The Impact of Nurse-Family Partnership

on At-Risk Families and Children in South Carolina

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Introduction

The Sorenson Impact Center (SIC), housed in the David Eccles School of Business at the University of Utah, and Dr. Fernando Wilson, Director, CTSI Health Economics Core (HEC), at the University of Utah conducted a quantitative and qualitative analysis of the impact of Nurse-Family Partnership for the highest need families in South Carolina (SC). HEC is nationally recognized for its economic evaluation research and impact analyses. This study was performed according to rigorous standards for quantitative and qualitative evaluation research.

To complement the quantitative analysis, the Sorenson Impact team conducted a qualitative analysis and interviewed nurse supervisors and site administrators from every Nurse-Family Partnership implementation site in SC. Questions were framed around their experiences during the Pay for Success project conducted from 2016 to 2021[1], as well as Nurse-Family Partnership outcomes outside of the project.

The quantitative analysis presented in this brief is based on a systematic review that collected data from over a dozen prior studies of Nurse-Family Partnership services as well as two meta-analyses that synthesized results from previous research (preterm birth and child injury). In order to maximize comparability of Nurse-Family Partnership family sample characteristics across prior literature, the HEC conducted several scenario-based quantitative analyses that included and excluded findings from the Pay for Success evaluation. These analyses included estimating the economic value and costs to SC and to the SC Medicaid program of expanding Nurse-Family Partnership services to Medicaid eligible teenage mothers with less than high school education.

[1] The Pay for Success project was a randomized control trial of 5,670 Medicaid eligible mothers in South Carolina conducted between April 2016 and March 2020 with a follow-up through February 2021.

As discussed below, the population served in the Pay for Success project are not fully representative of the clients historically and most effectively served by Nurse-Family Partnership and may not be representative of Nurse-Family Partnership's broad impact. In addition, the Pay for Success study was limited in the number of outcomes evaluated and may not represent the breadth of Nurse-Family Partnership's benefits. As a result, it is necessary to examine the impact of Nurse-Family Partnership more broadly with respect to more comprehensive data and analyses that focus on the populations that Nurse-Family Partnership have historically served and for whom the impact is greatest. Findings from the qualitative interviews illustrating considerations regarding enrollment and implementation during the Pay for Success project further reinforced the need to examine the impact of Nurse-Family Partnership within a more comprehensive framework.

Summary of Findings

The Sorenson Impact Center and CTSI Health Economics Core Comprehensive Quantitative Analysis

As indicated above, to understand the impact of Nurse-Family Partnership in South Carolina, it is necessary to conduct a comprehensive quantitative and qualitative analysis and focus on the client population that Nurse-Family Partnership historically serves. The primary results of this quantitative analysis show **the aggregate economic impact for SC investment in Nurse-Family Partnership for vulnerable families is $5.5 for every $1 spent**. This economic value incorporates impacts that span across the state and its government agencies (health, child welfare, educational attainment, workforce development and earnings). The findings also include:

- Health savings represent a large portion of the savings associated with investing in Nurse-Family Partnership with a resulting economic impact to SC Medicaid of $4.7 for every $1 spent.
- Because South Carolina contributes less than 25% of total Medicaid spending in the state (FY2023 FMAP is 76.78%), but enjoys much of the benefits of extending Nurse-Family Partnership services to families, the economic value of the state portion of Medicaid spending is approximately $19 for every $1 spent.

- Analysis of the initial South Carolina Pay for Success (Pay for Success) project data shows the results to be focused on a limited number of outcomes and not fully reflective of Nurse-Family Partnership's broad impact with specific demographic groups.
- Qualitative research shows several key non-quantifiable benefits demonstrating Nurse-Family Partnership's impact.

A substantial share of the financial and societal benefits are realized in the near-term and intermediate time periods, including averting preeclampsia, preterm/infant mortality, smoking while pregnant, and early childhood maltreatment. Broken down to the federal and state share, and state share only, of Medicaid investment, the intermediate aggregate economic value to SC Medicaid equals:

- $4.5 for every $1 spent for both the federal and state share of Medicaid spending.
- $18.9 for every $1 spent for just the state share of Medicaid spending.

Nurse-Family Partnership's impact includes a range of health and socioeconomic outcomes. This quantitative analysis of economic impact is likely to be conservative because only eight outcomes were examined relating to the societal and health impact for Nurse-Family Partnership families. However, there are additional benefits from participating in Nurse-Family Partnership, including:

- The impact of Nurse-Family Partnership on important long-term socioeconomic outcomes related to high school completion of mothers is significant, including economic mobility as well as access to healthcare and health status. However, HEC only includes the impact of high school completion on labor market earnings for mothers.
- Several other benefits were highlighted during our qualitative analysis including:
    - Increased likelihood of breastfeeding;
    - Increased confidence, self-reliance, and workforce participation among first-time mothers;
    - Immeasurable individual and non-quantifiable impacts resulting from the relationship of trust between the mother and the nurse.

Summary of Considerations Regarding Pay for Success Project Findings

The South Carolina Pay for Success project provided insight into the potential impact on certain maternal and child health outcomes of expanding Nurse-Family Partnership services to Medicaid mothers in general. However, an analysis of the Pay for Success evaluation shows the population served in the project are not fully representative of the clients historically and most effectively served by Nurse-Family Partnership and may not be representative of Nurse-Family Partnership's broad impact.

Table 1 shows the typical profile of a Nurse-Family Partnership mother substantively changed during Pay for Success implementation compared to before the project.

Table 1: Comparison of Demographic Characteristics of Mothers Enrolled

	Prior to Pay for Success	During Pay for Success
Percentage of mothers aged 15-19	**27.3%**	**18.2%**
Percentage of Hispanic Mothers	**8.5%**	**5.5%**
Percentage of Mothers with BMI >=30	**24.7%**	**34.9%**
Percentage of Mothers with Less than a High School Diploma	**34.3%**	**22.7%**
Percentage of Mothers who have Attended College	**34.7%**	**41.3%**

While participants in the Pay for Success evaluation generally did not fully represent the historical clients effectively served by Nurse-Family Partnership, the Pay for Success evaluation included a subsample of vulnerable mothers (defined as mothers younger than 19 years old, mothers who had not finished high school, or mothers who had challenges with mental health). Several studies of Nurse-Family Partnership's impact on preterm birth have been conducted prior to Pay for Success with comparable vulnerable populations. Incorporating these prior findings on preterm birth with the findings for this subsample from the Pay for Success study does not substantively change the aggregate economic value for South Carolina or the economic value to SC Medicaid.

This means that when the impact of Nurse-Family Partnership on preterm birth is considered within the larger body of evidence, it is predicted to result in significant cost savings.

Further, the Pay for Success evaluation results should also be considered in the context of the experience of participants involved in its implementation. Results from the qualitative analysis highlighted the experiences of nurse supervisors and site administrators during the course of implementing the South Carolina Pay for Success project, including:

- High stress enrollment process focused on hitting quotas rather than targeting the highest need mothers;
- Disruptions to traditional referral pathways such as OB/GYNs and school counselors;
- Changes in the population enrolled in the program, including low enrollment of teenage or other high-need mothers;
- Rapid expansion and hiring of new nurses for the increased caseload;
- Increased attrition rates of clients compared to previous years;
- Many outcomes and impacts of Nurse-Family Partnership were not included in the data collected and reported for the Pay for Success project.

Additional results from the qualitative analysis supplement and inform the quantitative analysis and further highlight the previously found impact of Nurse-Family Partnership:

- Increased likelihood of high-school graduation among teenage mothers;
- Increased likelihood of breastfeeding;
- Increased confidence, self-reliance, and workforce participation among first-time mothers;
- Immeasurable individual and non-quantifiable impacts resulting from the relationship between the mother and her nurse.

Key Demographics for Nurse-Family Partnership Impact

This comprehensive data analysis shows that South Carolina can achieve cost-savings and capture substantial economic value in the intermediate and long-term through

continued funding of Nurse-Family Partnership for the highest need families. Reaching and enrolling the most at-risk pregnant women is critical. Intensive home visiting services by Nurse-Family Partnership is most effective for:

- Young, first-time, or inexperienced mothers;
- Mothers living in poverty;
- Mothers at-risk of not completing high-school;
- Mothers at-risk of preeclampsia, preterm birth, or other complications;
- Mothers experiencing adverse home environments that may lead to risk of child maltreatment or abuse.

Quantitative Analysis

A number of prior studies have evaluated Nurse-Family Partnership services in improving maternal and child health and other outcomes. For example, a systematic review of Nurse-Family Partnership services on preterm births published in 2015 suggested that Nurse-Family Partnership was associated with a 14.7% decrease in the relative risk of preterm birth.[2] There is also evidence that Nurse-Family Partnership has a positive return on investment. A rigorous study by Miller (2013) examining the evidence base for a number of social, economic, and health outcomes for Nurse-Family Partnership families reports a Benefit-Cost Ratio (BCR) of 6.2 for Nurse-Family Partnership, associated with a total benefit of $66,893 per Nurse-Family Partnership family (inflation-adjusted to 2021 dollars).[3] However, a more recent analysis conducted by the Washington State Institute for Public Policy (WSIPP) reports a BCR of 1.4 and only $18,374 in benefits after inflation-adjustment.[4]

Prior evidence of the impact of the Nurse-Family Partnership program on South Carolina families is limited. Findings from the Pay for Success project (published in McConnell et al (2022)) suggest that Nurse-Family Partnership services did not have a statistically significant impact on certain maternal and child outcomes for Medicaid

[2] Miller TR. Projected Outcomes of Nurse-Family Partnership Home Visitation During 1996–2013, USA. Prev Sci 2015;16(6):765-77.
[3] Miller TR. Nurse-Family Partnership Home Visitation: Costs, Outcomes, and Return on Investment. September 2012 (Revised April 30, 2013).
[4] Washington State Institute for Public Policy (WSIPP). Nurse Family Partnership. December 2019. Available at: http://www.wsipp.wa.gov/BenefitCost/Program/35

eligible families compared to a control group.[5] This project examined likelihood of preterm birth, low birth weight, small for gestational age, and perinatal mortality for 4,966 participants.[6] The study also stratified findings for Black non-Hispanic mothers and socially vulnerable mothers. However, the set of short and long-term outcomes for mothers and their children documented in prior studies of Nurse-Family Partnership are broad, and an economic analysis for extending Nurse-Family Partnership services to vulnerable South Carolina families in light of McConnell et al (2022) and prior research findings is needed.

Methodology

HEC undertook scenario analyses of the benefit-to-cost of Nurse-Family Partnership services for vulnerable South Carolina families. HEC used results from prior studies of Nurse-Family Partnership outcomes and incorporated McConnell et al (2022) findings in a meta-analysis of preterm birth outcomes. A meta-analysis is a well-established statistical methodology that synthesizes and analyzes prior studies to create a summary statistic that provides a definitive and robust estimate of the overall impact of an intervention on a beneficial outcome. The scenarios derived Benefit-Cost Ratio (BCR) estimates that included outcomes examined in prior research and not examined in McConnell et al (2022).

In the meta-analysis of preterm births, HEC conducted a systematic review of the evidence base for Nurse-Family Partnership services, and, based on this review, which included McConnell et al (2022), HEC reported that Nurse-Family Partnership decreases the risk of preterm births by 19% (Relative Risk (RR)=0.81; 95% Confidence Interval (CI) 0.67, 0.98) for mothers participating in the program relative to non-participants.

- The meta-analysis of childhood injury showed a larger risk reduction for Nurse-Family Partnership than that for preterm births. For families participating in Nurse-Family Partnership, their risk of childhood injury decreased by 37% (RR=0.63; 95%CI 0.46, 0.87).
- These findings suggest that the Nurse-Family Partnership program is a highly effective and promising intervention to decrease risks of preterm births and childhood injuries among families.

[5] McConnell MA, Rokicki S, Ayers S, et al. Effect of an Intensive Nurse Home Visiting Program on Adverse Birth Outcomes in a Medicaid-Eligible Population. A Randomized Clinical Trial. JAMA 2022;328(1):27-37.
[6] Ibid.

For the economic evaluation of BCR of investment in Nurse-Family Partnership for South Carolina, HEC examined the following outcomes based on prior published studies and results from our meta-analysis:

- High school/GED attainment
- Preeclampsia
- Smoking during pregnancy
- Preterm birth
- Infant deaths
- Subsequent birth rate
- Child maltreatment/abuse/neglect
- Immunizations (7-vaccine series)

For each outcome, HEC examined the risk reduction associated with Nurse-Family Partnership services and compared this risk reduction with the corresponding population incidence using data from the Centers for Disease Control and Prevention (CDC) and other sources. Afterward, the monetary economic benefits across all outcomes were estimated using prior literature, data from the Bureau of Labor Statistics, and other sources. Furthermore, HEC undertook scenario analyses based on inclusion and exclusion of findings from McConnell et al (2022).

Scenario Analysis

In order to provide a comprehensive and insightful analysis of the impact of Nurse-Family Partnership on at-risk families and children in South Carolina, HEC performed scenario analyses. Six scenarios were analyzed:

- **Scenario 1:** Based on prior studies, excluding the SC Pay for Success evaluation results due to significant considerations regarding comparability.
- **Scenario 2**: Based on prior studies and including the results of the SC Pay for Success evaluation for the vulnerable mother subgroup (mothers 19 and under, less than high school graduation, experiencing mental health challenges) for preterm birth.
- **Scenario 3**: Based on prior studies and including the results of the SC Pay for Success evaluation for preterm birth for the vulnerable mother subgroup (mothers 19 and under, less than high school graduation, experiencing mental health challenges) and only includes infant mortality

after 7 days.

- **Scenario 4:** Based on prior studies and including the results of the SC Pay for Success evaluation for preterm birth for the vulnerable mother subgroup (mothers 19 and under, less than high school graduation, experiencing mental health challenges) and excludes all perinatal or infant mortality outcomes for vulnerable mothers.
- **Scenario 5**: Based on prior studies, excludes preterm birth and perinatal mortality for vulnerable mothers. The impact on infant mortality after one week from birth is included.
- **Scenario 6**: Based on prior studies, excludes preterm birth and all perinatal or infant mortality outcomes for vulnerable mothers.

For each scenario, the BCR of an investment in Nurse-Family Partnership to serve teen, less educated mothers was calculated for:

- The SC Aggregate Economic Impact:
  - Including averted infant mortality, preeclampsia, smoking while pregnant, preterm, subsequent birth, childhood maltreatment/abuse, immunizations
- The Economic Value to Medicaid:
  - Including averted infant mortality, preeclampsia, smoking while pregnant, preterm, subsequent birth, childhood maltreatment/abuse, immunizations
  - Calculated for both the state and federal share of Medicaid investment
  - Calculated for the state Medicaid share of investment only
- The Intermediate Economic Value to Medicaid:
  - Including averted infant mortality, preeclampsia, smoking while pregnant, preterm, & childhood maltreatment/abuse
  - Calculated for both the state and federal share of Medicaid investment
  - Calculated for the state Medicaid share of investment only
- A Break-Even Analysis for the Statistical Value of Life to Medicaid

The impact of Nurse-Family Partnership includes a range of outcomes. This analysis is likely to be conservative because HEC examined eight outcomes relating to the societal and health impact for Nurse-Family Partnership families. However, there are additional benefits from participating in Nurse-Family Partnership. For example:

- Several non-quantifiable benefits were highlighted during the course of SIC's

qualitative analysis. Nurses often provided customized care beyond medical needs, connecting mothers to additional community resources, and developed long-lasting, esteem-building relationships with mothers.

- The impact of Nurse-Family Partnership on high school completion, which is expected to have major long-term socio-economic impacts for Nurse-Family Partnership families in long-term economic mobility and health status. However, HEC only includes the impact of high school completion on labor market earnings for mothers.

Findings from the Quantitative Analyses

Table 2 below displays the Benefit Cost Ratios for each scenario. (Detailed findings are provided in Appendix I)

Table 2: Scenario Benefit-Cost Ratios

	SC Aggregate Economic Impact	Economic Value to Medicaid		Intermediate Economic Value to Medicaid		Economic Value to Medicaid State Only
	Benefit-Cost Ratio	Federal and State	State Only	Federal and State	State Only	Break-Even Value of Life (BCR=1)*
Scenario 1	5.5	4.7	19.0	4.5	18.9	$495.2k
Scenario 2	5.5	4.7	19.0	4.5	18.9	$499.1k
Scenario 3	2.6	1.8	6.5	1.6	6.4	$1.5M
Scenario 4	1.1	0.3	0.3	0.2	0.2	N/A
Scenario 5	2.4	1.7	6.5	1.6	6.3	$1.6M
Scenario 6	1.0	0.3	0.3	0.2	0.2	N/A

Based on prior studies, the Benefit-Cost Ratio (BCR) of investing in Nurse-Family Partnership for teenage, less educated Medicaid eligible mothers with respect to the SC aggregate economic impact of $5.5 for every $1 spent. The economic impact to Medicaid is $4.7 for $1 spent. As discussed, several studies of Nurse-Family Partnership's impact on preterm birth have been conducted prior to the implementation of the Pay for Success project with comparable vulnerable populations. The Scenario

Analysis demonstrated that incorporating these prior findings on preterm birth with that for the subsample of vulnerable mothers from the Pay for Success study (Scenario 2) does not substantively change the aggregate economic value for South Carolina or the economic value to SC Medicaid. The BCR for Scenario 1, excluding the results of the Pay for Success study and the BCR for Scenario 2, including the results of the vulnerable mother subgroup of the Pay for Success study in the meta-analyses of preterm birth, are comparable. These results show that when the impact of Nurse-Family Partnership on preterm birth is considered within the larger body of evidence, it is predicted to result in significant cost savings.

Excluding perinatal mortality and only including infant mortality from 7 days after birth to one year results in a positive aggregate economic return of $2.6 for $1 spent and $1.8 in economic value to Medicaid for every $1 spent, respectively.

A substantial share of benefits are realized in near-term and intermediate time periods, including averting preeclampsia, preterm/infant mortality and early childhood maltreatment. The Intermediate Aggregate Economic Impact is $4.5 for every $1 spent (federal and state share) and $18.9 for every $1 spent for the state share of Medicaid investment only.

Using the most restrictive assumptions of excluding any benefits from preventing preterm and infant mortality results in break-even (BCR = 1.0) for SC in the aggregate, and a BCR of 0.3 for Medicaid specifically. Including the reduction in infant mortality, the break-even value of life to achieve cost neutrality (BCR=1) is significantly below the average of $6.3M for studies by federal agencies to $15M for studies using industry data.

Qualitative Analysis

The study conducted by SIC and HEC utilized a mixed-methodology approach to provide a comprehensive view of both the Pay for Success project and the impact and outcomes of Nurse-Family Partnership broadly within South Carolina. SIC collected qualitative data through interviews with the local Nurse-Family Partnership administrative sites within South Carolina. Interviews were designed to create an understanding of:

- The experiences of the sites and their nurse home visitors before, during, and after the South Carolina Pay for Success project.

- The outcomes and impacts of the Nurse-Family Partnership program that are not captured by traditional data sets.

Methodology

SIC interviewed nurse managers, nurse supervisors, or site administrators from every Nurse-Family Partnership implementation site within South Carolina, totaling 10 interviews. Interviews included a participant from one site which did not participate in the Pay for Success project. Interviews were conducted virtually with informed consent for video and audio recording. Each interview contained 13 questions developed independently by SIC; questions were then shown to a representative from Nurse-Family Partnership to ensure all questions aligned with interviewee knowledge of the program and of the Pay for Success project. The full list of interview questions and details of the qualitative analysis applied are included in Appendix II and Appendix III.

Findings from the Qualitative Analysis: Pay for Success Project

SIC found 10 emergent themes reported frequently throughout the interview process regarding the experiences of the nurse supervisors and site administrators over the course of the South Carolina Pay for Success project. These themes were classified by SIC into three categories: (1) Changes in the Enrollment Process, (2) Historically Non-Traditional Enrolled Population, and (3) Pandemic Related Telehealth. The table below includes each category, the emergent themes within each category, and their respective frequency rates.

Table 3: Pay For Success Project Qualitative Theme Frequency

Changes in the Enrollment Process		**Historically Non-Traditional Enrolled Population**	
Theme	Frequency	Theme	Frequency
High Pressure Enrollment	**70%**	Absence of Teenage Mothers	**70%**
Focus on Gift Cards	**30%**	**Pandemic Related Telehealth**	
Directed to Other Resources	**60%**	Theme	Frequency
Referral System Changes	**60%**	Telehealth Impacting Service	**60%**
Caseloads	**30%**	Telehealth Providing Flexibility	**80%**
Nurse Experience Levels	**30%**		
Nurse Training Methods and Funding	**30%**		

Throughout the interviews, Nurse-Family Partnership nurse supervisors and site administrators emphasized the success and the impact of the program, but acknowledged that the Pay for Success project introduced additional factors that may have diluted the success or impact of some outcomes. These factors, addressed throughout the themes from the qualitative interviews and supported by data from the quantitative analysis, are summarized below. Detailed findings for each of the emergent themes within the categories are included in Appendix III.

Three Changes in the Enrollment Process:

1. Enrollment Quotas

   Interviewees reported a focus on meeting enrollment quotas fundamentally changed the outreach and enrollment process for Nurse-Family Partnership in South Carolina. According to interviewees, sites were no longer approached by mothers who wanted Nurse-Family Partnership services, and historical referral pipelines such as OB/GYNs and schools stopped referring mothers to the

program, expressing a concern that their high-need patients might be relegated to the control group and receive no services. Instead, Nurse-Family Partnership nurses relied on lists of Medicaid eligible mothers in low-income zip codes and were asked to cold call potential clients. In recruiting calls, nurses had to explain the Nurse-Family Partnership programming, the Pay for Success project and structure, and successfully encourage mothers to enroll in order to meet that site's enrollment quota.

2. Gift Card Incentives

   Interviewees also expressed that the gift card incentive for attending an informational session or enrolling in the program was ineffective because mothers frequently stopped participating in the program after receiving the gift card, potentially affecting the reported program outcomes.

3. Emotional Enrollment Process

   Finally, interviewees cited an overall stressful and demoralizing enrollment process because enrollment was done by the same nurse home visitors who would later perform services for these mothers. Interviewees said that many nurses felt distraught after a mother they had been working with, who the nurse truly believed needed Nurse-Family Partnership services, was assigned to the control group. Interviewees suspected the emotional nature of the enrollment process, and the enrollment being completed by the nurses themselves, may have resulted in control group mothers being directed to receive other services.

Historically Non-Traditional Enrolled Population:

The interviewees reported that the enrolled population during the Pay for Success project, in both the control and treatment groups, was markedly different from the traditional population served by Nurse-Family Partnership. Differences included age, education, income, and level of familial or community support. High need mothers, including mothers younger than 15 years old and those currently experiencing homelessness, were also unable to be enrolled due to restrictions of the Pay for Success project. These groups previously made up key portions of the service population for South Carolina Nurse-Family Partnership sites before and after the Pay for Success project.

Pandemic-Related Telehealth:

Interviewees expressed that the necessary switch to telehealth during the onset of the

pandemic was detrimental to service delivery because a vital component of Nurse-Family Partnership's programming requires nurses seeing the home and conditions for the mother and child. Additionally, nurses indicated that once telehealth was implemented as an optional approach, the increased flexibility for service delivery led to noticeable success in helping mothers.

Findings from the Qualitative Analysis: Nurse-Family Partnership's General Impact

SIC found six emergent themes reported frequently throughout the interview process regarding the general impact of Nurse-Family Partnership on its target population in general, not specific to the Pay for Success project. These themes were classified by SIC into two categories: (1) Nurse Home Visitors as Nurses, Teachers, and Advocates and (2) Upward Mobility Among Participating Mothers. The table below includes each category, the emergent themes within each category, and their respective frequency rates.

Table 4: Nurse-Family Partnership General Impact Qualitative Theme Frequency

Nurse Home Visitors as Nurses, Teachers, and Advocates		**Upward Mobility Among Participating Mothers**	
Theme	Frequency	Theme	Frequency
Impact Beyond the Data/Numbers	**70%**	Positive Educational Impact for Mothers	**30%**
Nurses Connect Mothers to Resources	**80%**	Nurse-Family Partnership Works with Highest Needs Families	**50%**
Nurse - Mother Relationship	**100%**	Nurse-Family Partnership is a Long-Term Investment in the Community	**20%**

Throughout the interviews, Nurse-Family Partnership nurse supervisors and site administrators frequently relayed the perspective that a large portion of the program's impact is not quantifiable and not reflected in the outcome data collected throughout the Pay for Success project. Interviewees discussed the long-term impacts of Nurse-Family Partnership, especially when applied to clients they categorized as highest need. These

impacts, addressed throughout the themes from the qualitative interviews and supported by data from the quantitative analysis, are summarized below. Detailed findings for each of the emergent themes within the categories are included in Appendix III.

Nurse Home Visitors as Nurses, Teachers, and Advocates:

Interviewees highlighted the three important roles of nurse home visitors in the lives of their clients as nurses, teachers, and advocates.

- As nurses, the home visitors are strongly committed to providing the highest quality care to the families they serve, customized to the mother's needs and personal goals.
- As teachers, nurses empower mothers to be independent and teach them good personal and infant care habits.
- As advocates, Nurse-Family Partnership works with mothers, especially young mothers, to build their support networks and increase their graduation rates and workforce participation. Interviewees described this human-centered approach as the key to Nurse-Family Partnership's impact. Interviewees cited that the relationship between the mother and her nurse is crucial, allowing the mother to confide in the nurse and be connected to necessary resources; the mother then has an ally with medical training who can advocate on their behalf and build trust within the medical community.

Upward Mobility among Participating Mothers:

Interviewees reported high levels of workforce participation among mothers who completed the program. Many reported that their clients elected to pursue a career in the medical field after working with their nurse home visitor. Interviewees indicated that support from Nurse-Family Partnership nurses was a key step to breaking the generational cycle of poverty, with this impact being even more pronounced among teenage or young mothers. Interviewees indicated a high level of educational enrollment, retention, and graduation rates among teenage mothers who completed the program. They also reported having success with breastfeeding rates, healthy infant sleeping habits, and connecting mothers with community resources to assist in escaping intimate partner violence and improving the client's mental health and addressing postpartum depressive symptoms.

Conclusion

The impact of Nurse-Family Partnership on at-risk families and children is broad across multiple domains and spans across South Carolina and its government agencies. Due to limitations and considerations regarding the results of the Pay for Success project in South Carolina highlighted in this brief, a comprehensive analysis of Nurse-Family Partnership's impact in South Carolina was needed to estimate its economic value and outcomes to the state and to SC Medicaid. Accounting for the wide range of health and socio-economic impact created by Nurse-Family Partnership for these families creates significant fiscal and societal benefits for South Carolina broadly.

The most critical populations who will benefit from program participation are young, first-time mothers; mothers living in poverty; mothers at risk of not completing high school; mothers at risk of pre-eclampsia, preterm birth, or other complications; and mothers living in adverse home environments leading to risk of child maltreatment or abuse. The findings of this comprehensive analysis suggest there are significant positive short- and long-term outcomes in continuing investment in Nurse-Family Partnership to serve the most high needs families.

Appendix I: Quantitative Scenario Analysis

Scenario 1

Scenario 1 utilizes results from prior studies of Nurse-Family Partnership impact and excludes results from McConnell and colleagues. This scenario suggests that extending Nurse-Family Partnership services to all teenage mothers eligible for Medicaid would have a total economic impact of $107.4 million for the State of South Carolina with total costs of $19.6 million to the Medicaid program after the two-year NFP program period. This results in an estimated BCR of 5.5. The largest impact from extending Nurse-Family Partnership services is $85.1 million in averted infant deaths (Figure A1). HEC estimates that expanding Nurse-Family Partnership to teenage Medicaid mothers would prevent six infant deaths for the two-year period of NFP services. Other economic benefits include 39 fewer preterm births ($970 thousand), 30 fewer cases of maltreatment and abuse ($1.2 million), 265 more children up-to-date on immunizations ($1.6 million), 68 fewer teenage mothers choosing to smoke ($80.5 thousand), 56 fewer cases of preeclampsia ($1.9 million), 122 averted subsequent births ($976.6 thousand), and seven mothers who avoid dropping out of high school ($1.14 million).

Figure A1. Aggregate economic impact stratified by source

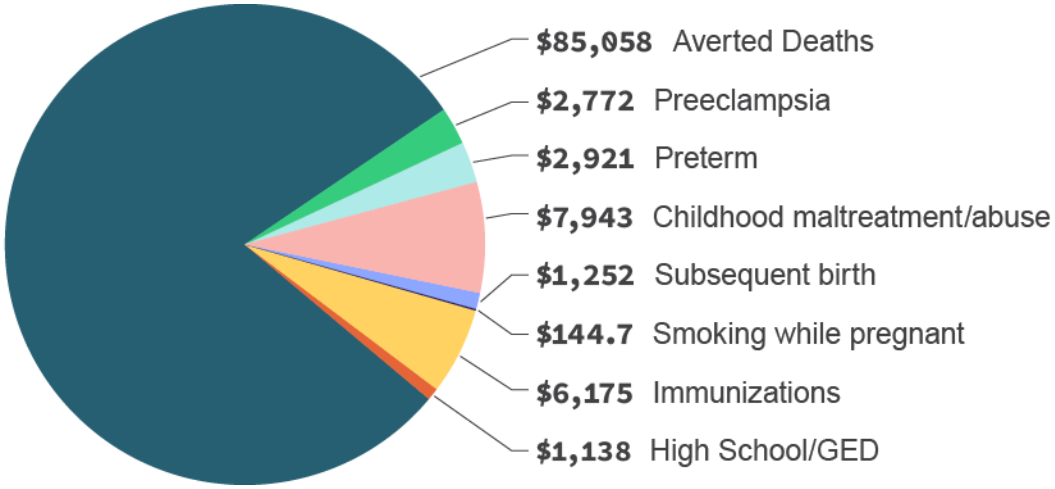
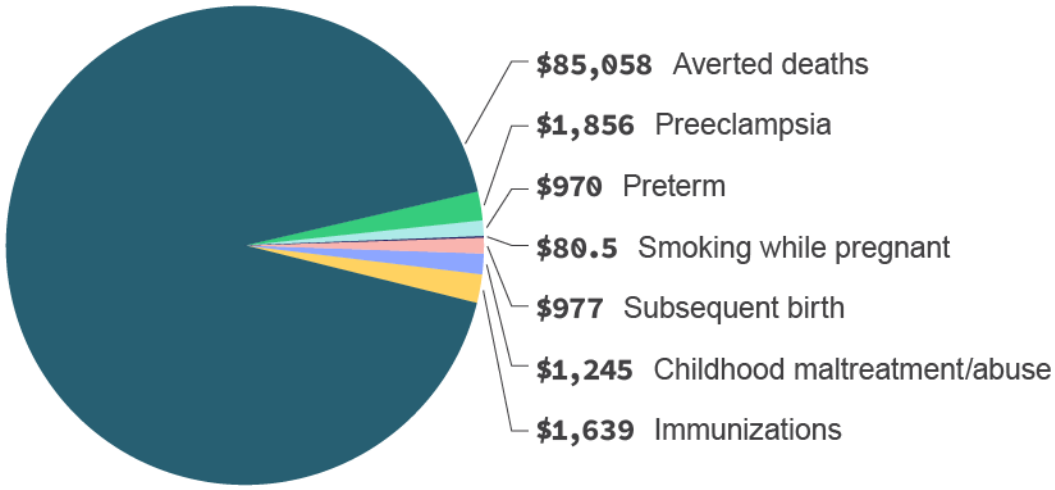


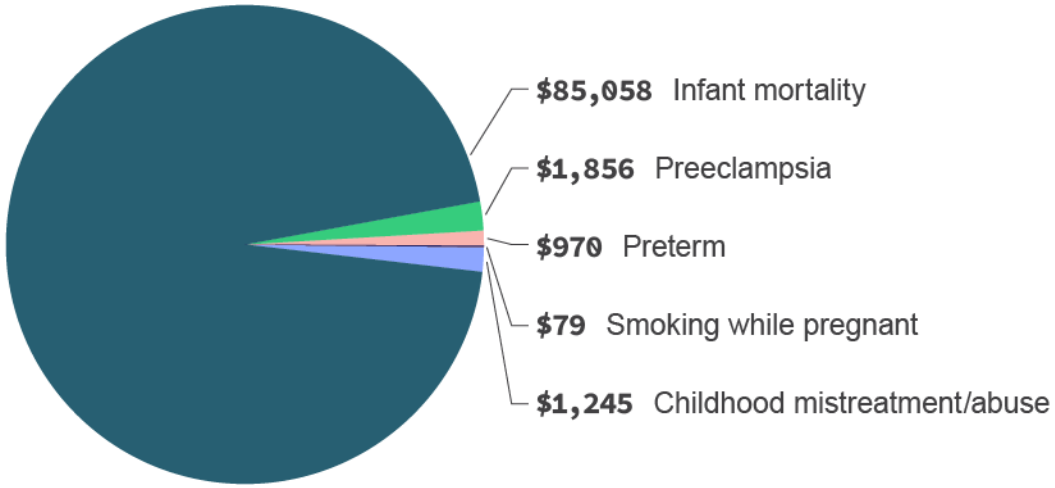
Figure A2 reports economic impact from the perspective of the Medicaid program, including both federal and state sources of funding. Total benefits are $91.8 million with associated program costs of $19.6 million. This results in a BCR of 4.7. However, this BCR increases substantially when excluding federal funding. The Federal Medical Assistance Percentage (FMAP) for Medicaid is 76.78% for FY2023; thus, the share of state budgetary funding for Medicaid is less than 25%. In effect, the average cost to the state is approximately $2,200 per Nurse-Family Partnership family. However, the state enjoys much of the benefits of extending Nurse-Family Partnership services to families. Examining the BCR for only the state share of expenditures results in a BCR of 19.0.

Figure A2. Economic value to Medicaid (federal and state) (in thousands)



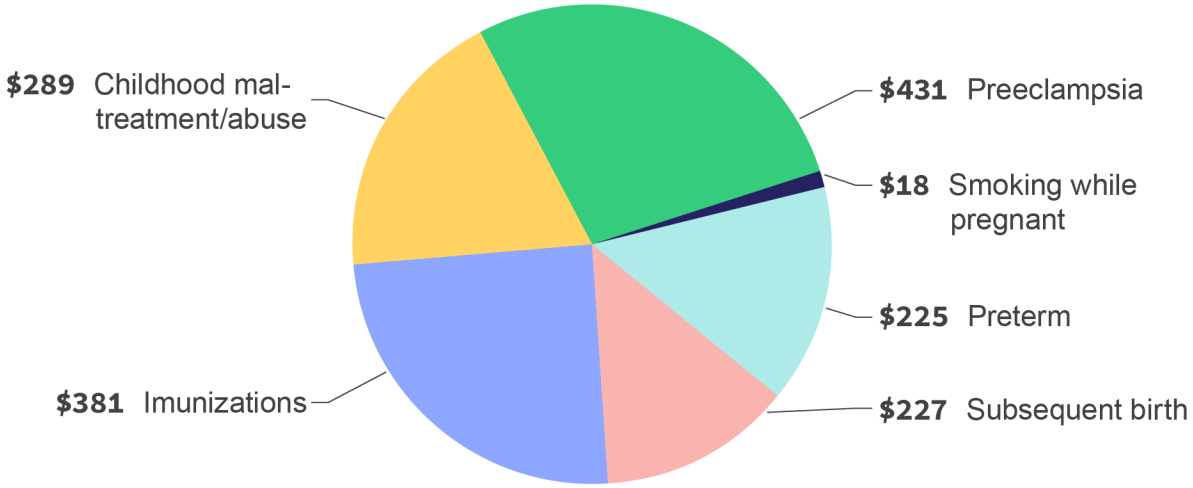
In Figure A3, only short- to intermediate-term outcomes were included as determined by the researchers. These include preeclampsia, preterm, smoking while pregnant, infant mortality, and childhood maltreatment and abuse. Much of the benefit of Nurse-Family Partnership relates to decreasing risk of infant mortality ($85 million). The BCR for both federal and state expenditures is 4.5, and, for state expenditures only, the BCR is 18.9.

Figure A3. Intermediate economic value to Medicaid (federal and state) (in thousands)



Finally, HEC determined break-even analysis for the statistical value of life and included only state budgetary expenditures for providing Nurse-Family Partnership services. The economic value for other outcomes is presented in Figure A4. The break-even value of life is estimated to be $495.2 thousand per life.

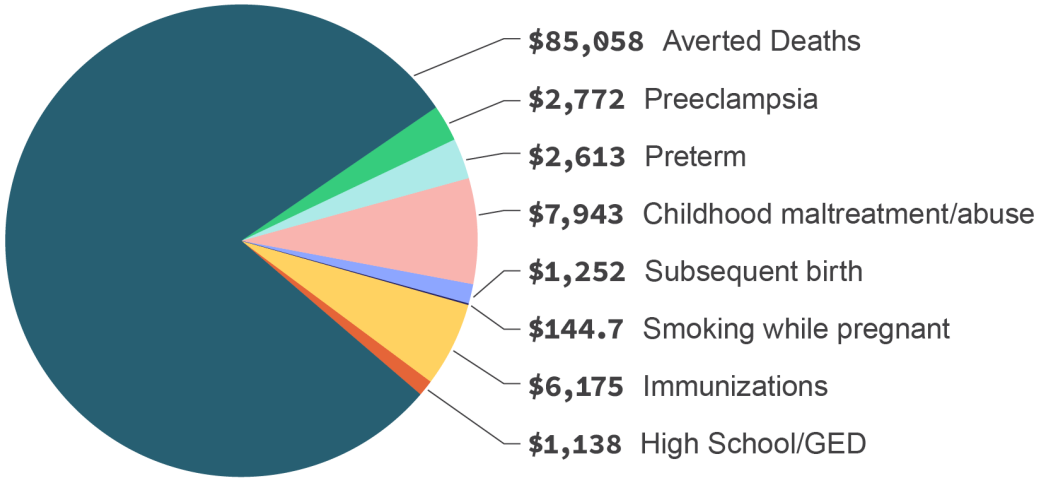
Figure A4. Economic value to Medicaid (state) (in thousands)



Scenario 2

Scenario 2 utilizes results from prior studies of Nurse-Family Partnership impact and includes results on preterm births for the vulnerable mother subgroup from McConnell and colleagues. Results are substantially the same as for Scenario 1. Extending Nurse-Family Partnership services to all teenage mothers eligible for Medicaid would have a total economic impact of $107.1 million for the State of South Carolina with total costs of $19.6 million to the Medicaid program. This results in an estimated BCR of 5.5. The distribution of benefits is presented in Figure A5.

Figure A5. Aggregate economic impact (in thousands)



For the Medicaid program, the BCR is 4.7, or 19.0 for state-only expenditures. The distribution of benefits is presented in Figure A6. Intermediate outcomes result in BCRs of 4.5 and 18.9 for federal/state and state-only expenditures, respectively (Figure A7). Finally, the break-even value of life is $499.1 thousand per life for state-only expenditures for Nurse-Family Partnership (Figure A8).

Figure A6. Economic value to Medicaid (federal and state) (in thousands)

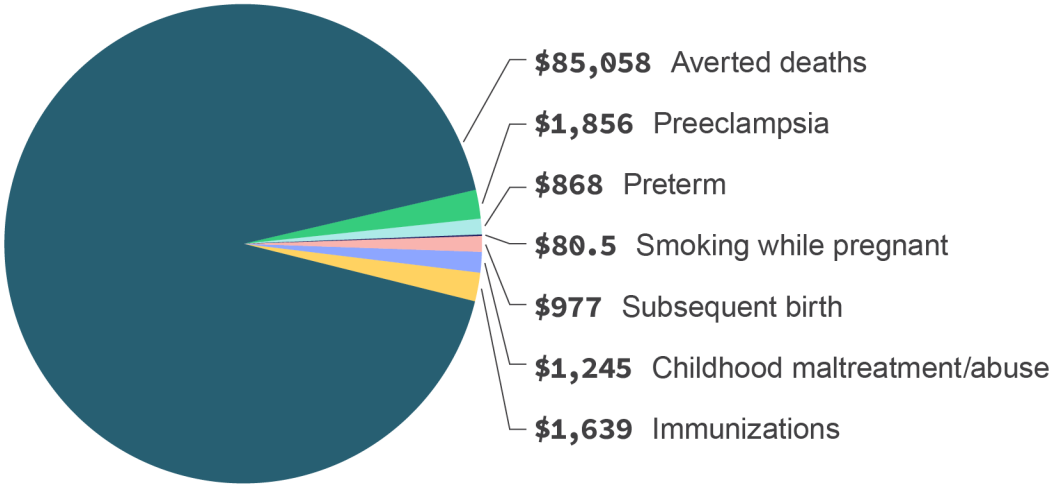


Figure A7. Intermediate economic value to Medicaid (federal and state) (in thousands)

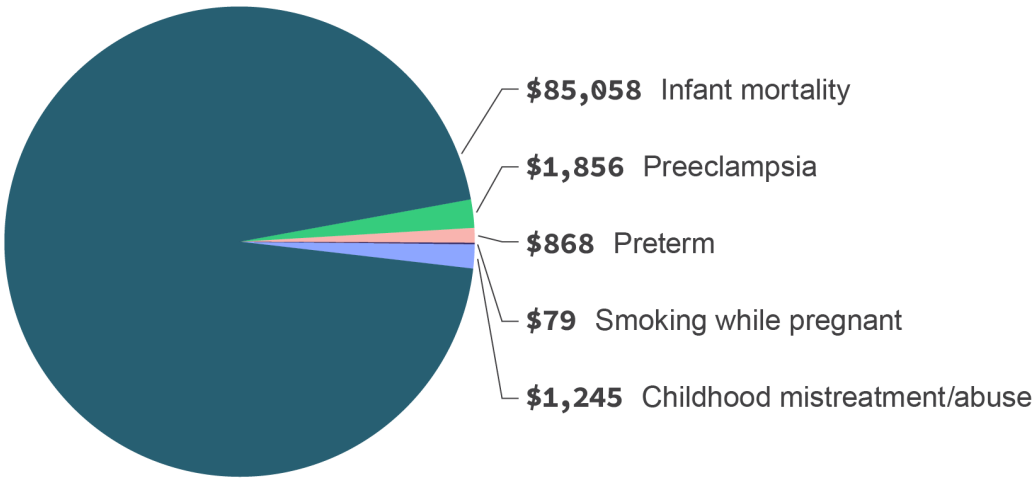
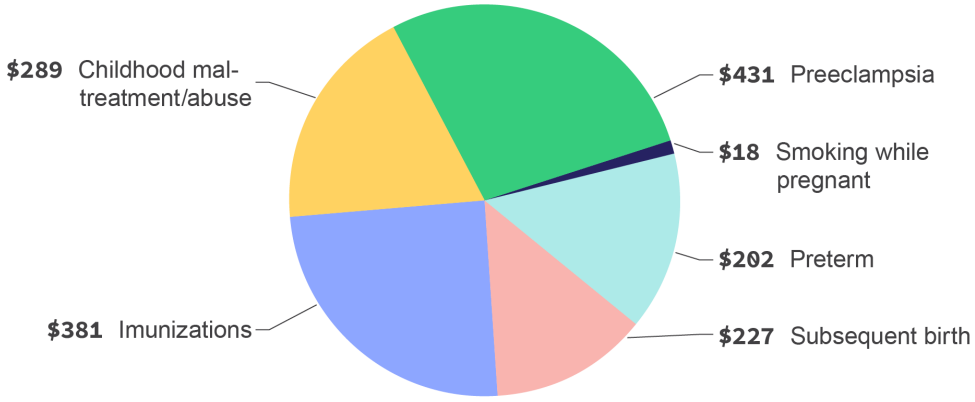


Figure A8. Economic value to Medicaid (state) (in thousands)

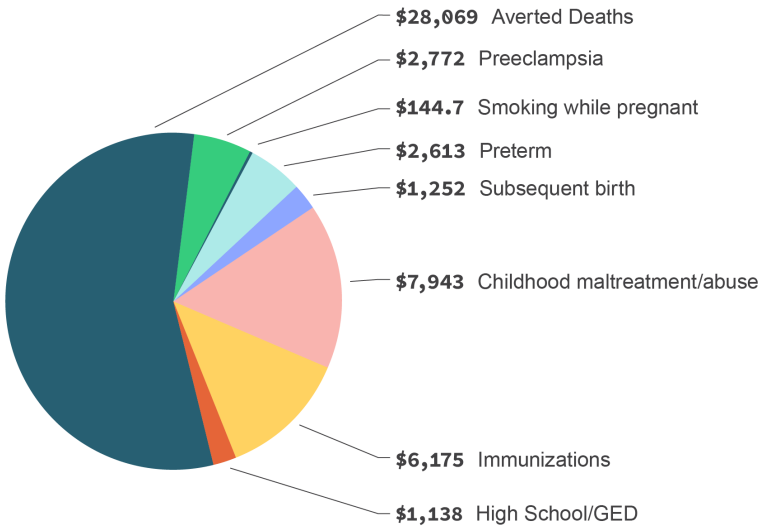


Scenario 3

Scenario 3 utilizes results from prior studies of Nurse-Family Partnership's impact and includes results on preterm births for the vulnerable mother subgroup from McConnell and colleagues. However, this scenario excludes infant mortality within seven days of birth. This would be predicted to result in two averted infant deaths.

The total economic impact is $50.1 million for the State of South Carolina to extend Nurse-Family Partnership services, costing $19.6 million to the Medicaid program. This results in an estimated BCR of 2.6. The distribution of benefits is presented in Figure A9.

Figure A9. Aggregate economic impact (in thousands)



The economic impact for Medicaid (federal and state) totals $34.7 million, resulting in a BCR of 1.8 (or 6.5 using only state funds) (Figure A10). For intermediate outcomes, the BCR is 1.6 for all sources of Medicaid funding, and 6.4 for state-only funds (Figure A11). Finally, break-even analysis suggests that a value of life exceeding $1.5 million would result in a BCR above 1.0 (Figure A12).

Figure A10. Economic value to Medicaid (federal and state) (in thousands)

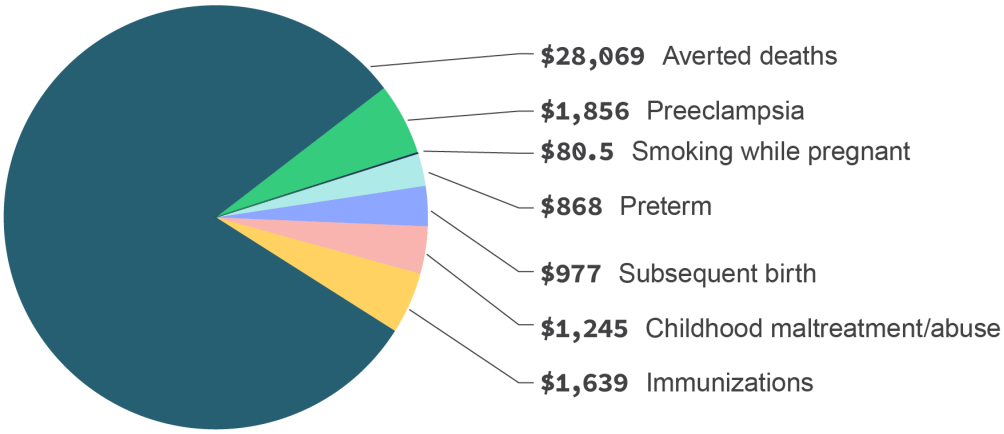


Figure A11. Intermediate economic value to Medicaid (federal and state) (in thousands)

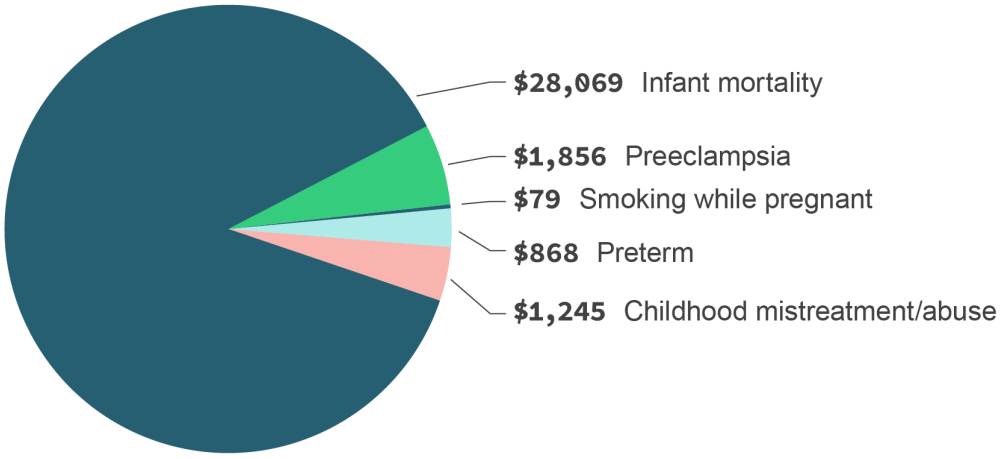
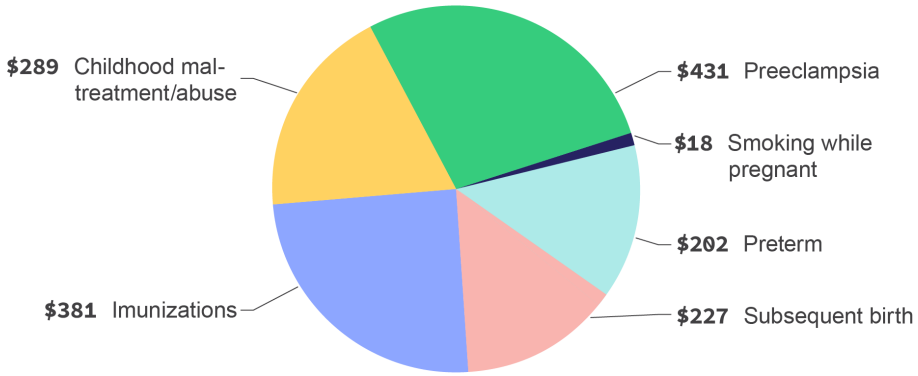


Figure A12. Economic value to Medicaid (state) (in thousands)



Scenario 4

Scenario 4 utilizes results from prior studies of Nurse-Family Partnership's impact and includes results on preterm births for the vulnerable mother subgroup from McConnell and colleagues, but excludes all benefits from infant mortality reduction with Nurse-Family Partnership.

The total economic impact is $22 million for the State of South Carolina, resulting in a near break-even BCR of 1.1. The distribution of benefits is presented in Figure A13. Examining only federal and state Medicaid benefits and costs results in a BCR of 0.3 (Figure A14). Total benefits for intermediate outcomes are $4.0 million for federal and state, and $939.8 thousand for only state, resulting in a BCR of 0.2 (Figure A15).

Figure A13. Aggregate economic impact (in thousands) (Scenario 4)

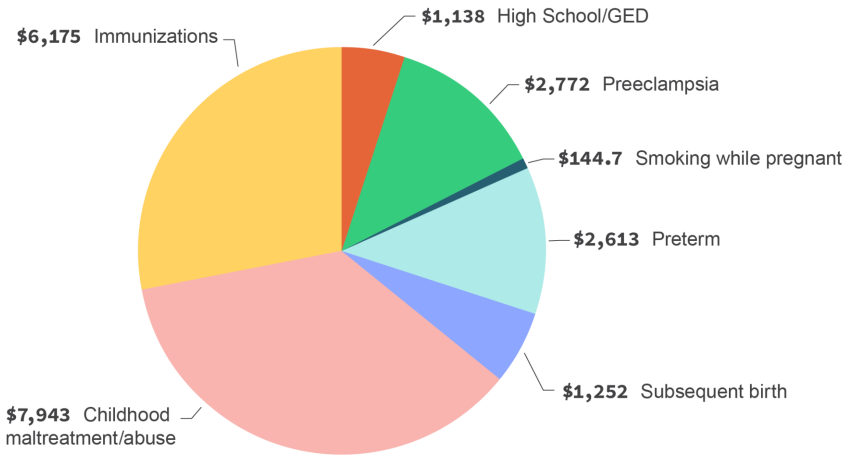


Figure A14. Economic value to Medicaid (federal and state) (in thousands)

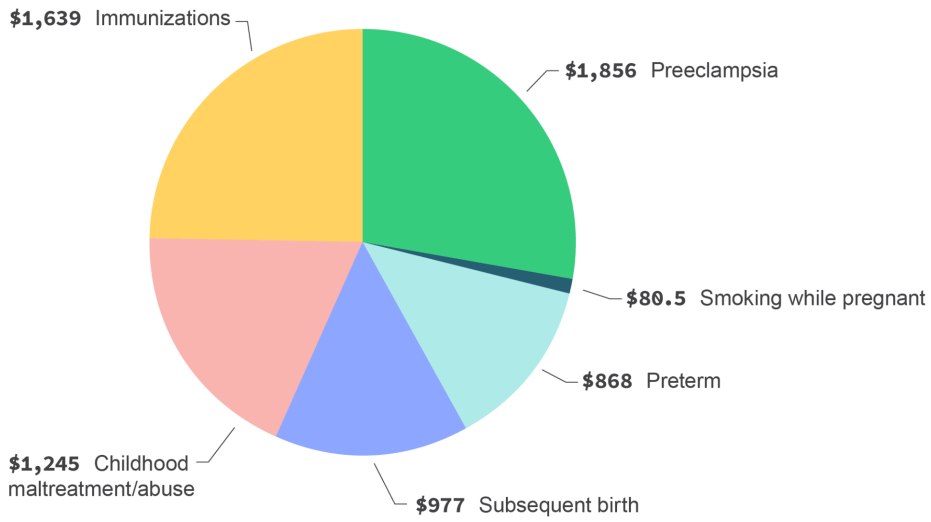
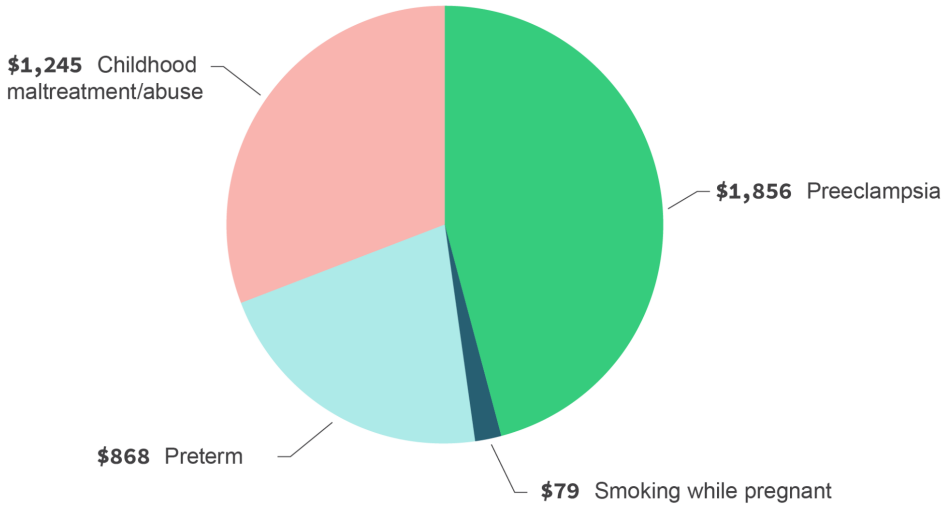


Figure A15. Intermediate economic value to Medicaid (Federal and State) (in thousands)



Scenario 5

Scenario 5 utilizes results from prior studies of Nurse-Family Partnership's impact but excludes results for preterm births for the vulnerable mother subgroup from McConnell and colleagues. The impact on infant mortality after one week from birth is included.

The total economic impact is $47.5 million for the State of South Carolina, resulting in a BCR of 2.4 (Figure A16). Examining only federal and state shares of Medicaid result in $33.9 million in benefits with a BCR of 1.7; these are $29.4 million and 6.5, respectively, for the state-only share (Figure A17). Including only intermediate outcomes result in $31.2 million in benefits, and a BCR of 1.6 for both federal and state Medicaid expenditures (Figure A18). The break-even estimate for the value of life is $1.6 million for the state Medicaid program (Figure A19).

Figure A16. Aggregate economic impact (in thousands)

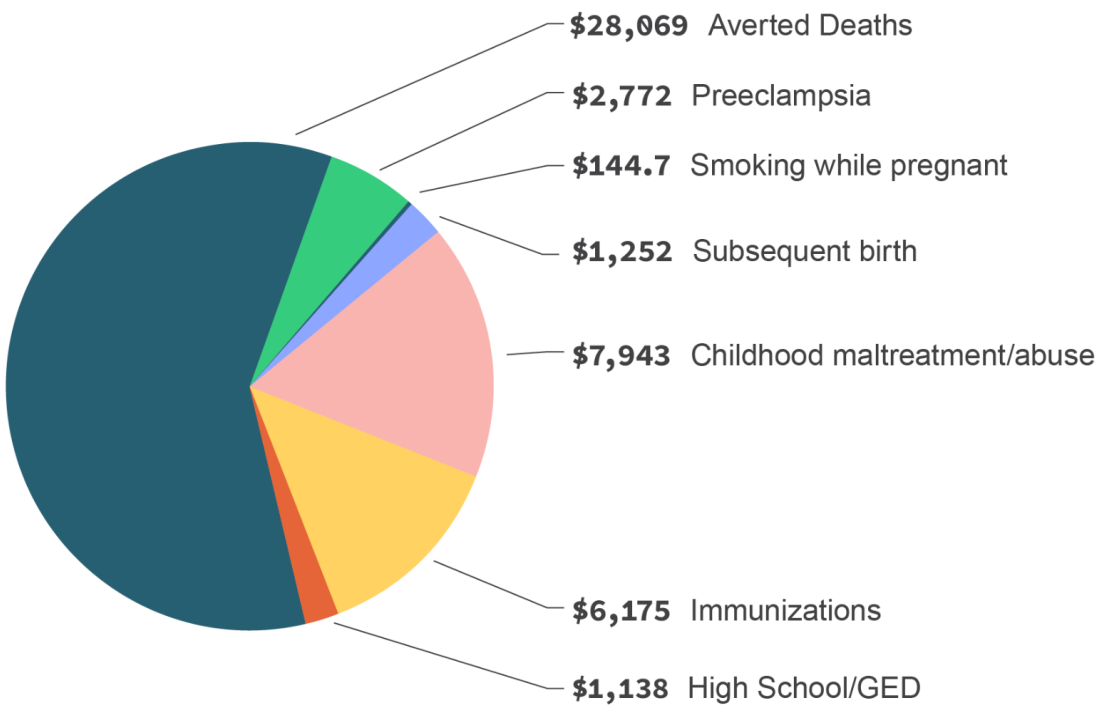


Figure A17. Economic value to Medicaid (federal and state) (in thousands)

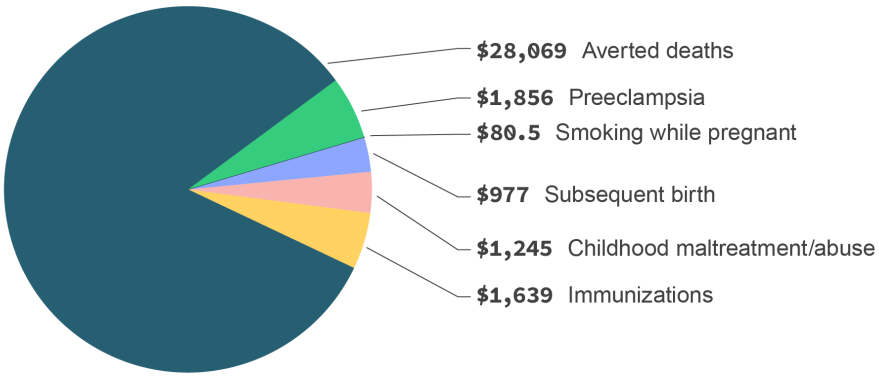


Figure A18. Intermediate economic value to Medicaid (federal and state) (in thousands)

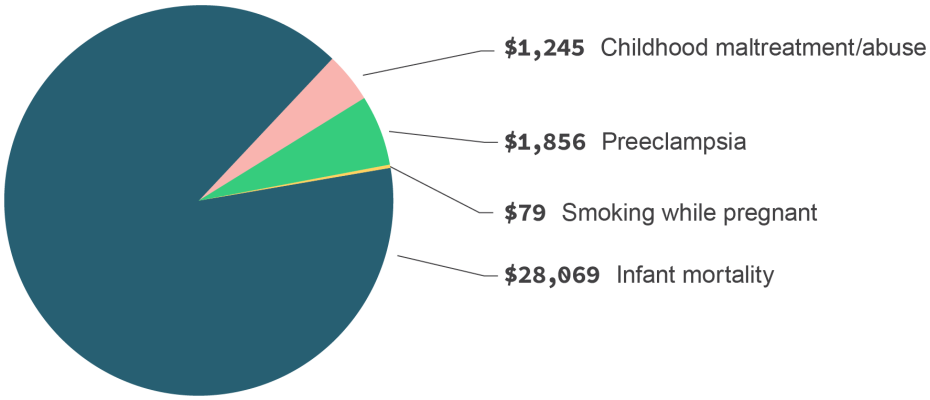
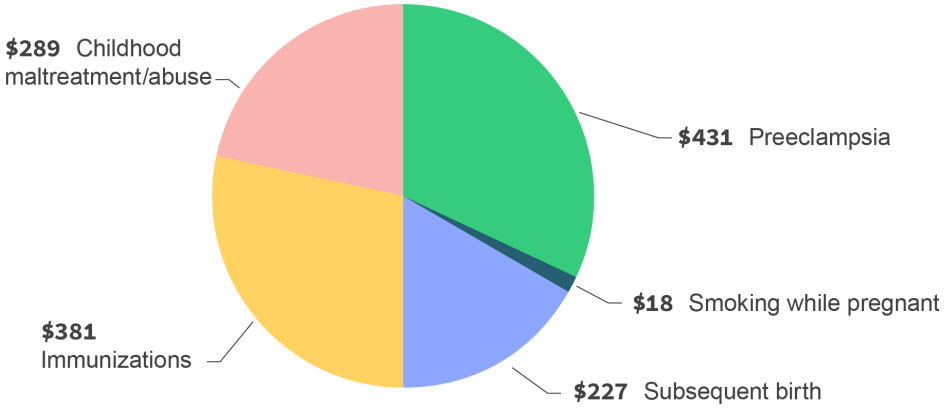


Figure A19. Economic value to Medicaid (state) (in thousands)



Scenario 6

Scenario 6 utilizes results from prior studies of Nurse-Family Partnership's impact but excludes all results for preterm births or infant mortality for the vulnerable mother subgroup from McConnell and colleagues. Figure A20 provides the distribution of benefits from this scenario. The BCR is at near break-even (1.0) with $19.4 million in benefits and $19.6 million in costs. Benefits for federal and state expenditures on Medicaid total $5.7 million (BCR is 0.3) (Figure A21). Finally, for intermediate outcomes, total benefits for the Medicaid program is $3.2 million (federal and state), resulting in a BCR of 0.2 (Figure A22).

Figure A20. Aggregate economic impact (in thousands)

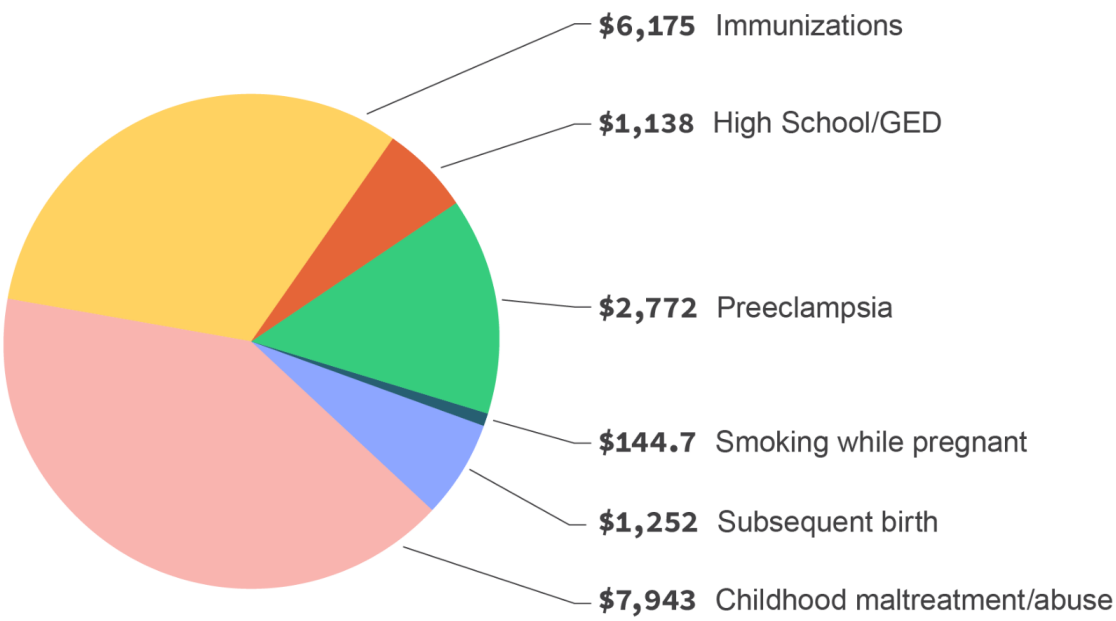


Figure A21. Economic value to Medicaid (federal and state) (in thousands)

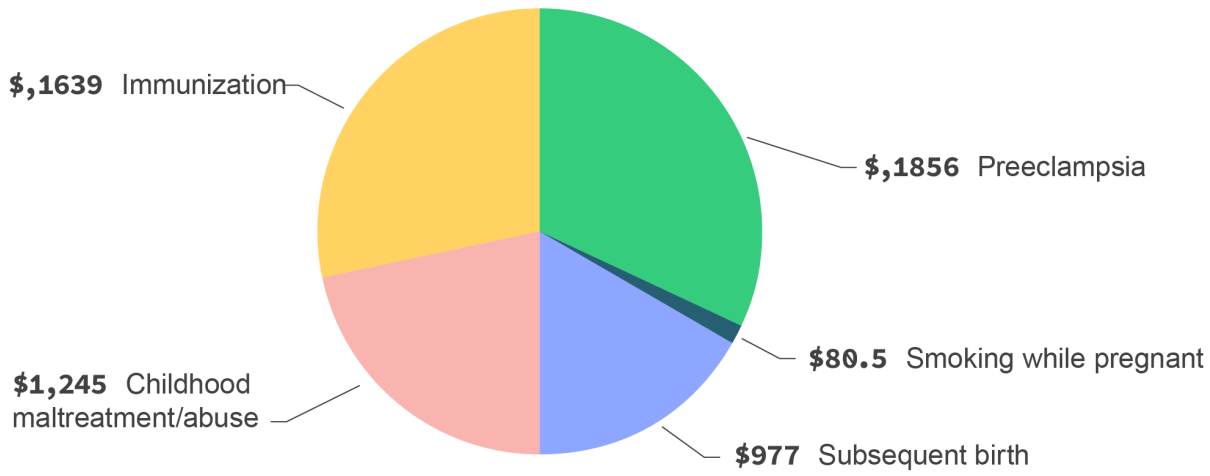
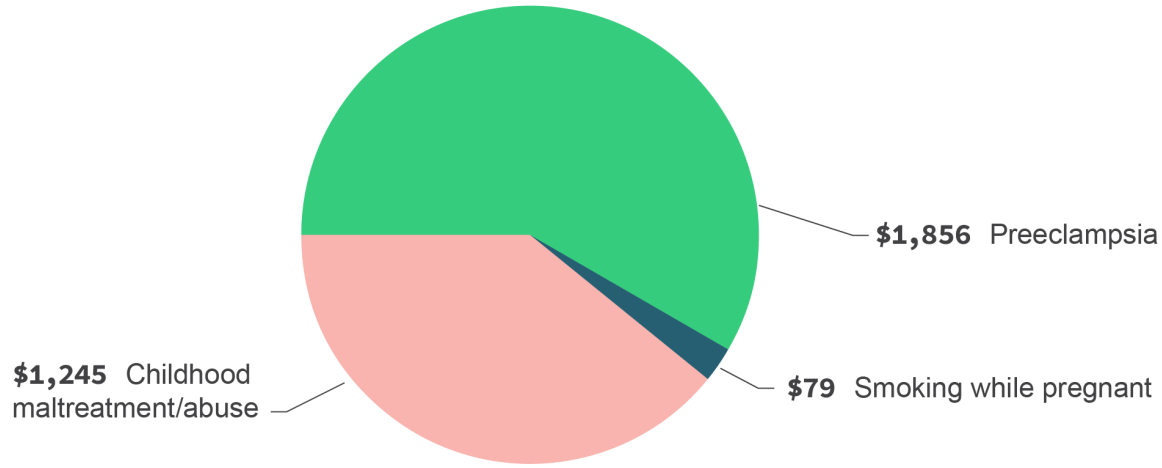


Figure A22. Intermediate economic value to Medicaid (federal and state) (in thousands)



Appendix II: Qualitative Interviews

SIC's qualitative interviews began with a brief introduction to SIC, an overview of the purpose of the interview, confidentiality practice, and obtaining informed consent to record.

The questions asked in each interview were:

1. Can you confirm your current position, the site you work at, and the counties or regions served by your site?
2. Can you tell us about your background and work history with Nurse-Family Partnership, including length of your employment, as well as locations and positions you have worked?
3. Please describe the enrollment process for Nurse-Family Partnership during the Pay for Success project, and any ways that it differed from the standard enrollment process.
4. Please describe the population that enrolled in Nurse-Family Partnership during the Pay for Success project period and any ways that it differed from the traditional enrolled population.
5. How did the enrolled population compare to those who were offered the program but decided not to enroll?
6. How would you describe the utilization and attrition rates of enrolled mothers before and during the Pay for Success project?
7. How would you describe the implementation of the Nurse-Family Partnership service model before, during, and after the enrollment period of the Pay for Success project?
    a. How would you describe the move to a model that integrated telehealth?
    b. How did the COVID-19 pandemic impact the Pay for Success project and service model implementation?
8. How would you describe Nurse-Family Partnership's overall impact or outcomes?
9. What impact or trends in outcomes have you seen specific to your site?
10. What other data, information, or observations do you have/know of that you feel is important to share with SC policymakers?
11. From your perspective, what factors influence the level of success of program outcomes?
12. (**Site admins only**) Do you work solely with Nurse-Family Partnership or do you work with other home visiting programs as well?
13. Are there any other questions, thoughts, or information that you would like to share?

Appendix III: Thematic Analysis Methodology and Detailed Findings

Analysis Methodology

SIC team members took notes during each interview as questions were asked, flagging themes as they emerged in the interview responses. Audio recordings were put through an encrypted transcription software and revised according to the audio as needed. SIC then performed a qualitative analysis of the interview transcripts to isolate common themes and identify patterns among the responses. The analysis was performed for all questions, including both questions regarding the Pay for Success project and questions about Nurse-Family Partnership's general impact and outcomes outside of the Pay for Success project.

SIC used the transcripts to isolate specific quotes or stories from the interviews which demonstrated the emergent themes or points from the analysis. All attributed quotes, stories, videos, and images from interviews were used in the slide presentation with explicit approval from the interviewee.

Findings

Pay for Success Theme Summaries

High Pressure Enrollment:

Interviewees explained that nurses often felt pressure to meet predetermined enrollment numbers and did not have the ability to adequately follow-up with potential clients. Many interviewees reported enrollment quotas and mentioned receiving lists of Medicaid eligible mothers in low-income zip codes with instructions to cold call the mothers and offer Nurse-Family Partnership services. Due to this focus on achieving a necessary sample size from each site, nurses reported not being able to follow up with, retain, or be as flexible when providing services to mothers when compared to before or after the Pay for Success project.

Focus on Gift Cards:

Interviewees expressed that many potential clients did not actually need or want Nurse-Family Partnership services to the same extent as traditional clients, and only participated in informational interviews to receive the gift card incentive. Many

interviewees also reported that clients would stop participating in the program after receiving the gift card.

Directed to Other Resources:

Interviewees suggested that mothers who were placed in the control group may have been directed to or sought out other services or resources after not being selected for the treatment group. Interviewees indicated that seeking out home visiting services is a daunting and often challenging process for mothers; therefore, mothers who sought out Nurse-Family Partnership services but were placed in the control group may have been more likely to pursue an alternative program. Some sites reported that, as a result of the nurses performing the enrollment process themselves, nurses felt an emotional connection to the mothers. Nurses felt demoralized when mothers they felt were in need of Nurse-Family Partnership services were put into the control group. Due to this conflict, and the emotional connection formed between the nurse and the mother, some sites theorized that nurses may have directed control-placed mothers to additional resources.

Referral System Changes:

Many interviewees reported that patient referral pipelines which operated successfully in the past, such as school counselors or OB/GYNs, stopped referring patients to Nurse-Family Partnership sites during the Pay for Success period; interviewees indicated this created further need to rely on the alternative recruiting methods such as cold-call lists to reach Pay for Success enrollment quotas. Some interviewees reported that their previous referral pipelines were no longer viable because the referrer did not want the mothers they were working with to be placed in the control group or be placed into an RCT experience. Others reported that the legal requirements of the project, which did not let mothers younger than 15 years old or mothers experiencing homelessness to participate, was the reason these pipelines stopped referring to Nurse-Family Partnership sites during the Pay for Success period. Many of the interviewees who indicated a disruption to their referral pipelines confirmed that this connection had been restored after the conclusion of the Pay for Success project.

Absence of Teenage Mothers:

Interviewees specified that limitations in the Pay for Success project made it impossible to enroll mothers younger than 15 years old; common referral pathways dealing with young or teenage mothers closed during the project, leading to a treatment population that was older on average than the typical Nurse-Family Partnership service population. This population shift is also demonstrated in the quantitative data analysis.
Nurse-Family Partnership interviewees mentioned their work is especially impactful for

younger mothers, and they have seen an increase in teenage mother enrollment since the conclusion of the project.

Caseloads:

Interviewees expressed that many experienced nurses already had full caseloads when the Pay for Success project began. Therefore, multiple sites had to hire additional nurses to accommodate enrollment quotas for the Pay for Success project. Additionally, mothers enrolled through the Pay for Success project were most frequently assigned to newly hired nurses.

Nurse Experience Levels:

Interviewees mentioned that turnover and client attrition rates were higher on average for newly hired nurses than for experienced or tenured nurses. Interviewees mentioned an increase in attrition rates, correlation between attrition and nurse experience, and difficulty retaining mothers enrolled during this period.

Nurse Training Methods and Funding:

Interviewees mentioned an expedited training process for nurses hired during the Pay for Success project; funding for that training came from a different budget than funding for nurses hired before the Pay for Success project. Interviewees suggested that the training during the Pay for Success period was insufficient compared to previous training because of time, funding, and practical constraints.

Telehealth Impacting Service:

Interviewees said that the switch to a 100% telehealth based model was detrimental to the client experience, specifying that staples of Nurse-Family Partnership's service model, such as observational visits, were difficult to complete during this time.

Telehealth Providing Flexibility:

Interviewees also said that a hybrid model that utilizes both telehealth and in-person visits was beneficial to providing care in an impactful and flexible manner.

Nurse-Family Partnership General Impact Theme Summaries

Impact Beyond the Data/Numbers:

Interviewees mentioned that the impact of Nurse-Family Partnership on the families and communities that it serves goes well beyond what can be captured by numbers. Stories

were shared with the SIC team recounting nurses helping mothers fix appliances so they could safely store insulin and a nurse helping a mother acquire a new air-conditioner for the baby's room. Interviewees detailed how these non-quantifiable actions have a profound impact on the family served, but are not captured by any data or reporting metric for the program.

Nurses Connect Mothers to Resources:

Interviewees said that a major component of the Nurse-Family Partnership service model is connecting clients with other local community resources, including addressing case-by-case needs like those mentioned above, transportation services to help the mother travel to work, daycare services for the child, addiction treatment, workforce services, and more.

Nurse-Family Partnership Works with the Highest Need Families:

Interviewees explained that the highest need families are the ones most impacted by Nurse-Family Partnership's model. Interviewees said they do their best work with teenage mothers or other high need families and that the population is more likely to feel the years-long impact of the Nurse-Family Partnership service on their long-term health and economic wellbeing.

Nurse-Family Partnership is a Long-Term Investment in the Community:

Interviewees explained that investment in Nurse-Family Partnership, and therefore investment in the families it serves, continues to pay dividends for those families long after they have graduated from the program. Dividends mentioned include higher education attainment, better salaries, lower rates of smoking during pregnancy, increased time between subsequent pregnancies, and reduced child maltreatment and infant mortality.

Positive Educational Impact for Mothers:

Interviewees reported increased educational attainment and graduation rates for teenage mothers enrolled in the program, acknowledging that this can lead to better paying jobs for the mothers and better health outcomes for their children.

Nurse-Mother Relationship:

Interviewees indicated that the most important factor to the impact of Nurse-Family Partnership is the relationship that the nurses build with the families. Nurses become advocates and trusted partners for these mothers, many of whom have active distrust in or limited exposure to the medical field.