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Potential Medicaid/SCHIP Offsets from Nurse Home Visiting by Julia Isaacs, Child and Family Policy Fellow at the Brookings Institution and First Focus Fellow (July 27, 2007)

This analysis explores the question of whether there would be any Medicaid/SCHIP offsets due to expanded nurse home visiting programs. Initially I was skeptical of such offsets, because they were not included in the two best-known benefit-cost analyses of the Nurse Family Partnership, the analysis by Lynn Karoly and colleagues at the Rand Corporation and the analysis of Steve Aos and colleagues at the Washington State Institute for Public Policy.¹ However, based on my review of randomized studies of nurse home visiting programs in three sites, it does appear that there could be substantial savings related to reductions in pre-term births, emergency room use, and subsequent births. I have provided a preliminary estimate of these savings, along with detailed notes on the many assumptions underlying the estimates.

Table 1 provides a summary of expected health-care savings over a five- and ten-year period. Whereas many standard benefit-cost analyses show a life-time stream of benefits, condensed through “net present value” methodology into one year, these savings are shown in the year they occur, as is done in the type of estimates done by the Congressional Budget Office. For every woman enrolled in a nurse home visiting program in year 1, there would an estimated \$210 in savings in year 1, \$2,085 in savings over the first five years, and \$4,165 savings over the first ten years.

**Table 1. Potential Health Care Savings
(Per Woman Enrolled in Nurse Home Visiting Programs)**

Health Care Savings	Year 1	Five-Year Savings	Ten-Year Savings	Timing
1. Reduced pre-term births (first child)	-\$210	-\$420	-\$420	Years 1-2
2. Reduced ER visits (first child)	\$0	-\$123	-\$158	Years 2-6
3. Reduction in subsequent births (birth costs)	\$0	-\$827	-\$1,335	Years 2-7
4. Reduction in subsequent births (associated child health care)	\$0	-\$196	-\$1,414	Years 3-10
5. Reduction in NICU use among subsequent births	\$0	-\$519	-\$839	Years 2-7
Total Savings (in dollars)	-\$210	-\$2,085	-\$4,165	Years 1-10

These estimates are uncertain, due to the high number of assumptions that must be made for each estimate. For transparency, major assumptions are outlined in Tables A1-A5. For simplicity, estimates were not adjusted for inflation. Even without inflation adjustments, the timing of the savings is quite complex, because some cost savings occur at birth, some when the child is 1-4 and some when the child is 1-6 and subsequent births are avoided.



As shown in Table 2, the majority of these savings accrue to Medicaid. There also would be small savings in the SCHIP program. The remaining savings would be non-governmental, reflecting health expenditures for a pregnant women and children who have private insurance or are uninsured. As was discussed in an earlier analysis, it costs an estimated \$7,200 to serve a woman in a nurse home visiting program.² Costs can thus be expressed as percentage savings for the initial dollar investment. As shown in Table 2, each dollar invested in nurse family partnership is estimated to result in a 2.3 percent Medicaid offset in year 1, rising to 6.5 percent offset in year 7 and falling back to a 2.5 percent offset in years 8-10. SCHIP offsets are estimated to be 0 percent in year 1, rising to 0.5 percent in year 10.

**Table 2. Medicaid and SCHIP Savings
(Per Woman Enrolled in Nurse Home Visiting Programs)**

	1	2	3	4	5	6	7	8	9	10	5-Yr	10yr
Total Savings	\$210	\$331	\$462	\$515	\$567	\$619	\$637	\$275	\$275	\$275	\$2085	\$4165
Medicaid Savings	\$168	\$261	\$361	\$394	\$427	\$459	\$469	\$179	\$179	\$178	\$1611	\$3075
SCHIP Savings	\$0	\$2	\$6	\$13	\$19	\$26	\$28	\$34	\$34	\$34	\$40	\$196
Medicaid as % of \$7,200 investment	2.3%	3.6%	5.0%	5.5%	5.9%	6.4%	6.5%	2.5%	2.5%	2.5%	22%	43%
SCHIP as % of \$7,200 investment	0.0%	0.0%	0.1%	0.2%	0.3%	0.4%	0.4%	0.5%	0.5%	0.5%	0.6%	2.7%

Note that Tables 1 and 2 shows saving under the simplified assumption that all costs occur as an initial one-time investment. In other words, there are no costs in years 2-10. In a full cost estimate of an ongoing program, there would be new costs in each of years 1-10. Under such a scenario the ten-year Medicaid savings compared to the ten-year nurse home visiting program costs would be much less than the 43 percent shown in Table 2 (because there would be 9 more years of costs, and much of the savings from the latter years of funding would be in years 11-20 and so outside the ten-year window).

Also note that these are combined federal and state costs and savings. An estimated 57 percent of the Medicaid savings and 69.5 percent of the SCHIP savings would accrue to the Federal government.

Explanation of Estimates

Major assumptions for the total health care savings shown in Table 1 are shown in Tables A1-A5. The allocations to Medicaid and SCHIP in Table 2 were based on information on health insurance status of clients of Nurse-Family Partnership programs, collected by the Nurse-Family Partnership Service Office. These data suggest that about 20 percent of clients have a form of health insurance (other than Medicaid) that covers their health expenditures.³ The remaining 80 percent of birth- and related infant expenditures were assumed to be covered by Medicaid, with the costs for children (lines 2 and 4 in Table 1) split 67 percent to Medicaid and 13 percent to SCHIP.⁴ The percentage of expenditures covered by other health insurance was assumed to gradually increase from 20 percent to 23 percent over the ten-year period, as the young women aged and increased their employment and marriage rates (and thus might gain employer-based coverage, and/or lose Medicaid and SCHIP eligibility due to higher income levels).



As noted in the tables and footnotes, I relied heavily on the results from the three randomized trials of nurse home visiting programs. I also benefited from communications with David Olds and Tamar Bauer of the Nurse-Family Partnership National Service Office, but I retain full responsibility for final assumptions and ways in which I manipulated data from the nurse home visiting programs. For further information about the assumptions in these tables, or the estimate overall, please feel free to contact me at jisaacs@brookings.edu, or 202-797-6466.

Table A1. Savings due to Reduction in Pre-Term Births

Parameter	Estimate/Assumption	Source
Live birth rate	96 percent	Data from Memphis & Denver. ⁵
Pre-Term Births as Percent of Live Births	12.5 percent	National vital statistics for 2004.
Reduction in Pre-Term Births due to nurse home visiting	10 percent	Rounded down average of experimental-control difference data from Elmira, Memphis & Denver. ⁶
Incremental costs of pre-term births	\$35,000	Institute of Medicine, 2006. Includes \$31,290 infant and \$3,800 maternal costs, rounded. (Infant costs include small additional costs for years 1-5, shown with infant costs for simplicity). ⁷
Estimate	$.96 * .125 * .11 * \$35,000 = \420	
Timing	Half in year 1, half in year 2	Births occur over 2 years due to rolling enrollment of pregnant women over course of first year.

Table A2. Savings due to Reduction in Emergency Room Use

Parameter	Estimate/Assumption	Source
Emergency room visits per year	0.7	Data from Elmira suggest about 1 ER visit per year at age 1 and 2, and 1.5 over ages 3-4 combined (with higher rates for the low-income sample). Data from Memphis on ER visits related to injuries and poisoning suggest 0.34 visits per year. The 0.7 is a conservative estimate based on averaging several points of data. ⁸
Reduction in ER visits	25 percent reduction	The 25 percent is an average of estimated reductions seen in Memphis & Elmira. ⁹
Cost per ER visit	\$200 cost per visit	Cost assumed by UCLA researchers in study of Medicaid costs for ER visits by Head Start children. ¹⁰
Estimate	$.7 * .25 * \$200 = \35 for full-year savings	
Timing	Half-year in year 2, full-year in years 3-6 when children are ages 1-4.	Data was collected on ER visits when child was 1-4. No savings assumed beyond year 6.

**Table A3. Savings due to Reduction in Subsequent Births: Birth/Delivery Costs**

Parameter	Estimate/Assumption	Source
Baseline annual rate of subsequent births	0.22 births per year for first 6 years following first birth	Control group data for Elmira, Memphis & Denver. Annual rate based on total subsequent births in Elmira and Denver when the primary child was age 4 years and data on subsequent births in Memphis when the primary child was age 6, and dividing by 3.25 and 5.25 years respectively, to get a birth rate per year (assuming no one has a birth within 9 months of the birth of the first child). ¹¹
Reduction due to nurse home visiting	17 percent	Based on average reductions of 18.3 percent in Elmira (year 15 for whole sample), 15.6 percent in Memphis (year 6), and 15.8 percent in Denver (year 4). Reductions in subsequent births were measured in the last available year of follow-up data for each site. ¹²
Cost of Medicaid birth	\$6,800	Unpublished estimate from March of Dimes
Estimate	$0.22 \times .17 \times \$6800 = \254 for full-year savings	
Timing	¼ savings in year 2, full savings in years 3-7 and no savings in years 8-10.	Although one site (Elmira) shows reductions in subsequent births through primary child at age 15, such data are not available from the other sites and so the reductions were only assumed to continue through age 6 (funding year 7).

Table A4. Savings due to Reduction in Subsequent Births: Associated Child Health Costs

Parameter	Estimate/Assumption	Source
Annual reduction in subsequent births	From Table A3, $0.22 \times .17 = .037$ births that do not occur each year.	See Table A3.
Cost	\$1400 average cost for Medicaid child enrollee.	Medicaid payments of \$1,410 per child enrollee in 2003. ¹³ Ideally would want costs for children ages 1-7.
Estimate	$3.74 \text{ percent} \times \$1400 = \$52$	
Timing	Savings are for child ages 1-7, and so lagged one year from estimate in Table A3 above (e.g., ¼ year in year 3, full year in years 4-8). However, note that these are cumulative numbers of children (rather than annual births), and so the numbers grow by \$52 per year. (\$13 in year 3, \$65 in year 4, \$117 in year 5, etc.)	



**Table A5. Savings due to Reduction in Subsequent Births:
NICU Savings**

Parameter	Estimate/Assumption	Source
Subsequent births that do occur	0.22 -.037=.183 births that do occur each year	Table A3 and Table A4
NICU rate of subsequent live births	12.5 percent	Used same 12.5 percent pre-term national statistic as in Table A1. (even though NICU and pre-term births are not quite the same).
Reduction in NICU/special care admissions	20 percent	Comparison of experimentals and controls in Denver and Memphis. ¹⁴
Reduced NICU costs	\$35,000	For simplicity, used pre-term birth costs as in Table A1, much of which is due to NICU costs.
Estimate	.183*.125*.2*\$35,000=\$160 full-year savings	
Timing	Assume ¼ as many in year 2, full year in years 3-7 and no savings in years 8-10.	As noted in Table A3, improvements in subsequent births assumed through primary child age 6 (funding year 7).

References on Nurse Home Visiting Outcomes

The endnotes use a short-hand notation to refer to the studies below as Elmira (Pediatrics, 1994), Elmira (JAMA, 1997), etc.

ELMIRA TRIAL ('77) - [Olds DL, Henderson CR Jr, Tatelbaum R, Chamberlin R.](#) Improving the Delivery of Prenatal Care and Outcomes of Pregnancy: A Randomized Trial of Nurse Home Visitation. Pediatrics. 1986 Jan;86(1):16-28.

ELMIRA TRIAL ('77) - [Olds DL, Henderson CR Jr, Kitzman H.](#) Does prenatal and infancy nurse home visitation have enduring effects on qualities of parental caregiving and child health at 25 to 50 months of life? Pediatrics. 1994 Jan;93(1):89-98.

ELMIRA TRIAL ('77) - [Olds DL, Eckenrode J, Henderson CR Jr, Kitzman H, Powers J, Cole R, Sidora K, Morris P, Pettitt LM, Luckey D.](#) Long-term effects of home visitation on maternal life course and child abuse and neglect. Fifteen-year follow-up of a randomized trial. JAMA. 1997 Aug 27;278(8):637-43.

ELMIRA TRIAL ('77) - [Olds D, Henderson CR Jr, Cole R, Eckenrode J, Kitzman H, Luckey D, Pettitt L, Sidora K, Morris P, Powers J.](#) Long-term effects of nurse home visitation on children's criminal and antisocial behavior: 15-year follow-up of a randomized controlled trial. JAMA. 1998 Oct 14;280(14):1238-44.

MEMPHIS TRIAL ('87) - [Kitzman H, Olds DL, Henderson CR Jr, Hanks C, Cole R, Tatelbaum R, McConnochie KM, Sidora K, Luckey DW, Shaver D, Engelhardt K, James D, Barnard K.](#) Effect of prenatal and infancy home visitation by nurses on pregnancy outcomes, childhood injuries, and repeated childbearing. A randomized controlled trial. JAMA. 1997 Aug 27;278(8):644-52.

MEMPHIS TRIAL ('87) - [Kitzman H, Olds DL, Sidora K, Henderson CR Jr, Hanks C, Cole R, Luckey DW, Bondy J, Cole K, Glazner J.](#) Enduring effects of nurse home visitation on maternal life course: a 3-year follow-up of a randomized trial. JAMA. 2000 Apr 19;283(15):1983-9.



MEMPHIS TRIAL ('87) - [Olds DL, Kitzman H, Cole R, Robinson J, Sidora K, Luckey DW, Henderson CR Jr, Hanks C, Bondy J, Holmberg J](#). Effects of nurse home-visiting on maternal life course and child development: age 6 follow-up results of a randomized trial. *Pediatrics*. 2004 Dec;114(6):1550-9.

DENVER TRIAL ('94) - [Olds DL, Robinson J, O'Brien R, Luckey DW, Pettitt LM, Henderson CR Jr, Ng RK, Sheff KL, Korfmacher J, Hiatt S, Talmi A](#). Home visiting by paraprofessionals and by nurses: a randomized, controlled trial. *Pediatrics*. 2002 Sep;110(3):486-96.

DENVER TRIAL ('94) - [Olds DL, Robinson J, Pettitt L, Luckey DW, Holmberg J, Ng RK, Isacks K, Sheff K, Henderson CR Jr](#). Effects of home visits by paraprofessionals and by nurses: age 4 follow-up results of a randomized trial. *Pediatrics*. 2004 Dec;114(6):1560-8. PMID: 15574615

¹ For summary of those two benefit-cost analyses, see Table 3 (p.14) of Isaacs, Julia. January 2007. *Cost Effective Investments in Children*. <http://www.brookings.edu/views/papers/200701isaacs.htm>. The estimate by Karoly and colleagues does include small savings for reduced emergency use but did not quantify savings related to reduced pre-term births and subsequent births.

² Isaacs, Julia. 2007. "Analysis of Healthy Children and Families Act of 2007" (available from author). The \$7,200 is based on \$4,500 annual cost and 1.6 years of treatment.

³ Personal communication from Tamar Bauer, Nurse-Family Partnership National Service Office. The 20 percent statistic was compared to estimates of insurance coverage for low-income women, infants, and children in the WIC program (35 percent had private health insurance according to NHANES II data from 1988-1994) and Current Population Survey data on all infants below 185 percent of poverty (18 percent had private health insurance, and the number fell to 14 percent for low-income infants without older siblings). The CPS data were from Brookings tabulations and the WIC data was from Cole, Nancy and Fox, Mary Kay (2004). *Nutrition and health characteristics of low-income populations. Volume II, WIC Participants and Nonparticipants* (Tables D-114 and D-115). <http://www.ers.usda.gov/publications/efan04014-2/>

⁴ The Medicaid vs. SCHIP split among children eligible for Medicaid/SCIHP was assumed to be 84 percent and 16 percent based on monthly enrollments in the two programs as of June 2005 and percent children in fiscal year 2003, as reported in Kaiser State Health Facts. (<http://www.statehealthfacts.org>).

⁵ Memphis (*Pediatrics*, 2004), Table 1; Denver (*Pediatrics*, 2002), Table 1. (See "References" for full citation of articles).

⁶ Elmira (1968), Table 8; Memphis (*JAMA*, 1997), Table 1; Denver (*Pediatrics*, 2002), Table 1.

⁷ Institute of Medicine. July 2006. *Preterm Birth: Causes, Consequences, and Prevention*. Report Brief and Table 12-1 (p. 400). <http://www.iom.edu/CMS/3740/25471/35813.aspx>

⁸ Elmira (*Pediatrics*, 1986), Table 7; Elmira (*Pediatrics*, 1994), Table 4; Memphis (*JAMA*, 1997), Table 5.

⁹ Ibid.

¹⁰ "Medicaid costs for a child's trip to an emergency room or clinic can be reduced annually by at least \$198," *Child Health News*, April 16, 2004. <http://www.news-medical.net/?id=569>

¹¹ Elmira (*AJPH*, 1988), Table 5; Table 3; Memphis (*Pediatrics*, 2004), Table 3; Denver (*Pediatrics*, 2004), Table 3.

¹² Ibid., and Elmira (*JAMA*, 1997).

¹³ Kaiser Commission on Uninsured. March 2007. "The Medicaid Program at a Glance."

¹⁴ Memphis (*JAMA*, 2000), Table 2; Denver (*Pediatrics*, 2004), Table 3.