

New York City Department of Health and Mental Hygiene
Division of Financial and Strategic Management
Office of Research and Evaluation

Nurse Family Partnership – Benefit/Cost Analysis

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I. Executive Summary

The Nurse-Family Partnership (NFP) is an intensive nurse home visiting program designed to improve the health and social functioning of low-income, first-time mothers and their children. The NYC Department of Health and Mental Hygiene is implementing NFP targeting mothers in high-risk neighborhoods. Research on program effectiveness in other cities has identified significant short- and long-term health and socioeconomic benefits and financial savings.

Anticipated Program Effects (impact per 100 participating mothers)

- 35% decrease in Pregnancy-Induced Hypertension (PIH), or 3.5 fewer cases, saving \$29,300.
- 50% reduction (2 fewer cases) in reported child abuse and neglect through the child's second birthday, saving \$38,500.
- 35% reduction in emergency department visits overall, and a 56% reduction in visits for accidents and poisonings, resulting in 16.8 fewer visits and saving \$11,584.
- 50% reduction (8 fewer children) in language delays, saving between \$133,000 and \$440,000.
- 29% decrease in subsequent births within two years and a 14% increase in time (months) between births of first and second child, reducing the risk for premature delivery. Preventing 3 cases of premature delivery saves \$242,800.
- 34% increase (6 more cases) in participants living with a partner two years following NFP enrollment, increasing income an average of \$43,000 per household over three years, for an overall program impact of over \$249,000.

For the first 100 program participants, the direct economic benefits of NFP almost cover the program costs by the child's fourth birthday, and are cost-saving within 5-10 years. This is a conservative estimate, based on six anticipated program effects and considering only the direct costs (i.e., hospitalizations) associated with each outcome. Each outcome likely includes additional savings not considered in this analysis. The financial impact of certain demonstrated program effects, as well as longer-term benefits, are difficult to quantify. However, based on other research, further expected benefits include savings in:

- **Medical costs** associated with fetal growth retardation, preeclampsia and eclampsia, and prematurity-related problems such as respiratory distress syndrome.
- **Education costs** associated with developmental delays and learning disorders.
- **Social services spending** for public assistance, child abuse and neglect and foster care.
- **Spending for emotional and psychological problems** including low self-esteem, problems bonding and forming relationships, aggressive behavior, depression, and post-traumatic stress and conduct disorders.
- **Financial burdens on families** that result from limited economic, social, and emotional support of non-resident fathers; productivity losses among caregivers and injured children later in life; permanent disability by injury leading to chronic pain or loss of motor or cognitive functioning.

II. NURSE FAMILY PARTNERSHIP - BENEFIT/COST SUMMARY FOR PILOT PROGRAM (N=100)

OUTCOME DOMAINS	Program Effect	NYC Baseline Data	Estimated Pilot Prevalence	Program Effect - Cases Prevented	Cost per Case	Program Effect / Savings (\$) Low Est.	Program Effect / Savings (\$) High Est.
1. Birth Outcomes - Pregnancy-induced hypertension (% of participants)	-35.0%	4.9%	5 cases	1.75	\$8,374	\$14,655	
		10.0%	10 cases	3.50	\$8,374		\$29,309
2. Sensitive, competent care of child (<i>in the first 2 yrs of the child's life</i>) - Home Observation for Measurement of the Environment, emotional/cognitive stimulation (mean scores)	+4.5%						NOT QUANTIFIABLE
3. State-verified reports of child abuse and neglect from 0 to 2 years, among low-income, unmarried teen mothers (%)	-79.0%	4.1%	4 cases	3.16	\$19,266		\$60,881
		4.1%	4 cases	2.00	\$19,266	\$38,532	
4. Emergency Department Visits from 25 to 50 months (mean)	-35.0%	24.1%	24 cases	8.40	\$454	\$3,814	\$3,814
5. Emergency Department Visits for accidents and poisonings through 2nd year of life (N)	-56.0%	150.1 per 1,000	15 cases	8.40	\$454	\$3,814	
		150.1 per 1,000	15 cases	8.40	\$925		\$7,770
6. Child neurodevelopmental impairment (emotional /behavioral regulation and cognition) - Language delays - Preschool Language Scale at 21 months (%)	-50.0%	16.5%	16.5 cases	8.25	\$53,340		\$440,055
		16.5%	16.5 cases	8.25	\$16,067	\$132,553	
7.1. Early parental life course - % of Mothers with subsequent births within 2 years after delivery of first child	-29.0%	Research indicates that shorter interpregnancy intervals are associated with increased risk for preterm delivery. Therefore, costs associated with preterm delivery were used to estimate program effects. See definition below.					
7.2. Later parental life course - Number of months between first and second child in first 5 years after delivery of first child	+13.7%						
Increased risk for preterm delivery with short interpregnancy interval (IPI). Baseline 23.7% had IPI < 15 mos (2 yrs minus 9 mos); chance of prematurity @ 12%. Costs associated with premature delivery.			24 with IPI < 15 mos	2.88	\$84,310	\$242,813	\$242,813
8. Rates of living with a partner (% of participants)	+34.0%	17.1%	17 cases	5.78	\$43,130	\$249,291	\$249,291
ESTIMATE OF PROGRAM BENEFIT (\$)						\$685,471	\$1,033,932
PROGRAM COST - BUDGET FOR 3 YEAR PILOT						\$1,279,859	\$1,279,859
BENEFIT minus COST						(\$594,388)	(\$245,927)

III. Nurse Family Partnership Long-Term Program Benefits based on Benefit/Cost Analysis

Pregnancy-Induced Hypertension

Approximately 10% of all pregnancies are complicated by hypertensive disorders; hospitalization costs for PIH and associated complications average \$8,374 per case.^(1,2) The Nurse Family Partnership (NFP) has been shown to reduce the prevalence of PIH by 35%. This translates to 3.5 fewer cases of PIH per 100 women participating in the program, a direct savings for \$29,300.

PIH is linked to retardation in fetal growth and, in some cases, the development of preeclampsia and eclampsia leading to convulsions and coma, and other serious health problems such as stroke and liver damage. Early delivery may be indicated due to PIH or severe preeclampsia, resulting in prematurity-related problems for the infant such as respiratory distress syndrome.^(1,3)

HOME scores (Home Observation for Measurement of the Environment)

Among children whose mothers participated in NFP, HOME scores measuring emotional and cognitive stimulation increased an average of 4.5%. The HOME scale measures aspects of the home environment that have been shown to have important consequences for children's cognitive performance, academic achievement, and emotional and social well-being.⁽⁴⁾

Research has demonstrated correlations between HOME scores and children's IQ and measures of cognitive and language development.⁽⁵⁾ HOME scores have also been shown to independently predict cognitive and language outcomes later in life, with correlations between HOME scores and children's cognitive test scores. The HOME Screening Questionnaire (HSQ) – a shorter version of the HOME forms – has been found to be useful in identifying environmentally caused learning difficulties.⁽⁶⁾

Child abuse and neglect

Outcome studies indicate a 50% reduction in state-verified reports of child abuse and neglect through the child's second birthday among low-income, unmarried teen mothers participating in NFP. At a cost of \$19,266 in hospital charges per case prevented, this translates into direct savings of \$38,532 for every 100 families participating in the program.⁽⁷⁾

Additional costs of child mistreatment may include the cost of emergency room visits, costs associated with special education, and the costs of investigation and follow-up actions, including foster care.⁽⁸⁾

Child abuse and neglect affect the physical, psychological, cognitive, and behavioral development of children and may result in minor to severe physical injuries, brain damage, chronic low self-esteem, problems with bonding and forming relationships, developmental delays, learning disorders, and aggressive behavior. Other clinical conditions associated with child abuse and neglect include depression, post-traumatic stress disorder, and conduct disorders.^(9,10) Studies also associate child maltreatment with increased risk of low academic achievement, drug use, teen pregnancy, juvenile delinquency, and adult criminality.^(9,11,12)

Emergency Department Visits from 25 to 50 months / ED Visits for Accidents and Poisonings

Among children whose mothers participate in NFP, the program reports a 35% reduction in emergency department visits overall, and a 56% reduction in ED visits for accidents and poisonings. The frequency, severity, disabling outcomes and, in some cases, fatalities make unintentional injuries a costly childhood health problem.

In NYC, these reductions translate into 8.40 fewer ED visits per 100 NFP families from 25 to 50 months – and 8.40 fewer visits for accidents and poisonings through the first two years of the child's life. Overall savings for ED visits average over \$11,584.

In addition to the direct cost of an emergency department visit, injuries among children and adolescents impose a financial burden on many segments of society. Parents and health insurers, for example, assume responsibility for a myriad of medically related expenses due to injuries. Parents may need to stay home from work to care for an injured child, affecting both the family's income and the employers' profit. Disabilities resulting from injury may limit a child's ability to work in the future. Injuries can also affect children's and families' quality of life. Children who are permanently disabled by injury may experience lifelong pain or suffer permanent loss of motor or cognitive functioning. Most of the financial burden associated with unintentional childhood injuries results from work losses among caregivers and injured children later in life.⁽¹³⁾

Child neurodevelopmental impairment – Language delays

Child neurodevelopmental impairment - defined as emotional/behavioral regulation and cognition - among children participating in NFP was assessed by measuring language delays at 21 months using the Preschool Language Scale. Using this scale, a 50% reduction in language delays was observed among NFP participants. This translates to 8.25 prevented cases per 100 families in the NYC pilot. At a cost of \$16,067 to \$53,340 per case, potential savings range from \$132,553 to \$440,055.

Published research has shown that children with language delays exhibit more problem behaviors and poorer social skills than children with typical language development.⁽¹⁴⁾ Children with less severe receptive language impairment demonstrate higher levels of proficiency on varying types of sociable behavior than their peers with more severe impairment. Children with more severe expressive problems also demonstrate poorer prosocial behavior than children with less severe expressive problems.⁽¹⁵⁾

Parental life course – Subsequent Birth and Interpregnancy Interval (in months)

NFP outcome studies report a 29.0% decrease in subsequent births within 2 years after delivery of a participant's first child. This shows that NFP participants have fewer short-spaced births; those that chose to have a second child delayed childbearing, increasing the time between births. On average, mothers participating in NFP who had a second child within 5 years of their first delivery increased the time between the two pregnancies by 13.7%, compared with the control group.

Research indicates that shorter interpregnancy intervals are associated with increased risk for preterm delivery. At an estimated cost of \$84,310 per premature delivery, NFP could prevent 2.88 cases per 100 women participating in the program by increasing participants' interpregnancy intervals. This translates to a savings of \$242,813.

Research has also shown that women with short intervals between pregnancies may also have more nutritional deficiencies.⁽¹⁶⁾ Infants conceived less than 6 months after a live birth were more likely to be low birth weight, preterm, and small size for gestational age compared to infants conceived within 18 to 23 months after a live birth.⁽¹⁷⁾

Data from the 17-year follow-up of the Adolescent Mothers and Their Children in Later Life study suggests that women who had two or more children within five years of the first birth (as adolescents) are 2.9 times more likely to be receiving welfare than women who do not have additional children. Research shows that subsequent childbearing may increase a teenage mother's need for public assistance, as increased likelihood of welfare receipt is linked to subsequent adolescent births.⁽¹⁸⁾

Rates of living with a partner

NFP outcome studies report a 34% increase in participants living with a partner two years after enrolling in the program. Based on the prevalence of co-habitation and/or marriage among first-time mothers in NYC, this translates into 5.78 more mothers living with a partner per 100 NFP participants. Recognizing that a second adult in the home represents a potential for increased household income, we estimate additional income of over \$249,000 annually for these 5.78 households.

Studies indicate that fathers provide important resources for children. Most basically, their presence in the household can increase economic, social and emotional support. Children in single-parent, female-headed families are less likely to have involved fathers who provide attention and emotional support.⁽¹⁹⁾

Positive father involvement, particularly by fathers who live with their children, has been linked to less-frequent child and adolescent behavioral problems, including delinquency, substance abuse, anxiety, and depression. However, these effects vary in size and significance and are not always large relative to other important influences on children's well being.⁽¹⁹⁾

Research has found that non-resident fathers are less likely to contribute financial resources to support their child.^(19, 20) In addition, many studies have documented poorer performance on a range of outcome measures among children in single-parent families, compared with children living with both biological parents.^(19,21) Studies demonstrate that children growing up in single-parent households, whether the parents were never married or have separated or divorced, have twice the risk of repeating a grade in school, having behavioral problems, dropping out of high school, and being out of work, and girls have twice the risk of becoming teenage mothers. Adjusting for social class reduces these risk by about half; nonetheless, even when income is taken into account, children from single-parent families fare worse than those from two-parent families.⁽²²⁾

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