY) 2015, based on the grant funding formulas, New Hampshire received $2.149 million in funding for Part C grants for infants and toddlers, along with $1.457 million in funding through the IDEA Part B 619 grants for preschool-age children. See U.S. Department of Education, *2015 Parts B and C Formula Grant Award Application Packages*, website, April 8, 2015. As of January 28, 2017: https://www2.ed.gov/fund/grant/apply/osep/2015apps.html

[38] Adrienne L. Fernandes-Alcantara, *Maternal and Infant Early Childhood Home Visiting (MIECHV) Program: Background and Funding*, Washington, D.C.: Congressional Research Service, 2016.

[39] NHDHHS, *Home Visiting New Hampshire*, website, undated. As of January 28, 2017: http://www.dhhs.nh.gov/dphs/bchs/mch/home.htm. NHDHHS also operates a second home visiting program, funded primarily through Medicaid, with services offered from birth to age 21. The Healthy Families Home Visiting program does not employ one of the 17 evidence-based models that qualify under MIECHV.

[40] Figures in this section come from W. Steven Barnett and Allison H. Friedman-Krauss, *State(s) of Head Start: 2016*, New Brunswick, N.J.: National Institute for Early Education Research, 2016. In addition to the standard Early Head Start grant, the state was awarded two Early Head Start/Child Care Partnership grants for $800,000. Because these are one-time competitive grants and not expected to increase the steady-state funding level, we do not include them in the funding figures in Table 2.5.

[41] Barnett, Friedman-Krauss, et al., 2016.

[42] Office of Child Care, U.S. Department of Health and Human Services, 2016.

[43] The eight domains are regulation, administration and business practices, learning environment, parent/family involvement, children with special needs, professional development, staff qualifications and compensation, and program evaluation.

[44] Build Initiative, *QRIS Compendium*, website, 2016. As of January 28, 2017: http://qriscompendium.org.

[45] Build Initiative, 2016. These counts do not include licensed family child care providers or school-age only providers.

[46] Child Development Bureau, New Hampshire Department of Health and Human Services and New Hampshire Department of Education, *NH Early Learning Standards: Birth Through Five*, Concord, N.H., 2016. As of January 28, 2017: http://www.dhhs.nh.gov/dcyf/cdb/documents/nh-early-learning-standards.pdf

[47] Child Development Bureau, *New Hampshire's Early Childhood Professional Development System Guidebook*, Concord, N.H.: Division for Children, Youth, and Families, New Hampshire Department of Health and Human Services, 2015.

[48] Karoly, Kilburn, and Cannon, 2005.

[49] Deanna S. Gomby, Patti L. Culross, and Richard E. Behrman, "Home Visiting: Recent Program Evaluations—Analysis and Recommendations," *The Future of Children*, Vol. 9, No. 1, 1999, pp. 4–26. As of January 28, 2017: http://www.futureofchildren.org/usr_doc/vol9no1Art1.pdf

[50] Administration for Children and Families, *Home Visiting Evidence of Effectiveness*, website, U.S. Department of Health and Human Services, undated. As of January 28, 2017: http://homvee.acf.hhs.gov/

[51] The effect size is a standardized measure of the magnitude of an impact and is usually calculated as the ratio of the program effect (the difference in means between the treatment and control groups in the case of an experimental evaluation) divided by the standard deviation of that effect estimate (that is, the pooled standard deviation in a difference of means). In some cases, effect sizes are calculated using the standard deviation of the control group mean in the denominator. Effect sizes of 0.2, 0.5, and 0.8 are usually considered to be small, moderate, and large, respectively.

[52] WSIPP, *Benefit-Cost Results*, website, undated. As of January 28, 2017: http://www.wsipp.wa.gov/; Administration for Children and Families, undated. Cost estimates based on program evaluations are often higher because the home visitors are not always fully employed as families drop out of the program, but a replacement is not provided given the ongoing evaluation.

[53] WSIPP, undated.

[54] Beth L. Green, Jerod M. Tarte, Mary Beth Sanders, and Mark S. Waller, *Testing the Effectiveness of Healthy Families America in an Accredited Statewide System: Outcomes and Cost-Benefits of the Healthy Families Oregon Program: Final Project Report*, Portland, Ore.: Portland State University, 2016; Kimberly DuMont, Kristen Kirkland, Susan Mitchell-Herzfeld, Susan Ehrhard-Dietzel, Monica L. Rodriguez, Eunju Lee, China Layne, and Rose Greene, *A Randomized Trial of Healthy Families New York (HFNY): Does Home Visiting Prevent Child Maltreatment?* Rensselaer, N.Y.: New York State Office of Children and Family Services and Albany, University of Albany, State University of New York, 2010.

[55] The WSIPP benefit-cost model discounts program impacts (that is, reduces their size) for weaker study designs and when the program was evaluated by its developer.

[56] Karoly, Kilburn, and Cannon, 2005; Ted R. Miller, *Nurse-Family Partnership Home Visitation: Costs, Outcomes, and Return on Investment, Executive Summary*, Beltsville, Md.: Pacific Institute for Research and Evaluation, 2013.

[57] National Center for Education Statistics, 2016, Table 202.30.

[58] National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network (ECCRN), "Does Quality of Child Care Affect Child Outcomes at Age 4 ½?" *Developmental Psychology*, Vol. 39, No. 3, pp. 451–469; NICHD ECCRN, *Child Care and Child Development: Results from the NICHD Study of Early Child Care and Youth Development*, New York: Guilford Press, 2005.

[59] NICHD ECCRN, "Characteristics and Quality of Child Care for Toddlers and Preschoolers," *Applied Developmental Science*, Vol. 4, 2000, pp. 116–135.

[60] W. Steven Barnett and Leonard N. Masse, "Comparative Benefit-Cost Analysis of the Abecedarian Program and Its Policy Implications," *Economics of Education Review*, Vol. 26, 2007, pp. 113–125; Jorge Luis García, James J. Heckman, Duncan Ermini Leaf, and Maria José Prados, *The Life-Cycle Benefits of an Influential Early Childhood Program*, Chicago: Human Capital and Economic Opportunity Global Working Group, The University of Chicago, Working Paper 2016-035, 2016.

[61] John M. Love, Ellen Eliason Kisker, Christine M. Ross, Peter Z. Schochet, Jeanne Brooks-Gunn, Diane Paulsell, et al., *Making a Difference in the Lives of Infants and Toddlers and Their Families: The Impacts of Early Head Start*, Vol. I, *Final Technical Report*, Washington, D.C.: Office of Planning, Research, and Evaluation, Department of Health and Human Services, 2002; Early Head Start Research and Evaluation Project, *Preliminary Findings from the Early Head Start Prekindergarten Follow-Up*, Washington, D.C.: Office of Planning, Research, and Evaluation, Department of Health and Human Services, 2006; Cheri A Vogel, Yange Xue, Emily M. Moiduddin, Ellen Eliason Kisker, and Barbara Lepidus Carlson, *Early Head Start Children in Grade 5: Long-Term Follow-Up of the Early Head Start Research and Evaluation Study Sample*, Washington, D.C.: Office of Planning, Research, and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services, OPRE Report # 2011-8, 2010.

[62] WSIPP, undated.

[63] Phyllis Weinstock, Johannes Bos, Fannie Tseng, Emily Rosenthal, Lorena Ortiz, Chantell Dowsett, Aletha Huston, and Alison Bentley, *Evaluation of Program for Infant/Toddler Care (PITC): An On-Site Training of Caregivers*, Washington, D.C.: U.S. Department of Education, NCEE 2012-4003, 2012.

[64] Martha Zaslow, Kathryn Tout, Tamara Halle, Jessica Vick Whittaker, and Bridget Lavelle, *Toward the Identification of Features of Effective Professional Development for Early Childhood Educators: Literature Review*, Washington, D.C.: U.S. Department of Education, 2010. As of January 28, 2017: http://www2.ed.gov/rschstat/eval/professional-development/literature-review.pdf; Lynn A. Karoly, *A Golden Opportunity: Advancing California's Early Care and Education Professional Development System*, MG-1188-PF/BECF, Santa Monica, Calif.: RAND Corporation, 2012. As of January 28, 2017: http://www.rand.org/pubs/monographs/MG1188.html

[65] Barnett and Masse, 2007; García et al., 2016.

[66] Anne Martin, Jeanne Brooks-Gunn, Pamela Klebanov, Stephen L. Buka, and Marie C. McCormick, "Long-Term Maternal Effects of Early Childhood Intervention: Findings from the Infant Health and Development Program (IHDP)," *Journal of Applied Development Psychology*, Vol. 29, 2008, pp. 201–117.

[67] Jonah B. Gelbach, "Public Schooling for Young Children and Maternal Labor Supply," *American Economic Review*, Vol. 92, No. 1, March 2002, pp. 307–322; Maria Donovan Fitzpatrick, "Preschoolers Enrolled and Mothers at Work? The Effects of Universal Prekindergarten," *Journal of Labor Economics*, Vol. 28, No. 1, 2010, pp. 51–85.

[68] Karoly and Auger, 2016.

[69] For example, although full-day programs cost about twice as much as part-day programs, they do not consistently show impacts that are twice as large. The same is true for two years of preschool experience versus one. However, research to date has not randomly assigned children to part- versus full-day programs or to one-year versus two-year programs to definitively test for differences in program effectiveness without the confounding factor of which families choose which type of program. Furthermore, the findings to date may reflect the current implementation of full-day or two-year programs, rather than a limitation on what is feasible if programs are well designed to take advantage of a longer day or to capitalize on a first year of preschool in the second year.

[70] Barbara Gault, Anne W. Mitchell, and Erica Williams, *Meaningful Investments in Pre-K: Estimating the Per-Child Costs of Quality Programs*, Washington, D.C.: Institute for Women's Policy Research, 2008. Their estimates in 2007 dollars have been inflated to 2015 dollars using the CPI-U.

[71] Timothy J. Bartik, William Gormley, and Shirley Adelstein, "Earnings Benefits of Tulsa's Pre-K Program for Different Income Groups," *Economics of Education Review*, Vol. 31, 2012, pp. 1143–1161; Jim Minervino, *Lessons from Research and the Classroom: Implementing High-Quality Pre-K that Makes a Difference for Young Children*, Seattle, Wash.: Bill and Melinda Gates Foundation, 2014. Dollar figures from earlier years are inflated to 2015 values using the CPI-U.

[72] Other estimates of the return to a high-quality preschool program are based on the Perry Preschool program and reach as high as $17 in benefits for every dollar of cost. However, the Perry Preschool program was a small-scale demonstration program implemented in the 1960s for a very targeted population at a time when the control group had no alternative programs to access. Such high returns, even for a targeted program, are unlikely to be realized in under present conditions, as noted by Lynn A. Karoly, "The Economic Returns to Early Childhood Education," *The Future of Children*, Vol. 26, No. 2, 2016, pp. 37–55. For estimates of the economic return to Perry Preschool, see Lawrence J. Schweinhart, Jeanne Montie, Zongping Xiang, W. Steven Barnett, Clive R. Belfield, and Milagros Nores, "Lifetime Effects: The High/Scope Perry Preschool Study Through Age 40," *Monographs of the High/Scope Educational Research Foundation*, Ypsilanti, Mich.: High/Scope Press, No. 14, 2005; James J. Heckman, Seong Hyeok Moon, Rodrigo Pinto, Peter A. Savelyev, and Adam Yavitz, "The Rate of Return to the High Scope Perry Preschool Program," *Journal of Public Economics*, Vol. 94, 2010, pp. 114–128.

[73] An independent evaluation of the HVNH HFA program, conducted by researchers at the University of New Hampshire, will provide evidence of impact that could be used to estimate the program's economic returns.

[74] Lynn A. Karoly and James H. Bigelow, *The Economics of Investing in Universal Preschool Education in California*, Santa Monica, Calif.: RAND Corporation, MG-349-PF, 2005. As of January 28, 2017: http://www.rand.org/pubs/monographs/MG349.html; Timothy J. Bartik, William Gormley, and Shirley Adelstein, "Earnings Benefits of Tulsa's Pre-K Program for Different Income Groups," *Economics of Education Review*, Vol. 31, No. 6, December 2012, pp. 1143–1161; Noa Kay and Annie Pennucci, *Early Childhood Education for Low-Income Students: A Review of the Evidence and Benefit–Cost Analysis*, Olympia, Wash.: WSIPP, January 2014; Eugene Steurle and Leigh M. Jackson, eds., *Advancing the Power of Economic Evidence for Making Informed Investments in Children, Youth, and Families*, Washington, D.C.: National Academies Press, 2016.

[75] Based on national data, we estimate that there are about 4,800 births to first-time mothers in New Hampshire per year. Assuming that 12 percent have family income below FPL, we can expect about 575 births per year to first-time mothers with income below FPL. A 17-percent participation rate equates to 100 families served per cohort. A higher participation rate could be accommodated if the qualified workforce is available.

[76] NFP National Service Office, *MIECHV Program Toolkit*, website, 2011. As of January 28, 2017: http://www.nursefamilypartnership.org/public-policy/NFP-Tool-Kit-for-State

[77] Miller, 2012. Miller makes a similar assumption of 20 percent attenuation, noting that the number of home visits per family in scaled-up NFP programs are about 80 percent of the number achieved in randomized trials. In a meta-analysis of delinquency intervention studies, Lipsey finds that real-world programs achieve average effect sizes that are about 67 percent as large as demonstration programs. Mark W. Lipsey, "The Confounded Moderators in Meta-Analysis: Good, Bad, and Ugly," *The Annals of the American Academy of Political and Social Science*, Vol. 587, No. 1, 2003, pp. 69–81.

[78] For the 2014–2015 program year, a preschool participation rate of this magnitude has been achieved in the District of Columbia (86 percent), Vermont (84 percent), Florida (77 percent), and Oklahoma (75 percent), all of which operate universal programs. This rate of participation has been reached in other states for the targeted population they serve. Barnett, Friedman-Krauss, et al., 2016.

[79] U.S. Department of Health and Human Services, *Provider Cost of Quality Calculator*, website, undated. As of January 28, 2017: https://www.ecequalitycalculator.com

[80] Raj Chetty, John N. Friedman, Nathanial Hilger, Emmanuel Saez, Diane Whitmore Schanzenbach, and Danny Yagan, "How Does Your Kindergarten Classroom Affect Your Earnings? Evidence from Project STAR," *Quarterly Journal of Economics*, Vol. 126, No. 4, 2011, pp. 1593–1660.

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About This Report

Recognizing the importance of the first five years of life, states have been expanding their investments in an array of early childhood interventions designed to address early-life stressors and other factors that can compromise healthy child development. Drawing on an extensive body of program evaluation and economic evaluation research, this report documents the ongoing need for early childhood investments in the state of New Hampshire, particularly for at-risk children; the evidence base for three strategies for promoting child development from birth to kindergarten entry—early home visiting, high-quality child care, and high-quality preschool; and the estimated economic returns in New Hampshire under various scenarios for expanding investments in such programs.

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