Promoting Health Equity Through Education Programs and Policies: Effectiveness of School-Based Health Centers in Improving Educational and Health Outcomes

Summary Evidence Table - Economic Review

Study	Study and Population Characteristics	Intervention Description	Effect Size	Program Costs	Health Care Cost Averted/ Productivity Losses Averted	Full Economic Summary Measure*
Author (Year):	Location:	The goal of the	NA	NA	Users ever used SBHC:	SBHCs saved
Adams and	Atlanta, GA	analysis is to			During 1994-1995, yearly	Medicaid
Johnson (2000)	Population	evaluate and			per person expense change	expenses.
Study Design:	Characteristics:	compare the				Preventive care
Comparison		Medicaid health			\$841.77 in 2013 dollars) for	_
control	4 through 12	care costs per child				improved.
(Difference in	years old enrolled	for those children			the yearly per person	Regression
differences)	in Medicaid, 97%	whose primary			expense change in Medicaid	results: The
uniterences)	to 98% African	caregiver was the			was -\$278.64 (-\$438 in	emergency
Economic	Americans.	WESBHC to			2013 dollars) for the control	department
Method: Benefit	Americans.	children in an area			group. The difference in	expenses per
analysis (savings	Whitefoord	without a SBHC.			differences was -\$256.87 (-	child-year
to Medicaid	Elementary SBHC	Control group:			\$403.77 in 2013 dollars)	enrolled
expenses)	(WESBHC) had	349-632 students			Users having SBHC as the	decreased by
	been in operation	from non-SBHC			primary provider: During	\$52.39 (p=.10)
Monetary	after 1994.	schools			1994-1995, yearly expense	after a school as
conversion: CPI		56116616			change in Medicaid was -	the comparison
ratio of year 2013	About 90% of the	Intervention			\$895.36 (-\$1,407.42 in	group adopted
against year 1994	Whitefoord	group: 262-274			2013 dollars) for the	SBHC.
is 1.57.	children were	from WESBHC			intervention group. And the	020.
	enrolled in	school during the			yearly per person expense	
	Medicaid	two years of			change in Medicaid was -	
	sometime during	research study.			\$278.64 (-\$438 in 2013	
	this period.				dollars) for the control	
	Time Horizon:				group. The difference in	
	1994-1996				differences was -\$616.72 (-	
	1334-1330				\$969.42 in 2013 dollars)	

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					Asthmatic users ever used SBHC: During 1994-1995, yearly expense change in Medicaid was -\$614.97 (-\$966.68 in 2013 dollars) for the intervention group. And the yearly per person expense change in Medicaid was +\$126.51 (+\$198.86 in 2013 dollars) for the control group. The difference in differences was -\$741.48 (-\$1,165.54 in 2013 dollars)	
Author (Year): Brindis et al. (1992) Study Design: Cross-sectional Economic Method: Cost- benefit analysis Monetary conversion: CPI ratio of year 2013 against year 1988 is 1.97	Location: CA Population Characteristics: Nine SBHCs with 1,339 to 4,375 visits per year, or 2.2 to 5.1 per person per yr. Female users range from 47% to 64%. The majority of the users are 9 th and 10 th graders. 56% users are Hispanics, 21% African American, 12% White, 9% Asian, and 7% others. 60% no insurance, 12%	SBHCs mainly provided primary care, reproductive healthcare and counseling. No control group Intervention group: School students from three schools, school size in terms of students were not reported.	The numbers of users were calculated by the reviewer, ranging from 462-1071 for school#1; 389-903 for school#2, and 366-848 for school#3.	Total cost: tcost School #1: tcost=\$335,000 (\$659,684 in 2013 dollars) (year 1989); tcost=\$421,000 (\$750,382 in 2013 dollars) (year 1991). School #2: tcost=\$195,000 (\$383,995 in 2013 dollars) (year 1989); tcost=\$162,000 (\$288,745 in 2013 dollars) (year 1991). School #3: tcost=\$227,650 (\$448,290 in 2013 dollars) (year 1989); tcost=\$227,650 (\$405,759 in 2013 dollars) (year 1989);	Cost averted: 1. ER services: \$540 total (\$1,063 in 2013 dollars) for school#1, \$2,360 total (\$4,647 in 2013 dollars) for #2, and \$3,920 total (\$7,719 in 2013 dollars) for #3 (year 1989). 2. Avoided pregnancy: \$452,886 for 21 avoided pregnancy (\$891,826 in 2013 dollars) for school #1. \$345,056 (calculated by the reviewer) (\$679,486 in 2013 dollars) for 16 avoided pregnancy in school #2. \$409,754 (calculated by the reviewer) (\$806,890 in 2013 dollars) for 19 avoided	Total benefit was mainly driven by the benefit from avoided

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	private insurance, 15% HMO, 13% Medi-Cal.			Costs were based on operating budget	pregnancy in school #3: (year 1989).	raising a child. However, less than 10% of the
	Time Horizon: 1986-1991				3. Early pregnancy detection: \$1,416 (\$2,788 in 2013 dollars) for #1; \$8,756 (\$17,242 in 2013 dollars) for #2; \$2,929 for	visits to the SBHCs were for reproductive service.
					#3 (\$5,768 in 2013 dollars) (year 1989).	Benefit of avoided pregnancy/child
					4. Prenatal care: \$6,333 (\$12,471 in 2013 dollars) for #1; \$28,034 (\$55,205 in 2013 dollars) for #2;	birth might have been overestimated.
					\$11,522 (\$22,689 in 2013 dollars) for #3 (year 1989).	
					5. STD detection & treatment: \$2,402 (\$4,730 in 2013 dollars) for #1;	
					\$6,573 (\$12,944 in 2013 dollars) for #2; \$310 (\$610 in 2013 dollars) for #3 (1989).	
					Total Benefit: \$463,577 (\$912,878 in 2013 dollars) for #1; \$390,779 (\$769,524 in 2013 dollars) for #2; \$428,435 (\$843,677 in 2013 dollars) for #3 (year 1989).	

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Author (Year): The Children's Aid Society, 2012 Study Design: NA Economic Method: Benefit only analysis	Location: NY	NA	NA	NA	248 emergency room visits were prevented, saving nearly \$250,000 (\$267,079 in 2013 dollars) in ambulance and emergency room costs to NY taxpayers	The savings to taxpayers in ambulance and emergency room were calculated as \$1,077 (in 2031 dollars) per visit.
Monetary conversion: CPI ratio of year 2013 against year 2010 is 1.07						
Author (Year): Contraceptive Technology Update (1985) Study Design: NA Economic Method: benefit only analysis Monetary conversion: CPI ratio of year 2013 against year 1985 is 2.41	Location: Jackson, MS. Population Characteristics: 5 community health center established clinics in five public schools, three urban high schools, one rural high school, and one urban junior high school.	NA	NA	\$143 was spent (\$345 in 2013 dollars) per student served by the program. The service was free to the students.	The average cost in 1982 of raising one son to age 22 was about \$215,000 (\$519,023 in 2013 dollars), that for two sons was \$357,000 (\$861,820 in 2013 dollars), and that for three sons was \$475,000 (\$1,146,680 in 2013 dollars). Yearly savings per student for not raising the son is \$23,592 (\$519,023/22). With daughters, the cost was 9% higher	"School-based clinics are likely to be successful only when they offered family planning services as part of a comprehensive health care clinic."

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Author (Year): DC 21st Century School Fund (2004) Study design: NA Economic analysis: Cost only Monetary conversion: CPI ratio of year 2013 against year 2003 is 1.27	Location: D.C. Population characteristics: public charter schools. Eastern Sr. High: 968 students, 890 students enrolled in SBHC. 19% uninsured. Brightwood elementary school: 503 students, 130 students enrolled in SBHC.	Intervention group: Eastern: SBHC opens all weekdays, 8.5 hours. Pediatrician, 0.5 FTE; nurse practioner, 1.0 FTE; psychiatrist, 0.1 FTE; clinical social worker, 1.0 FTE, and medical assistants, 2.0 FTE. Brightwood: SBHC opens all weekdays, 8.5 hours. 1 nurse practitioner, 1.0 FTE.	Users: 890 students in Eastern Sr. High and 130 students from Brightwood elementary school	Operating budget was \$200,000 (\$253,214 in 2013 dollars) for eastern and \$95,000 (\$120,277 in 2013 dollars) for Brightwood.	NA	Operating budget was between \$120,277 to \$253,214
Author (Year): Dryfoos (1988) Study design: NA Economic analysis: Cost only Monetary conversion: CPI ratio of year 2013 against year 1988 is 1.97	Location: U.S.	NA	NA	Costs per client at school-based clinics are roughly estimated to be between \$150 (\$295 in 2013 dollars) and \$250 (\$492 in 2013 dollars) per year, and caseloads average about 1,000, yielding an annual estimated cost of about \$200,000 (\$393,841 in 2013 dollars) for clinic operations.	NA	

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Author (Year): Dryfoos (1985) Study design: NA Economic analysis: Cost only Monetary conversion: CPI ratio of year 2013 against year 1985 is 2.165	Location: U.S. Population Characteristics: 14 SBHCs operating in 32 schools. Caseloads raged from 500 to 5000 students per year and handle up to 20,000 patient visits annually.			Depending on the diversity of the program, costs ranged from \$25,000 (\$54,126 in 2013 dollars) to \$1.9 million (\$4,113,553 in 2013 dollars) providing maternity services with a number of clinic sites. \$90,000/year was needed for St. Paul clinic (\$194,853 in 2013 dollars). On average, \$100 per patient per year (\$217 in 2013 dollars) was needed for comprehensive services, including family planning	NA	
Author (Year): Foch (1995) Study design: NA Economic analysis: Cost only Monetary conversion: CPI ratio of year 2013 against year 1992 is 1.66	Location: U.S Population characteristics: Enrollment rates vary from 60% to 90%, mostly Africian- Americans, 1991- 1992 school year	Intervention group: 24 SBHCs in the school-based adolescent health care program	NA	"Operating costs are dependent on such factors as number of personnel, and the range of services delivered. Expense ranges from \$130,000 to \$325,000 (\$215,854.67-\$539,636.67 in 2013 dollars). Staff salaries and benefits often comprise 80% to 90% of the operating budget. Laboratory work, X-rays, medications, office supplies, medical supplies and equipment maintenance are additional expenses."		

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Author (Year): Fothergill and Ballard (1998) Study design: NA Economic analysis: Cost only Monetary conversion: CPI ratio of year 2013 against year 1997 us 1.45	Nationwide survey on school linked health centers (SLHCs), 41 SLHCs, 21 responded the survey. SLHCs' target audience is adolescents, including young adults up to 23 years of age and the children of adolescents. 37% of visits were for children of teens. Also, 81% SLHCs reported providing services to homeless youth and university students.		NA	Budgets ranged from \$30,000 (\$43,543 in 2013 dollars) to \$1,500,000 (\$2,177,168 in 2013 dollars). The mean and median are \$436,511 (\$633,572 in 2013 dollars) and \$410,000 (\$595,093 in 2013 dollars).	NA	
Author (year): Guo et al. 2010 Study design: Comparison control	Location: Greater Cincinnati, OH Population characteristics: 7 schools with SBHCs and 6 schools without.	Intervention group: 3673 students enrolled in schools with SBHC. A total of 7572 encounters from the students.	From a related report, the sizes of four schools were: rural (1018 students and 461 users); urban#1 (3338 students and 614 users);	For the first 3 years of operation (2001-2003), the operation funding was \$1,382,260 as proxy for the operational costs. Medicaid reimbursement value to 7,572 encounters was \$479,929. Copayment by the patients were \$75,720. Market value of	A. Total value of health state change is \$954,387. B. Additional funding attracted by SBHC is \$457,598. C. Cost averted:	Total net benefit was: \$1.35 million Specifically, net benefit for: rural school was \$192,880 with

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Economic analysis: Cost- benefit Monetary conversion: CPI ratio of year 2013 against year 2002 is 1.29	Targeted population is school aged students (kindergarten through 12 th grade) enrolled in Ohio Medicaid or SCHIP from 1997-2003. A total of 7608 students enrolled in 4 school districts with SBHCs, 5056 of them used Medicaid.	Control group: 1383 students enrolled in schools without SBHC	urban #2 (648 students and 410 users); urban #3 (2604 students and 829 users)	the space was \$60,750 for 3 years. Therefore, the total cost for 3 years was 1,998,659 (\$2,588,113 in 2013 dollars). From a related report, specific cost for each school was obtained: Rural: \$168,700 Urban #1: \$165,838 Urban #2: \$143,728 Urban #3: \$118,876	1. Asthma hospitalization: \$228,144. 2. RX drugs \$443,532 3. productivity loss \$542,761 4. travel cost \$42,956 5. medical referrals \$42,642 D. Multiplier effect for community: \$638,726 E. Unquantifiable benefits Total benefit was \$3,350,746 (\$4,338,965 in 2013 dollars), which was \$361,581 per school per year. From the payers' perspective, Medicaid net savings was \$533,964, which was \$35.20 per child per year (\$46 in 2013 dollars), or \$23.5 per visit (\$30 in 2013 dollars). Total per year net savings for Medicaid was \$177,988 (\$230,481.10 in 2013 dollars).	benefit-cost ratio of 2.14; school urban#1 was \$195,742 with benefit-cost ratio of 2.18; school urban#2 was \$217,852 with benefit-cost ratio of 2.52; school urban#3 was \$243,204 with benefit-cost ratio of 3.05.

Study Study and Population Characteristic	Intervention Description	Effect Size	Program Costs	Health Care Cost Averted/ Productivity Losses Averted	Full Economic Summary Measure*
Author (year): Guo et al. (2005) Study design: Comparison control (difference in differences) Economic analysis: Benefit only Regression (ANCOVA) Monetary conversion: CPI ratio of year 2013 against year 2002 is 1.29 Location: Great Cincinnati, OH Population characteristics 7 schools with SBHCs and 6 schools without 273 asthmatic children who continuous enrolled in both their schools and the Ohio Medical program, including 196 in SBHC schools ar 77 in non-SBHC schools, 42% female, 41.7% African- Americans, with average age of 8.2	group: 196 asthmatic students using SBHC Control group: 77 non-SBHC students	Outcome measures are: rate of hospitalization per child; rate of ED The number of hospitalizations decreased from 36 to 12 in the SBHC group; while the rate remained the same in the control group. The total number of ED visits for all diagnoses decreased from 344 to 307 in the intervention group; while the number increased from 200 to 210 in the control group	NA	Difference in differences for cost of hospitalization is \$748.06 (\$968.68 in 2013 dollars) in terms of rate of hospitalization per child. ED visit: difference in differences calculated by the reviewer was \$56 (\$72.24 in 2013 dollars).	The potential savings from SBHC for hospitalization for child with asthma was \$969. A significant interaction effect between time and SBHC on hospitalization (p=.044), indicating the existence of SBHC was related to the decrease in hospitalization cost. But insignificant effect on ED use (p=0.477).

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Author (Year): Horton and Lima- Negron (2009) Study design: NA Economic analysis: Cost and benefit (startup cost only) Monetary conversion: CPI ratio of year 2013 against year 2008 IS 1.08	Location: NY state Population characteristics: 216 SBHCs, serving 200,000 students, who made 700,000 visits in 2008. Enrollment in NY state is 87%.	No control group	One full time nurse practitioner, or physician assistants, should be available for every 700-1500 enrollees. One full-time licensed mental health provider should be available for every 700-1500 enrollees.	Start up cost reported only: Ranged from \$200,000 to \$350,000 (\$216,402 to \$378,704 in 2013 dollars)	benefit related to asthmatic patients were \$13,888.89 (\$15,027.93 in 2013 dollars) per SBHC	Benefit cost ratio not calculated because only startup cost information was available
Author (Year): Keeton and Brindis (2012) Study design: NA Economic analysis: Cost only Monetary conversion: CPI ratio of year 2013 against year 2012 is 1.014	Location: U.S	NA	NA	In Colorado, SBHCs operate on an average annual revenue of approximately \$287,000 (\$291,196 in 2013 dollars)	NA	

Study	Study and Population Characteristics	Intervention Description	Effect Size	Program Costs	Health Care Cost Averted/ Productivity Losses Averted	Full Economic Summary Measure*
Author (Year): Massachusetts Association for school-based health care (2012) Study design: NA Economic analysis: Benefit only Monetary conversion: CPI ratio of year 2013 against year 2010 is 1.07	Location: Massachusetts 8059 visits during 9/1/10-6/30/11, 1234 asthma/allergy related visits, others are of the remaining 5 categories	No control group, Intervention group: Assume 50% of visits would have been delivered in an ED, even though the cases are non- emergent	50% reduction in visits by assumption	NA	For each asthma-related visit, \$565 (\$604 in 2013\$) would be saved by community health center sponsored SBHCs, \$529 (\$565 in 2013\$) would be saved by hospital-sponsored SBHCs, and \$565 (\$604 in 2013\$) would be saved by others. For each visit of other categories, \$190 (\$203 in 2013 dollars) would be saved by community health center sponsored SBHCs, \$154 (\$165 in 2013 dollars) would be saved by hospital-sponsored SBHCs, and \$190 (\$203 in 2013 dollars) would be saved by others.	
Author (year): Mckinney and Peak (1993) Study design: NA Economic analysis: Cost only Monetary conversion: CPI ratio of year 2013	Population characteristics: 202 of 510 surveyed SBHC/SLHCs, located in 34 state. 61% were school-based and 37% were school-linked. 21% operated over 10 years, 33%	NA	NA	The median cash operating budget per SBHC/SLHC was \$143,575, with median in-kind contributions of another \$20,000, resulting a total of \$163,575 (\$279,779 in 2013 dollars) 83% of the cash budget was on staff.	NA	

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against year 1991 is 1.71	operated for 5 to 9 years, and 46% less than 5 years. SLHCs on average served 5.1 schools. Mean number of eligible students was 1,948. Of them, 58% was enrolled, with rural centers having slightly higher enrollment.					
Author (year): Moore (1998) Study design: NA Economic analysis: Cost only Monetary conversion: CPI ratio of year 2013 against year 1998 is 1.43	Location: Denver, CO Population characteristics: Sheridan school district with 2170 student, 59% are eligible for reduced-cost lunch, and 42.5% under poverty level. Year of Aug 1, 1997 to July 31 1998, 1206 users made 3837 visits.	NA	1206 users made 3837 visits.	\$325,155 (\$464,706.34 in 2013 dollars) spending for fiscal year 1998, 90% of which was on salary and benefits. Operation cost was actual data, but based on spending. There was a deficit of \$64,960.	NA	

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Author (year):	Location: Oregon	NA	NA	Startup costs (midrange): for	NA	
Nystrom and	Population			centers without modular is		
Prata (2008)	characteristics:			\$49,750 (\$59,343 in 2013		
Study design:	State wide data,			dollars) [\$34,750, \$95,750];		
NA	total 63863 visits			for centers with modular is		
	by 20177 clients			\$128,250 (\$152,979 in 2013		
Economic	to 42 SBHCs			dollars) [\$110.250, \$163,750].		
analysis: Cost	to 42 SBITCS			Annual 9 months' operation		
only				costs (midrange): for core		
,				center is \$90,750 (\$108,248 in		
Monetary				2013 dollars) [\$41,000,		
conversion: CPI				\$212,500]; for intermediate		
ratio of year 2013				center is \$121,750 (\$145,225		
against year 2005				in 2013 dollars) [\$60,000,		
is 1.19				\$247,000]; for expanded		
				center is \$152,750 (\$182,203		
				in 2013 dollars) [\$88,500,		
				\$311,250].		
				Annual 12 months' operation		
				costs (midrange): for core		
				center is \$116,000 (\$138,367		
				in 2013 dollars) [\$56,500,		
				\$255,000]; for intermediate		
				center is \$162,250 (\$193,534		
				in 2013 dollars) [\$85,000,		
				\$277,500]; for expanded		
				center is \$208,500 (\$248,702		
				in 2013 dollars) [\$127,000,		
				\$402,500].		
				Total cost was between		
				203,077 and 489,950 in		
				2013\$, with midrange of		
				\$298,204, assuming		

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				intermediate center with modular, operating for 9 months.		
Author (year): Schlitt, Juszczak and Eichner (2008) Study design: N.A Economic analysis: Cost only by grant funding Monetary conversion: CPI ratio of year 2013 against year 2004 is 1.23	Location: U.S Population characteristics: Survey of 19 states	NA	NA	Yearly operation costs by funding ranged from \$13,235 (\$16,322 in 2013 dollars) to \$248,515 (\$306,476 in 2013 dollars) per HBSC, with an average of \$91,057 (\$112,294 in 2013 dollars).	NA	
Author (year): Siegel and Krieble (1987) Study design: NA Economic analysis: benefit only Monetary conversion: CPI	Location: Delaware Population characteristics: Middletown, rural area 30 miles south of Wilmington, Del. 658 students (87% Caucasian,	NA	1000 medical visits were made in school year 1985-1986; nutrition service was provided to 35 individuals with 156 visits. Social worker held 158 counseling sessions. Health	NA	Cost averted to private physician's office: \$23.94/visit (\$51.83 in 2013 dollars). Productivity loss averted and travel cost averted by the parents: \$14.30/visit (\$30.96 in 2013 dollars).	Calculated by the reviewer: Compared to private clinic, net savings per visit was \$21.33 (\$46.18 in 2013 dollars). This was obtained by \$42.83-\$21.5.

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·	51% female), and 50% enrolled (Caucasian females are frequent users), 80% of whom had private insurance, 6% covered by Medicaid, and 13% had no health insurance.		education services were given to 31% of the student body.		Student's loss of school time averted: \$4.59/visit (\$9.94 in 2013 dollars). The total cost averted is \$42.83 (\$92.73 in 2013 dollars) The cost of visiting a SBHC was \$21.5 (\$46.55 in 2013 dollars).	To the enrolled patient, the service is free. Therefore, cost savings to them was \$21.33+\$20.26, or \$46.18+\$43.86=\$90.04 in 2013\$
Author (year): Silberberg and Cantor (2002) Study design: NA Economic analysis: Cost only Monetary conversion: CPI ratio of year 2013 against year 2002 is 1.29	Location: New Jersey	NA	NA	\$150,000 (\$194,239 in 2013 dollars) to \$200,000 (\$258,985 in 2013 dollars) annual operation cost	NA	
Author (year): Tereszkiewicz and Brindis (1986)	General description of SBHC	NA	NA	A former program administrator in St. Paul estimates that \$100,000-\$125,000 per year (\$212,552.01-\$265,690.01 in	NA	

Promoting Health Equity Through Education Programs: School-Based Health Centers – Economic Evidence Table

Study	Study and Population Characteristics	Intervention Description	Effect Size	Program Costs	Health Care Cost Averted/ Productivity Losses Averted	Full Economic Summary Measure*
Study design: NA Economic analysis: Cost only				2013 dollars) is needed to operate a full-time high school clinic, even after it has been equipped.		
Monetary conversion: CPI ratio of year 2013 against year 1986 is 2.13						