Smoking cessation programs for pregnant women: Intensive behavioral interventions

Health Care: Maternal and Infant Health

Benefit-cost estimates updated December 2023. Literature review updated December 2016.

Current estimates replace old estimates. Numbers will change over time as a result of model inputs and monetization methods.

The WSIPP benefit-cost analysis examines, on an apples-to-apples basis, the monetary value of programs or policies to determine whether the benefits from the program exceed its costs. WSIPP's research approach to identifying evidence-based programs and policies has three main steps. First, we determine "what works" (and what does not work) to improve outcomes using a statistical technique called meta-analysis. Second, we calculate whether the benefits of a program exceed its costs. Third, we estimate the risk of investing in a program by testing the sensitivity of our results. For more detail on our methods, see our Technical Documentation.

Program Description: In this analysis, we reviewed research literature on behavioral interventions that provide moderate-to-intensive in-person or phone counseling. These programs are tailored for women who smoke during pregnancy, include more than a single brief counseling session, and offer self-help materials to encourage smoking cessation. Motivational interviewing is the most common type of counseling.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$240
Participants	$276
Others	$125
Indirect	$2,026
Total benefits	$2,667
Net program cost	($112)
Benefits minus cost	$2,555

Benefit to cost ratio	$23.91
Benefits minus costs	$2,555
Chance the program will produce benefits greater than the costs	90%

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2022). The chance the benefits exceed the costs are derived from a Monte Carlo risk analysis. The details on this, as well as the economic discount rates and other relevant parameters are described in our Technical Documentation.

Meta-Analysis of Program Effects

Outcomes measured	Treatment age	Primary or secondary participant	No. of effect sizes	Treatment N	Adjusted effect sizes and standard errors used in the benefit-cost analysis						Unadjusted effect size (random effects model)	
					First time ES is estimated			Second time ES is estimated				
					ES	SE	Age	ES	SE	Age	ES	p-value
Smoking during late pregnancy^	26	Primary	16	2370	-0.228	0.079	26	n/a	n/a	n/a	-0.228	0.004
Regular smoking	26	Primary	6	895	-0.043	0.074	26	-0.043	0.074	36	-0.043	0.559
Low birthweight birth***	26	Primary	3	793	-0.088	0.066	26	0.000	0.000	27	-0.088	0.183
Low birthweight birth***	1	Secondary	3	793	-0.088	0.066	1	0.000	0.000	2	-0.088	0.183

^WSIPP's benefit-cost model does not monetize this outcome.

***We report this outcome twice: once for mothers (designated as the primary participant) and once for infants (designated as the secondary participant). We do this because the outcome is associated with costs and benefits for both mothers and infants, and the amount of the cost or benefit is different for mothers than it is for infants.

Meta-analysis is a statistical method to combine the results from separate studies on a program, policy, or topic in order to estimate its effect on an outcome. WSIPP systematically evaluates all credible evaluations we can locate on each topic. The outcomes measured are the types of program impacts that were measured in the research literature (for example, crime or educational attainment). Treatment N represents the total number of individuals or units in the treatment group across the included studies.

An effect size (ES) is a standard metric that summarizes the degree to which a program or policy affects a measured outcome. If the effect size is positive, the outcome increases. If the effect size is negative, the outcome decreases.

Adjusted effect sizes are used to calculate the benefits from our benefit cost model. WSIPP may adjust effect sizes based on methodological characteristics of the study. For example, we may adjust effect sizes when a study has a weak research design or when the program developer is involved in the research. The magnitude of these adjustments varies depending on the topic area.

WSIPP may also adjust the second ES measurement. Research shows the magnitude of some effect sizes decrease over time. For those effect sizes, we estimate outcome-based adjustments which we apply between the first time ES is estimated and the second time ES is estimated. We also report the unadjusted effect size to show the effect sizes before any adjustments have been made. More details about these adjustments can be found in our Technical Documentation.

Detailed Monetary Benefit Estimates Per Participant

Affected outcome:	Resulting benefits:[1]	Benefits accrue to:				
		Taxpayers	Participants	Others[2]	Indirect[3]	Total
Low birthweight birth	Health care associated with low birthweight births	$13	$1	$13	$6	$32
	Subtotals	*$13*	*$1*	*$13*	*$6*	*$32*
From secondary participant						
Low birthweight birth	Infant mortality	$115	$271	$0	$2,019	$2,406
Low birthweight birth	Health care associated with low birthweight births	$112	$5	$112	$56	$285
	Subtotals	*$227*	*$276*	*$112*	*$2,075*	*$2,690*
Program cost	Adjustment for deadweight cost of program	$0	$0	$0	($56)	($56)
Totals		$240	$276	$125	$2,026	$2,667

[1]In addition to the outcomes measured in the meta-analysis table, WSIPP measures benefits and costs estimated from other outcomes associated with those reported in the evaluation literature. For example, empirical research demonstrates that high school graduation leads to reduced crime. These associated measures provide a more complete picture of the detailed costs and benefits of the program.

[2]"Others" includes benefits to people other than taxpayers and participants. Depending on the program, it could include reductions in crime victimization, the economic benefits from a more educated workforce, and the benefits from employer-paid health insurance.

[3]"Indirect benefits" includes estimates of the net changes in the value of a statistical life and net changes in the deadweight costs of taxation.

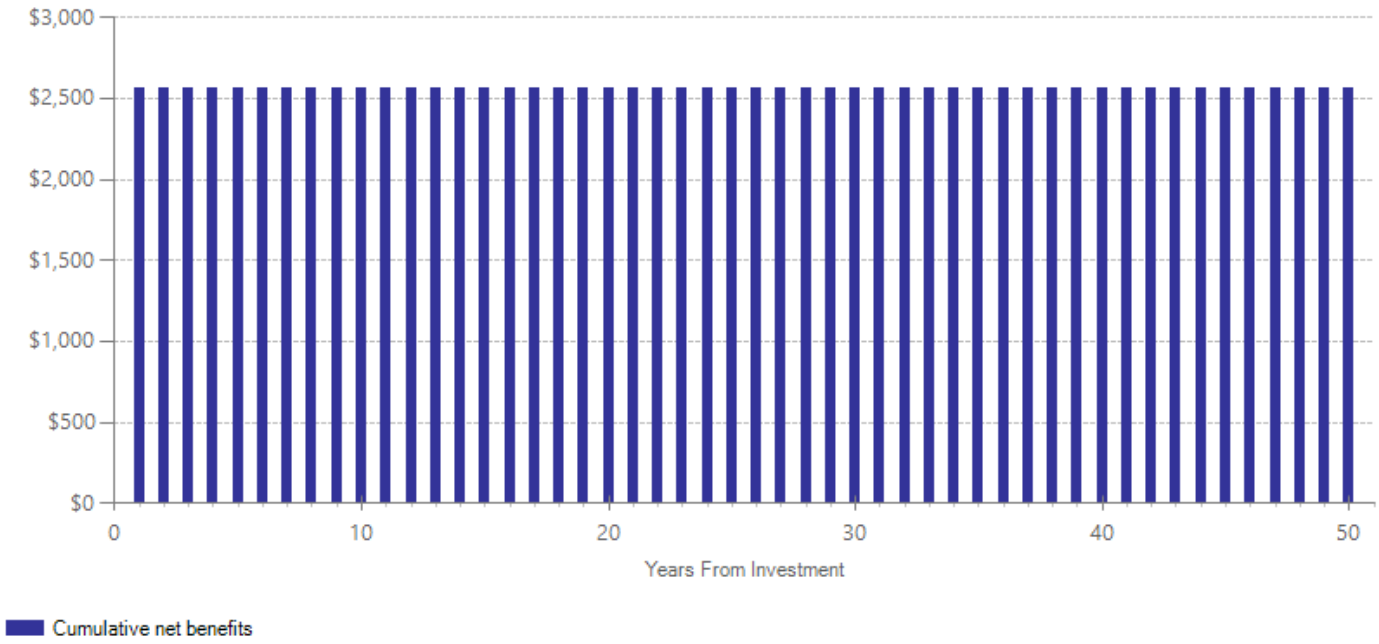
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$99	2016	Present value of net program costs (in 2022 dollars)	($112)
Comparison costs	$5	2016	Cost range (+ or -)	30%

The per-participant cost of treatment is based on physician/therapist time reported in studies, multiplied by the Medicaid reimbursement rate for tobacco cessation for pregnant clients, reported by the Washington State Health Care Authority for physician-related/professional services. Cost estimates were obtained from El-Mohandes et al. (2011), McBride, C.M. (1999), Patten et al. (2010) Rigotti et al. (2006), and Secker-Walker et al. (1994). Studies with reported treatment costs include Dornelas et al. (2006), Ruger et al. (2008), and Secker-Walker et al. (1998).

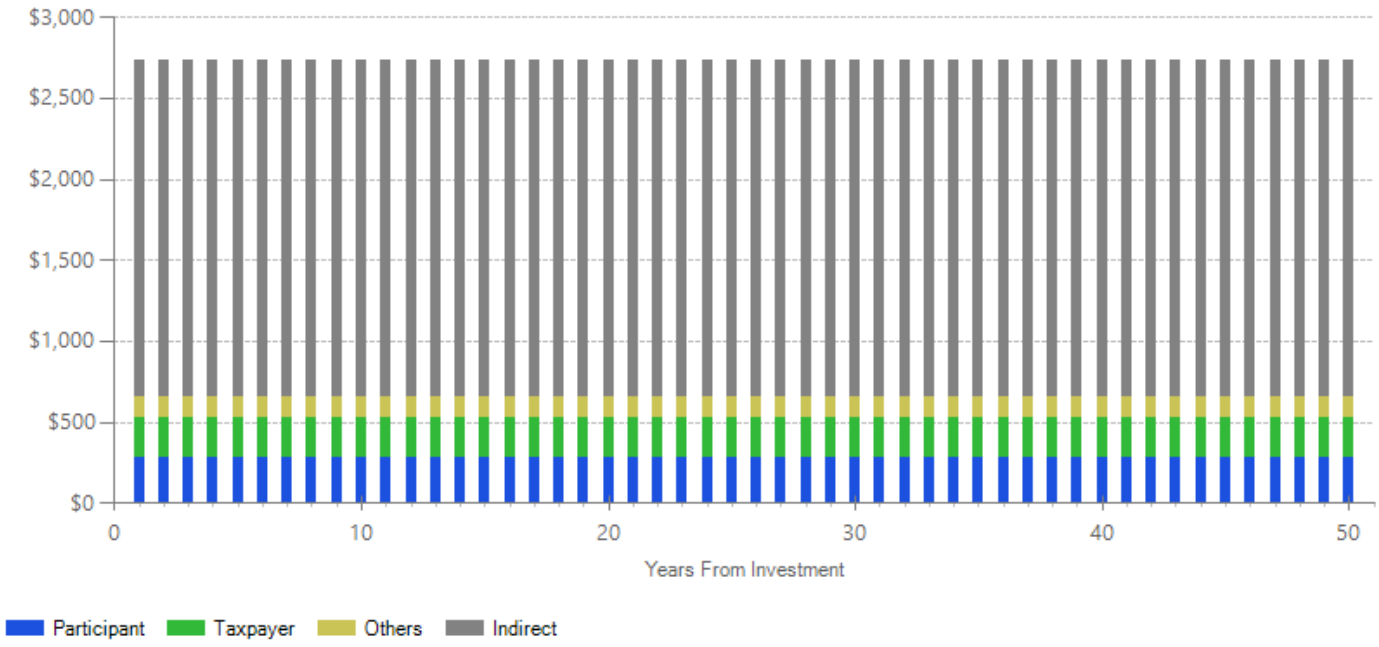
The figures shown are estimates of the costs to implement programs in Washington. The comparison group costs reflect either no treatment or treatment as usual, depending on how effect sizes were calculated in the meta-analysis. The cost range reported above reflects potential variation or uncertainty in the cost estimate; more detail can be found in our Technical Documentation.

Benefits Minus Costs Over Time (Cumulative Discounted Dollars)

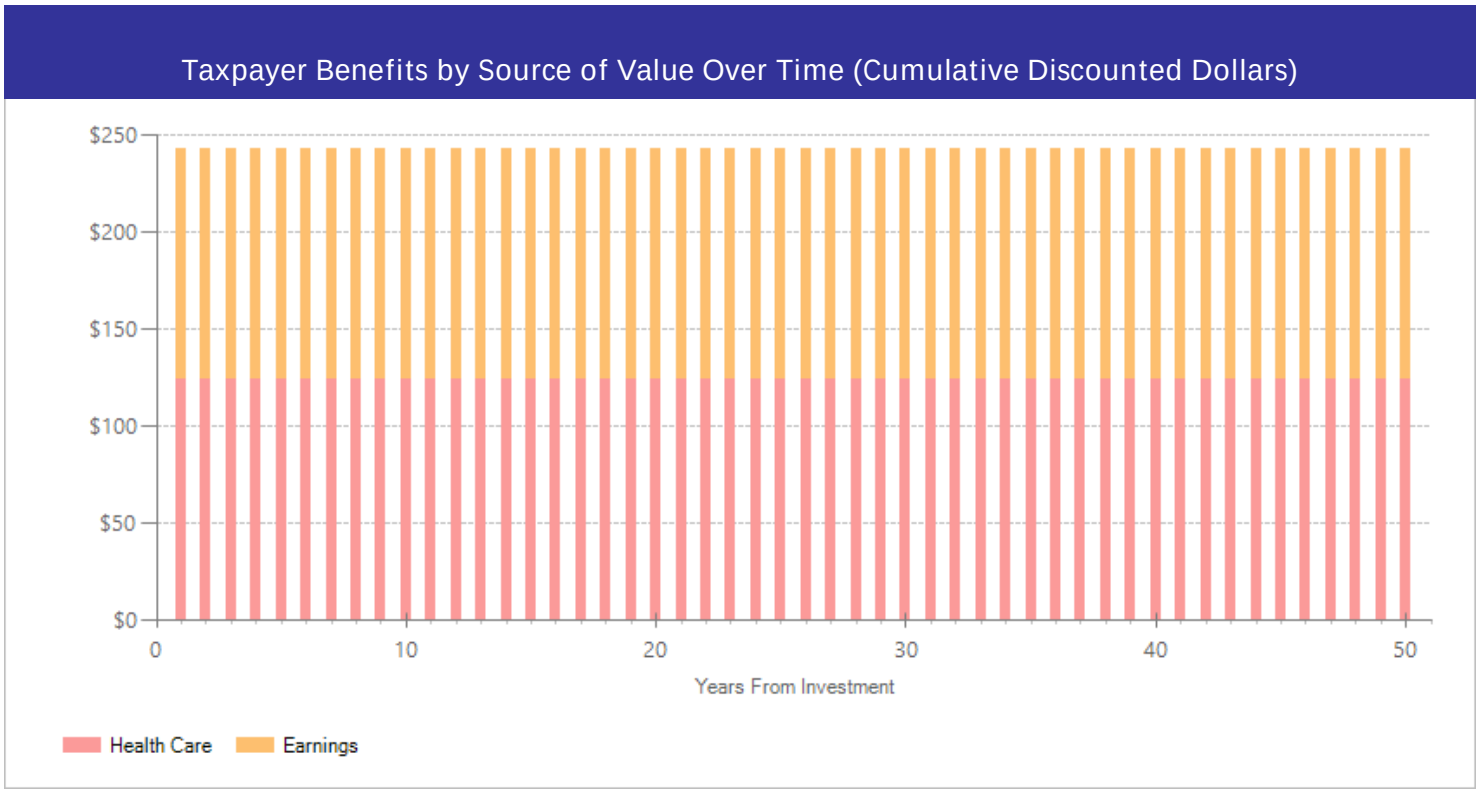


The graph above illustrates the estimated cumulative net benefits per-participant for the first fifty years beyond the initial investment in the program. We present these cash flows in discounted dollars. If the dollars are negative (bars below $0 line), the cumulative benefits do not outweigh the cost of the program up to that point in time. The program breaks even when the dollars reach $0. At this point, the total benefits to participants, taxpayers, and others, are equal to the cost of the program. If the dollars are above $0, the benefits of the program exceed the initial investment.

Benefits by Perspective Over Time (Cumulative Discounted Dollars)



The graph above illustrates the breakdown of the estimated cumulative benefits (not including program costs) per-participant for the first fifty years beyond the initial investment in the program. These cash flows provide a breakdown of the classification of dollars over time into four perspectives: taxpayer, participant, others, and indirect. “Taxpayers” includes expected savings to government and expected increases in tax revenue. “Participants” includes expected increases in earnings and expenditures for items such as health care and college tuition. “Others” includes benefits to people other than taxpayers and participants. Depending on the program, it could include reductions in crime victimization, the economic benefits from a more educated workforce, and the benefits from employer-paid health insurance. “Indirect benefits” includes estimates of the changes in the value of a statistical life and changes in the deadweight costs of taxation. If a section of the bar is below the $0 line, the program is creating a negative benefit, meaning a loss of value from that perspective.



The graph above focuses on the subset of estimated cumulative benefits that accrue to taxpayers. The cash flows are divided into the source of the value.

Citations Used in the Meta-Analysis

Albrecht, S.A., Caruthers, D., Patrick, T., Reynolds, M., Salamie, D., Higgins, L.W., . . . Mlynarchek, S. (2006). A randomized controlled trial of a smoking cessation intervention for pregnant adolescents. *Nursing Research, 55*(6), 402-410.

Bullock, L., Everett, K.D., Mullen, P.D., Geden, E., Longo, D.R., & Madsen, R. (2009). Baby BEEP: A randomized controlled trial of nurses' individualized social support for poor rural pregnant smokers. *Maternal and Child Health Journal, 13*(3), 395-406.

Cook, C., Ward, S., Myers, S., & Spinnato, J. (1995). A prospective, randomized evaluation of intensified therapy for smoking reduction in pregnancy. *American Journal of Obstetrics and Gynecology: Part 2, 172*(1), 290.

Dornelas, E.A., Magnavita, J., Beazoglou, T., Fischer, E.H., Oncken, C., Lando, H., Greene, J., Barbagallo, J., Stepnowski, R., & Gregonis, E. (2006). Efficacy and cost-effectiveness of a clinic-based counseling intervention tested in an ethnically diverse sample of pregnant smokers. *Patient Education and Counseling, 64,* 342-349.

El-Mohandes, A.A., El-Khorazaty, M.N., Kiely, M., & Gantz, M.G. (2011). Smoking cessation and relapse among pregnant African-American smokers in Washington, DC. *Maternal and Child Health Journal, 15,* 96-105.

Ershoff, D.H., Quinn, V.P., Boyd, N.R., Stern, J., Gregory, M., & Wirtschafter, D. (1999). The Kaiser Permanente prenatal smoking cessation trial: when more isn't better, what is enough? *American Journal of Preventive Medicine, 17*(3), 161-168.

McBride, C.M. (1999). Prevention of relapse in women who quit smoking during pregnancy. *American Journal of Public Health, 89*(5), 706-711.

Naughton, F., Prevost, A.T., Gilbert, H., & Sutton, S. (2012). Randomized controlled trial evaluation of a tailored leaflet and SMS text message self-help intervention for pregnant smokers (MiQuit). *Nicotine & Tobacco Research, 14*(5), 569-577.

Patten, C.A., Windsor, R.A., Renner, C.C., Enoch, C., Hochreiter, A., Nevak, C., . . . Brockman, T. (2010). Feasibility of a tobacco cessation intervention for pregnant Alaska Native women. *Nicotine and Tobacco Research, 12*(2), 79-87.

Rigotti, N.A., Park, E.R., Regan, S., Chang, Y., Perry, K., Loudin, B., & Quinn, V. (2006). Efficacy of telephone counseling for pregnant smokers. *Obstetrics & Gynecology, 108*(1), 83-92.

Ruger, J.P., Weinstein, M.C., Hammond, S.K., Kearney, M.H., & Emmons, K.M. (2008). Cost-effectiveness of motivational interviewing for smoking cessation and relapse prevention among low-income pregnant women: A randomized controlled trial. *Value in Health, 11*(2), 191-198.

Secker-Walker, R.H., Solomon, L.J., Flynn, B.S., Skelly, J.M., Lepage, S.S., Goodwin, G.D., & Mead, P.B. (1994). Individualized smoking cessation counseling during prenatal and early postnatal care. *American Journal of Obstetrics and Gynecology, 171*(5), 1347-1355.

Secker-Walker, R.H., Solomon, L.J., Flynn, B.S., Skelly, J.M., & Mead, P.B. (1998). Reducing smoking during pregnancy and postpartum: physician's advice supported by individual counseling. *Preventive Medicine, 27*(3), 422-430.

Sexton, M., & Hebel, J.R. (1984). A clinical trial of change in maternal smoking and its effect on birth weight. *Jama: the Journal of the American Medical Association, 251*(7), 911-915.

Stotts, A.L., Diclemente, C.C., & Dolan-Mullen, P. (2002). One-to-one: A motivational intervention for resistant pregnant smokers. *Addictive Behaviors, 27*(2), 275-292.

Stotts, A.L., DeLaune, K.A., Schmitz, J.M., & Grabowski, J. (2004). Impact of a motivational intervention on mechanisms of change in low-income pregnant smokers. *Addictive Behaviors, 29*(8), 1649-1657.

Stotts, A.L., Groff, J.Y., Velasquez, M.M., Benjamin-Garner, R., Green, C., Carbonari, J.P., & DiClemente, C.C. (2009). Ultrasound feedback and motivational interviewing targeting smoking cessation in the second and third trimesters of pregnancy. *Nicotine & Tobacco Research, 11*(8), 961-968.

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