Washington State Institute for Public Policy

Health Care Benefit-Cost Results

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.

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

Lifestyle interventions to prevent diabetes: Long-term, intensive, individual counseling programs

Health Care: Obesity and Diabetes

Benefit-cost estimates updated May 2017. Literature review updated February 2017.

Program Description: All lifestyle programs target individuals at high risk for developing type 2 diabetes, providing them with counseling and other support. Typical programs in this specific category include three years of active intervention with individual counseling sessions and supervised exercise classes.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$11,936	Benefit to cost ratio	$7.87
Participants	$11,998	Benefits minus costs	$26,000
Others	$3,075	Chance the program will produce benefits greater than the costs	100 %
Indirect	$2,779		
Total benefits	$29,787		
Net program cost	($3,787)		
Benefits minus cost	$26,000		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Labor market earnings associated with diabetes	$10,237	$4,649	$0	$936	$15,821
Health care associated with diabetes	$1,761	$7,287	$3,075	$3,753	$15,876
Adjustment for deadweight cost of program	$0	$0	$0	($1,910)	($1,910)
Totals	$11,998	$11,936	$3,075	$2,779	$29,787

[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.

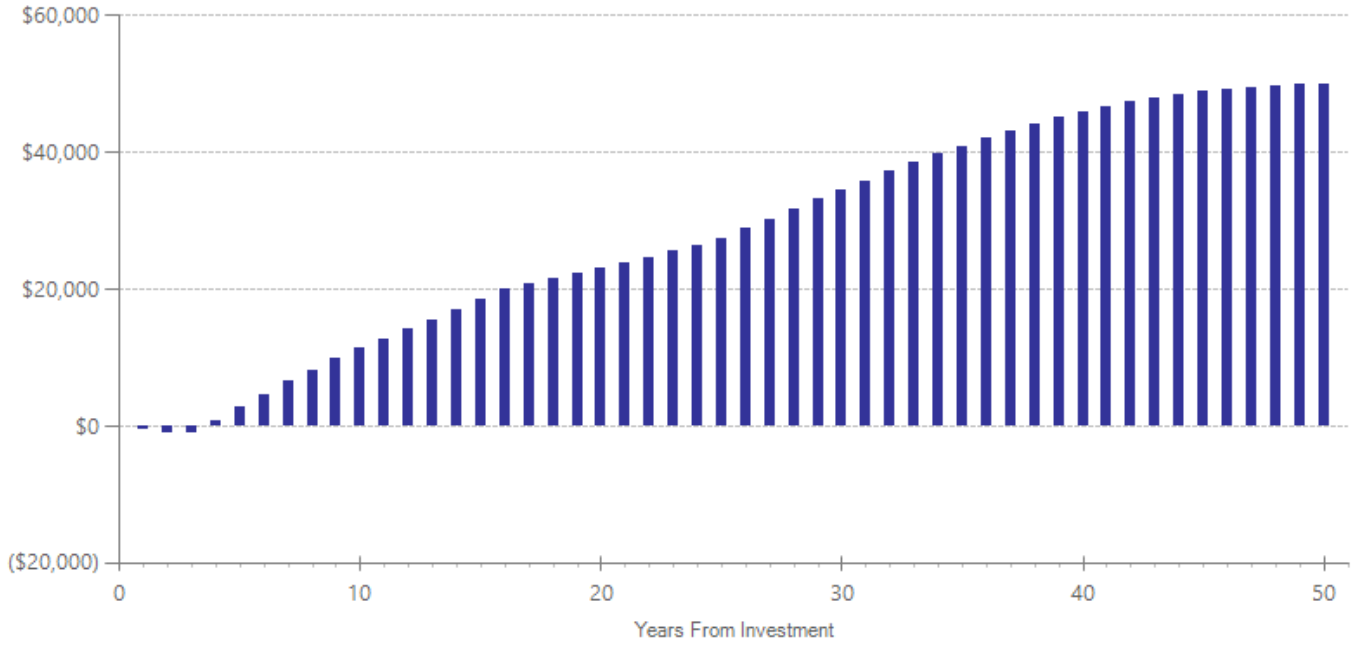
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$1,287	2014	Present value of net program costs (in 2016 dollars)	($3,787)
Comparison costs	$0	2014	Cost range (+ or -)	10 %

These programs typically last for three years. Per-participant estimates are based on costs observed in the US Diabetes Prevention Program (DPP) trial. WSIPP averaged annual costs for treatment over control, inflated to 2014 dollars.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Diabetes incidence	2	1344	-0.533	0.098	53	-0.255	0.077	60	-0.533	0.001
Fasting glucose^	2	1344	-0.453	0.053	50	n/a	n/a	n/a	-0.453	0.001
Weight change	2	1344	-0.298	0.052	53	0.000	0.054	60	-0.298	0.001

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

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.

Citations Used in the Meta-Analysis

Haffner, S., Temprosa, M., Crandall, J., Fowler, S., Goldberg, R., Horton, E., Marcovina, S., ... Diabetes Prevention Program Research Group. (2005). Intensive lifestyle intervention or metformin on inflammation and coagulation in participants with impaired glucose tolerance. *Diabetes, 54*(5), 1566-72.

Knowler, W.C., Barrett-Connor, E., Fowler, S.E., Hamman, R.F., Lachin, J.M., Walker, E.A., Nathan, D.M., ... Diabetes Prevention Program Research Group. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *The New England Journal of Medicine, 346*(6), 393-403.

Lindstrom, J., Eriksson, J.G., Valle, T.T., Aunola, S., Cepaitis, Z., Hakumaki, M., Hamalainen, H., ... Tuomilehto, J. (2003). Prevention of diabetes mellitus in subjects with impaired glucose tolerance in the Finnish Diabetes Prevention Study: Results from a randomized clinical trial. *Journal of the American Society of Nephrology, 14,* 2, S108-S113.

Tuomilehto, J., Lindstro¨m, J., Eriksson, J.G., Valle, T.T., Ha¨ma¨la¨inen, H., Ilanne-Parikka, P., Keina¨nen-Kiukaanniemi, S., ... Finnish Diabetes Prevention Study Group. (2001). Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *The New England Journal of Medicine, 344*(18), 1343-50.

Lifestyle interventions to prevent diabetes: Shorter-term programs with group-based counseling

Health Care: Obesity and Diabetes

Benefit-cost estimates updated May 2017. Literature review updated February 2017.

Program Description: All lifestyle diabetes prevention programs target individuals at high risk for developing type 2 diabetes, providing them with counseling and other support. Programs in this specific category are shorter-term, lower-cost, group-based counseling programs provided in community settings (e.g., YMCA's, churches).

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$4,875
Participants	$6,303
Others	$1,359
Indirect	$1,218
Total benefits	$13,756
Net program cost	($446)
Benefits minus cost	$13,309

Benefit to cost ratio	$30.82
Benefits minus costs	$13,309
Chance the program will produce benefits greater than the costs	80 %

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Labor market earnings associated with diabetes	$5,767	$2,619	$0	$316	$8,703
Health care associated with diabetes	$535	$2,256	$1,359	$1,125	$5,276
Adjustment for deadweight cost of program	$0	$0	$0	($223)	($223)
Totals	$6,303	$4,875	$1,359	$1,218	$13,756

[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

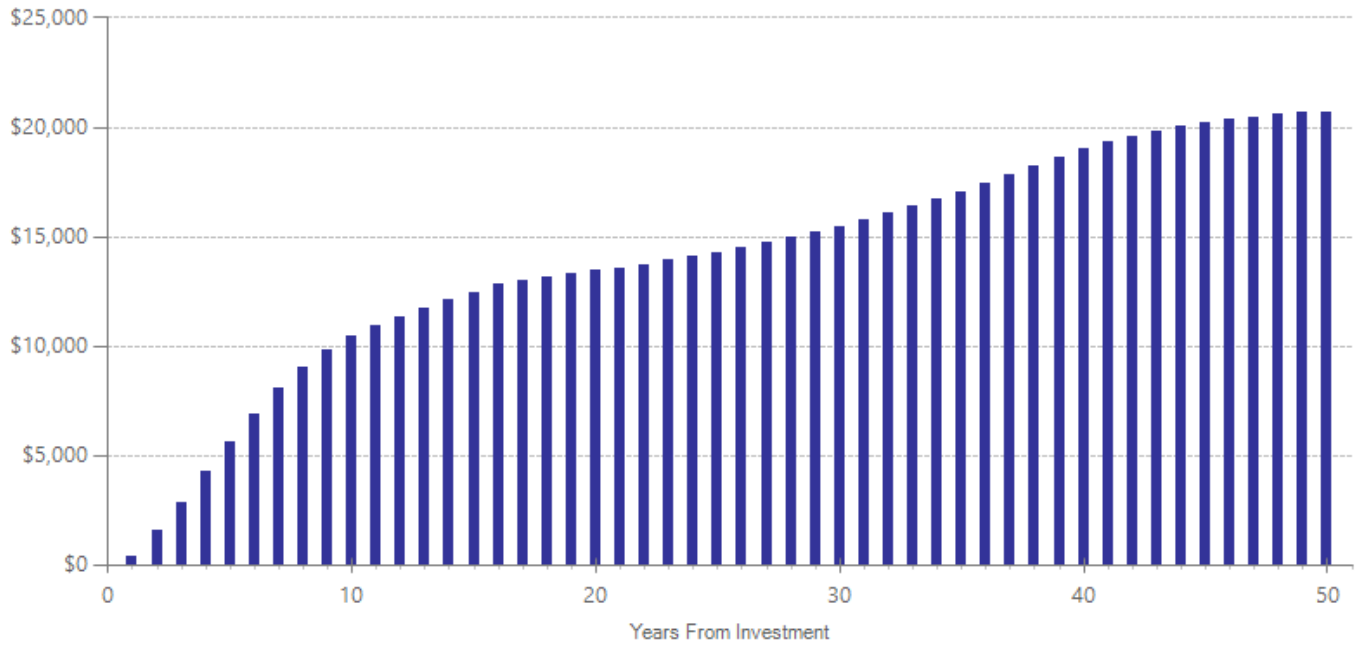
	Annual cost	Year dollars
Program costs	$440	2014
Comparison costs	$0	2014

Summary	
Present value of net program costs (in 2016 dollars)	($446)
Cost range (+ or -)	10 %

These programs typically last for up to one year. Per-participant costs are based on a 2014 Washington Department of Health Diabetes Epidemic and Action Report (p. 133), accessed from: http://www.doh.wa.gov/Portals/1/Documents/Pubs/345-342-DiabetesEpidemicActionReport.pdf.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Fasting glucose^	7	763	-0.292	0.074	50	n/a	n/a	n/a	-0.292	0.001
Weight change	7	490	-0.156	0.101	53	-0.048	0.101	60	-0.218	0.002

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

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.

Citations Used in the Meta-Analysis

Ackermann, R.T., Finch, E.A., Brizendine, E., Zhou, H., & Marrero, D.G. (2008). Translating the Diabetes Prevention Program into the community. The DEPLOY Pilot Study. *American Journal of Preventive Medicine, 35*(4), 357-63.

Katula, J.A., Vitolins, M.Z., Rosenberger, E.L., Blackwell, C.S., Morgan, T.M., Lawlor, M.S., & Goff, D.C.J. (2011). One-year results of a community-based translation of the Diabetes Prevention Program: Healthy-Living Partnerships to Prevent Diabetes (HELP PD) Project. *Diabetes Care, 34*(7), 1451-7.

Kulzer, B., Hermanns, N., Gorges, D., Schwarz, P., & Haak, T. (2009). Prevention of diabetes self-management program (PREDIAS): effects on weight, metabolic risk factors, and behavioral outcomes. *Diabetes Care, 32*(7), 1143-6.

Ma, J., Yank, V., Xiao, L., Wilson, S.R., Rosas, L.G., Stafford, R.S., & Lavori, P.W. (2013). Translating the diabetes prevention program lifestyle intervention for weight loss into primary care: A randomized trial. *Jama Internal Medicine, 173*(2), 113-121.

Mason, C., Foster-Schubert, K.E., Imayama, I., Kong, A., Xiao, L., Bain, C., Campbell, K.L., ... McTiernan, A. (2011). Dietary weight loss and exercise effects on insulin resistance in postmenopausal women. *American Journal of Preventive Medicine, 41*(4), 366-75.

Moore, S.M., Hardie, E.A., Hackworth, N.J., Critchley, C.R., Kyrios, M., Buzwell, S.A., & Crafti, N.A. (2011). Can the onset of type 2 diabetes be delayed by a group-based lifestyle intervention? A randomised control trial. *Psychology and Health, 26*(4), 485-499.

Ockene, I.S., Tellez, T.L., Rosal, M.C., Reed, G.W., Mordes, J., Merriam, P.A., Olendzki, B.C., ... Ma, Y. (2012). Outcomes of a Latino community-based intervention for the prevention of diabetes: the Lawrence Latino Diabetes Prevention Project. *American Journal of Public Health, 102*(2), 336-42.

Parikh, P., Simon, E.P., Fei, K., Looker, H., Goytia, C., & Horowitz, C.R. (2010). Results of a pilot diabetes prevention intervention in East Harlem, New York City: Project HEED. *American Journal of Public Health, 100*(Suppl 1), S232-S239.

Behavioral interventions to reduce obesity for adults: High-intensity, in-person programs

Health Care: Obesity and Diabetes

Benefit-cost estimates updated May 2017. Literature review updated December 2014.

Program Description: Behavioral interventions for obesity include behavioral counseling, therapy, and educational components, and often include diet and exercise components as well. For this review of interventions for obese adults, we excluded studies that targeted diabetic populations as well as those aimed at preventing obesity.
Programs in this specific category are delivered to obese adults, and conducted face-to-face, with 12 or more sessions a year for 12 months or more.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$500	Benefit to cost ratio	$3.68
Participants	$889	Benefits minus costs	$1,673
Others	$299	Chance the program will produce benefits greater than the costs	59 %
Indirect	$609		
Total benefits	$2,297		
Net program cost	($624)		
Benefits minus cost	$1,673		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Labor market earnings associated with obesity	$834	$379	$0	$859	$2,071
Health care associated with obesity	$56	$122	$299	$59	$536
Adjustment for deadweight cost of program	$0	$0	$0	($310)	($310)
Totals	$889	$500	$299	$609	$2,297

[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.

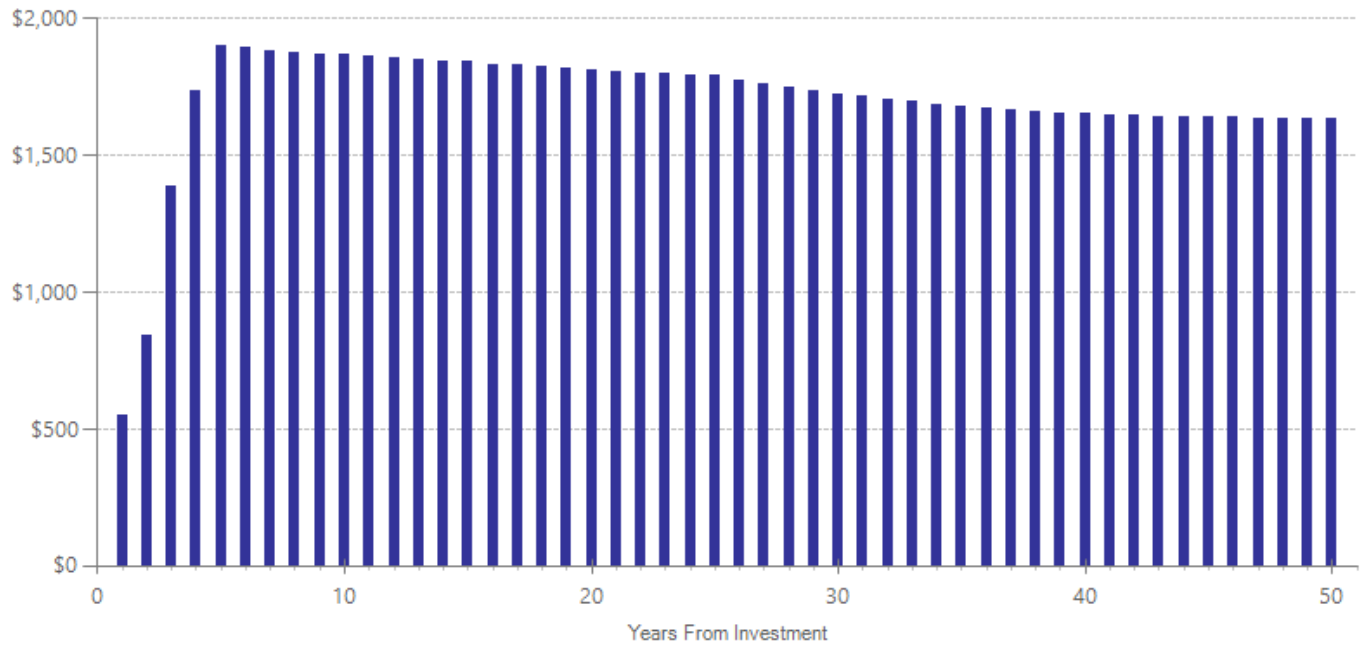
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$313	2014	Present value of net program costs (in 2016 dollars)	($624)
Comparison costs	$0	2014	Cost range (+ or -)	25 %

On average, these programs provide approximately 52 contact hours over 24 months, including both group and individual sessions. The average per-participant cost of these programs was computed using contact hours and average Washington State 2014 hourly wages of the appropriate professionals who conducted the intervention (generally dietitians, nurses, general practitioners, or therapists).

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Diastolic blood pressure^	8	1641	-0.340	0.165	50	n/a	n/a	n/a	-0.340	0.040
HDL cholesterol^	7	986	0.049	0.051	50	n/a	n/a	n/a	0.049	0.343
LDL cholesterol^	7	986	-0.011	0.051	50	n/a	n/a	n/a	-0.011	0.827
Obesity	9	1357	-0.238	0.087	50	0.000	0.086	55	-0.238	0.006
Systolic blood pressure^	8	1641	-0.123	0.047	50	n/a	n/a	n/a	-0.123	0.009
Weight change	12	2070	-0.174	0.050	50	0.000	0.012	55	-0.174	0.001

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

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.

Citations Used in the Meta-Analysis

Appel, L.J., Clark, J.M., Yeh, H.C., Wang, N.Y., Coughlin, J.W., Daumit, G., Miller, E.R., Dalcin, A., Jerome, G., Geller, S., Noronha, G., Pozefsky, T., Charleston, J., Reynolds., Durkin, N., Rubin, R., Louis, T.A., & Brancati, F.L. (2011). Comparative effectiveness of weight-loss interventions in clinical practice. *The New England Journal of Medicine, 365*(21), 1959-1968.

Burke, V., Beilin, L.J., Cutt, H.E., Mansour, J., Wilson, A., & Mori, T.A. (2005). Effects of a lifestyle programme on ambulatory blood pressure and drug dosage in treated hypertensive patients: a randomized controlled trial. *Journal of Hypertension, 23*(6), 1241-1249.

de Vos, B.C., Runhaar, J., & Bierma-Zeinstra, S.M. (2014). Effectiveness of a tailor-made weight loss intervention in primary care. *European Journal of Nutrition, 53*(1), 95-104.

Eriksson, M.K., Franks, P.W., & Eliasson, M. (2009). A 3-year randomized trial of lifestyle intervention for cardiovascular risk reduction in the primary care setting: the Swedish Bjorknas study. *Plos One, 4*(4), e5195.

Fitzgibbon, M.L., Stolley, M.R., Schiffer, L., Sharp, L.K., Singh, V., & Dyer, A. (2010). Obesity reduction black intervention trial (ORBIT): 18-month results. *Obesity, 18*(12), 2317-2325.

Jeffery, R.W., Wing, R.R., Thorson, C., Burton, L.R., Raether, C., Harvey, J., & Mullen, M. (1993). Strengthening behavioral interventions for weight loss: a randomized trial of food provision and monetary incentives. *Journal of Consulting and Clinical Psychology, 61*(6), 1038-1045.

Kumanyika, S.K., Fassbender, J.E., Sarwer, D.B., Phipps, E., Allison, K.C., Localio, R., Morales, K.H., Wesby, L., Harralson, T., Kessler, R., Tan-Torres, S., Han, X., Tsai, A.G., & Wadden, T.A. (2012). One-year results of the Think Health! study of weight management in primary care practices.*Obesity, 20*(6), 1249-1257.

The Trials of Hypertension Collaborative Research Group (1997). Effects of Weight Loss and Sodium Reduction Intervention on Blood Pressure and Hypertension Incidence in Overweight People With High-Normal Blood Pressure. *Archives of Internal Medicine, 157*(6), 657-667.

Ross, R., Lam, M., Blair, S.N., Church, T.S., Godwin, M., Hotz, S.B., Johnson, A., Katzmarzyk, P.T., Levesque, L. & MacDonald, S. (2012). Trial of prevention and reduction of obesity through active living in clinical settings: a randomized controlled trial. *Archives of Internal Medicine, 172*(5), 414-424.

Silva, M.N., Vieira, P.N., Coutinho, S.R., Minderico, C.S., Matos, M.G., Sardinha, L.B., & Teixeira, P.J. (2010). Using self-determination theory to promote physical activity and weight control: a randomized controlled trial in women. *Journal of Behavioral Medicine, 33*(2), 110-122.

Vetter, M.L., Wadden, T.A., Chittams, J., Diewald, L.K., Panigrahi, E., Volger, S., Sarwer, D.B., & Moore, R.H.. (2013). Effect of lifestyle intervention on cardiometabolic risk factors: results of the POWER-UP trial. *International Journal of Obesity, 37*(1), 19-24.

Villareal, D.T., Shah, K., Banks, M.R., Sinacore, D.R., & Klein, S. (2008). Effect of weight loss and exercise therapy on bone metabolism and mass in obese older adults: a one-year randomized controlled trial. *The Journal of Clinical Endocrinology and Metabolism, 93*(6), 2181-2187.

Wadden, T.A., Volger, S., Sarwer, D.B., Vetter, M.L., Tsai, A.G., Berkowitz, R.I., Kumanyika, S., Schmitz, K.H., Diewald, L.K., Barg, R., Chittams, J., & Moore, R.H. (2011). A two-year randomized trial of obesity treatment in primary care practice. *The New England Journal of Medicine, 365*(21), 1969-1979.

Wood, P.D., Stefanick, M.L., Williams, P.T., & Haskell, W.L. (1991). The effects on plasma lipoproteins of a prudent weight-reducing diet, with or without exercise, in overweight men and women. *The New England Journal of Medicine, 325*(7), 461-466.

Woollard, J., Burke, V., Beilin, L.J., Verheijden, M., & Bulsara, M.K. (2003). Effects of a general practice-based intervention on diet, body mass index and blood lipids in patients at cardiovascular risk. *Journal of Cardiovascular Risk, 10*(1), 31-40.

Behavioral interventions to reduce obesity for adults: Remotely-delivered programs

Health Care: Obesity and Diabetes

Benefit-cost estimates updated May 2017. Literature review updated December 2014.

Program Description: Behavioral interventions for obesity include behavioral counseling, therapy, and educational components, and often include diet and exercise components as well. For this review of interventions for obese adults, we excluded studies that targeted diabetic populations as well as those aimed at preventing obesity.

Programs in this specific category are delivered to obese adults, and conducted remotely, usually via computer or phone.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$153	Benefit to cost ratio	$8.23
Participants	$285	Benefits minus costs	$689
Others	$92	Chance the program will produce benefits greater than the costs	54 %
Indirect	$255		
Total benefits	$784		
Net program cost	($95)		
Benefits minus cost	$689		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Labor market earnings associated with obesity	$272	$123	$0	$285	$681
Health care associated with obesity	$13	$30	$92	$17	$151
Adjustment for deadweight cost of program	$0	$0	$0	($48)	($48)
Totals	$285	$153	$92	$255	$784

[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.

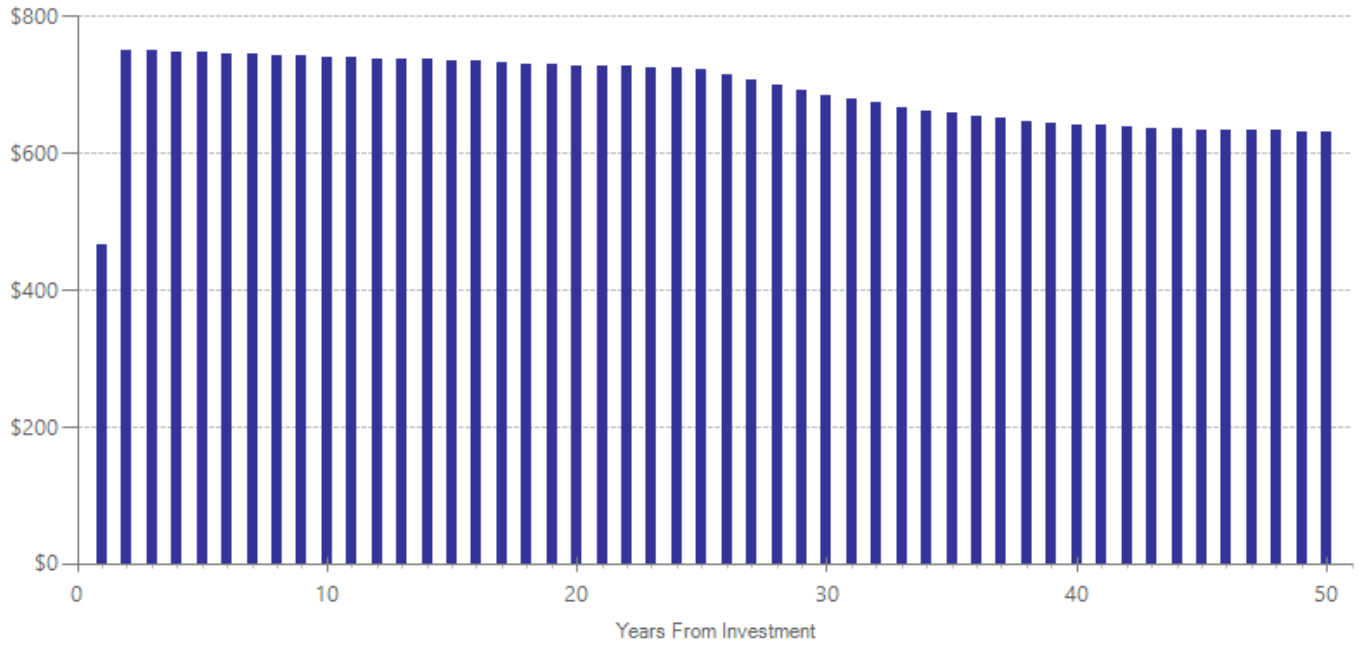
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$94	2014	Present value of net program costs (in 2016 dollars)	($95)
Comparison costs	$0	2014	Cost range (+ or -)	25 %

On average, these interventions occur over approximately 18 months. For programs that require intervention staff time, participants received an average of approximately 2.5 contact hours. The average per-participant cost of these programs was computed using contact hours and average Washington State 2014 hourly wages of the appropriate professionals who conducted the intervention (generally dietitians, nurses, general practitioners, or therapists). For the remote programs with "eHealth" technology (web or computer programs, automated phone programs), we estimated costs from the calculations of Ritzwoller, D.P. et al., (2013). Economic analyses of the Be Fit Be Well Program: A weight loss program for community health centers. *Journal of General Internal Medicine, 28*(12), 1581-1588.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Diastolic blood pressure^	5	627	-0.069	0.056	50	n/a	n/a	n/a	-0.069	0.219
Obesity	5	608	-0.139	0.057	50	0.000	0.086	52	-0.139	0.015
Systolic blood pressure^	5	627	-0.101	0.056	50	n/a	n/a	n/a	-0.101	0.073
Weight change	9	1092	-0.115	0.046	50	0.000	0.012	52	-0.115	0.013

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

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.

Citations Used in the Meta-Analysis

Appel, L.J., Clark, J.M., Yeh, H.C., Wang, N.Y., Coughlin, J.W., Daumit, G., Miller, E.R., Dalcin, A., Jerome, G., Geller, S., Noronha, G., Pozefsky, T., Charleston, J., Reynolds., Durkin, N., Rubin, R., Louis, T.A., & Brancati, F.L. (2011). Comparative effectiveness of weight-loss interventions in clinical practice. *The New England Journal of Medicine, 365*(21), 1959-1968.

Bennett, G.G., Herring, S.J., Puleo, E., Stein, E.K., Emmons, K.M., & Gillman, M.W. (2010). Web-based weight loss in primary care: a randomized controlled trial. *Obesity (silver Spring, Md.), 18*(2), 308-313.

Bennett, G.G., Warner, E.T., Glasgow, R.E., Askew, S., Goldman, J., Ritzwoller, D.P., Emmons, K.M., ... Be Fit, Be Well Study Investigators. (2012). Obesity treatment for socioeconomically disadvantaged patients in primary care practice. *Archives of Internal Medicine, 172*(7), 565-574.

Bennett, G.G., Foley, P., Levine, E., Whiteley, J., Askew, S., Steinberg, D.M., Batch, B., Greaney, M.L., Miranda, H., Wroth, T.H., Holder, M.G., Emmons, K.M., & Puleo, E. (2013). Behavioral treatment for weight gain prevention among black women in primary care practice. *JAMA Internal Medicine, 173*(19), 1770-1777.

Haapala, I., Barengo, N.C., Biggs, S., Surakka, L., & Manninen, P. (2009). Weight loss by mobile phone: a 1-year effectiveness study. *Public Health Nutrition, 12*(12), 2382-2391.

Logue, E., Sutton, K., Jarjoura, D., Smucker, W., Baughman, K., & Capers, C. (2005). Transtheoretical model-chronic disease care for obesity in primary care: a randomized trial. *Obesity Research, 13*(5), 917-927.

Tate, D.F., Wing, R.R., & Winett, R.A. (2001). Using Internet technology to deliver a behavioral weight loss program. *JAMA, 285*(9), 1172-1177.

Tate, D.F., Jackvony, E.H., & Wing, R.R. (2006). A randomized trial comparing human e-mail counseling, computer-automated tailored counseling, and no counseling in an Internet weight loss program. *Archives of Internal Medicine, 166*(15), 1620-1625.

Werkman, A., Hulshof, P.J.M., Stafleu, A., Kremers, S.P.J., Kok, F.J., Schouten, E.G., & Schuit, A.J. (2010). Effect of an individually tailored one-year energy balance programme on body weight, body composition and lifestyle in recent retirees: a cluster randomised controlled trial. *BMC Public Health, 10*(1).

Behavioral interventions to reduce obesity for adults: Low-intensity, in-person programs

Health Care: Obesity and Diabetes

Benefit-cost estimates updated May 2017. Literature review updated December 2014.

Program Description: Behavioral interventions for obesity include behavioral counseling, therapy, and educational components—often including diet and exercise components. For this review of interventions for obese adults, we excluded studies that targeted diabetic populations as well as those aimed at preventing obesity.

Programs in this specific category are delivered to obese adults, and conducted face-to-face, with fewer than 12 sessions a year or for less than 12 months.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$48	Benefit to cost ratio	$0.86
Participants	$83	Benefits minus costs	($26)
Others	$28	Chance the program will produce benefits greater than the costs	46 %
Indirect	($1)		
Total benefits	$158		
Net program cost	($185)		
Benefits minus cost	($26)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Labor market earnings associated with obesity	$77	$35	$0	$85	$197
Health care associated with obesity	$6	$13	$28	$7	$54
Adjustment for deadweight cost of program	$0	$0	$0	($93)	($93)
Totals	$83	$48	$28	($1)	$158

[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.

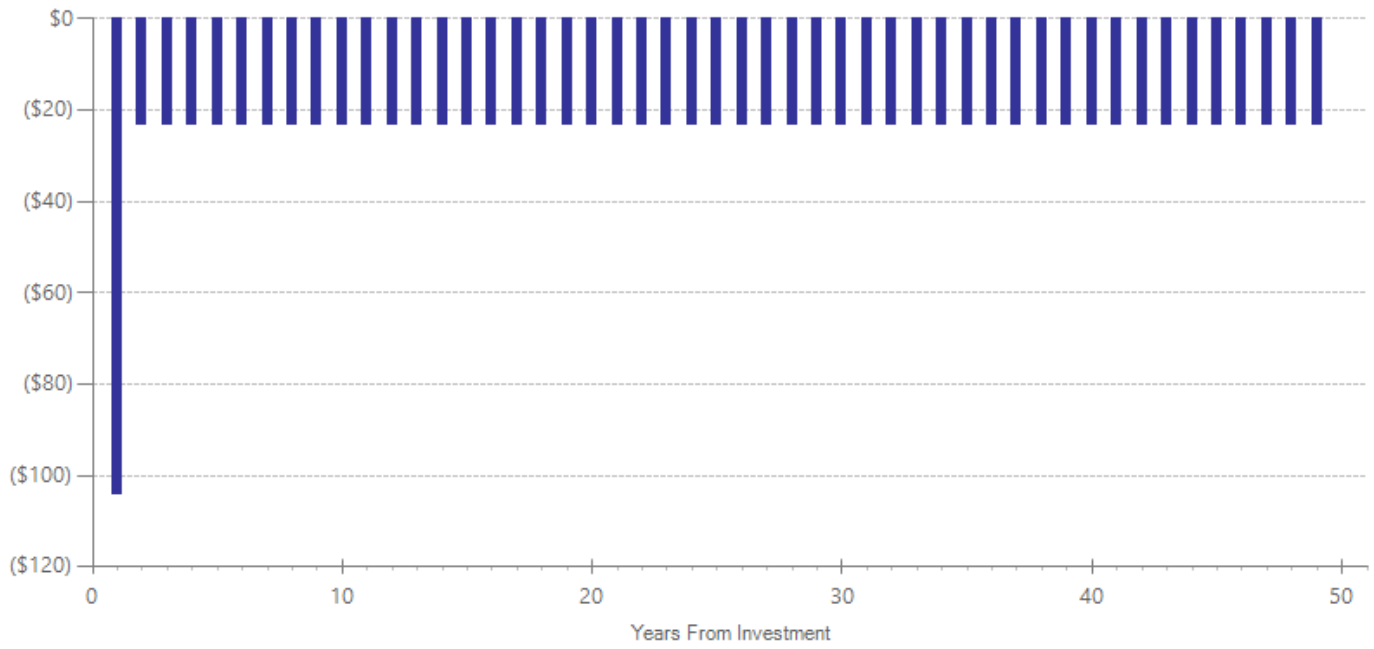
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$182	2014	Present value of net program costs (in 2016 dollars)	($185)
Comparison costs	$0	2014	Cost range (+ or -)	25 %

On average, these programs provide approximately six contact hours over seven months, including both group and individual sessions. The average per-participant cost of these programs was computed using contact hours and average Washington State 2014 hourly wages of the appropriate professionals who conducted the intervention (generally dietitians, nurses, general practitioners, or therapists).

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Diastolic blood pressure^	6	697	-0.146	0.073	51	n/a	n/a	n/a	-0.146	0.047
HDL cholesterol^	4	474	0.069	0.181	51	n/a	n/a	n/a	0.069	0.705
LDL cholesterol^	4	474	-0.205	0.100	51	n/a	n/a	n/a	-0.205	0.041
Obesity	4	554	-0.040	0.079	51	0.000	0.086	53	-0.040	0.610
Systolic blood pressure^	6	697	-0.112	0.078	51	n/a	n/a	n/a	-0.112	0.154
Weight change	10	1004	-0.084	0.057	51	0.000	0.012	53	-0.084	0.138

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

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.

Citations Used in the Meta-Analysis

Cooper, Z., Doll, H.A., Hawker, D.M., Byrne, S., Bonner, G., Eeley, E., O'Connor, M.E., & Fairburn, C.G. (2010). Testing a new cognitive behavioural treatment for obesity: A randomized controlled trial with three-year follow-up. *Behaviour Research and Therapy, 48*(2010), 706-713

Davis, M.P., Rhode, P.C., Dutton, G.R., Redmann, S.M., Ryan, D.H., & Brantley, P J. (2006). A primary care weight management intervention for low-income African-American women. *Obesity, 14*(8), 1412-1420.

Hardcastle, S., Taylor, A., Bailey, M., & Castle, R. (2008). A randomised controlled trial on the effectiveness of a primary health care based counselling intervention on physical activity, diet and CHD risk factors. *Patient Education and Counseling, 70*(1), 31-39.

Jolly, K., Lewis, A., Beach, J., Denley, J., Adab, P., Deeks, J.J., Daley, A., & Aveyard, P. (2011). Comparison of range of commercial or primary care led weight reduction programmes with minimal intervention control for weight loss in obesity: Lighten Up randomised controlled trial. *BMJ,* 343.

Miller, E.R. ., Erlinger, T.P., Young, D.R., Jehn, M., Charleston, J., Rhodes, D., Wasan, S.K., & Appel, L.J. (2002). Results of the Diet, Exercise, and Weight Loss Intervention Trial (DEW-IT). *Hypertension, 40*(5), 612-618.

Nanchahal, K., Power, T., Holdsworth, E., Hession, M., Sorhaindo, A., Griffiths, U., Townsend, J., Thorogood, N., Haslam, D., Kessel, A., Ebrahim, S., Kenward, M., & Haines, A. (2012). A pragmatic randomised controlled trial in primary care of the Camden Weight Loss (CAMWEL) programme. *BMJ, 2*(3).

Sniehotta, F.F., Dombrowski, S.U., Avenell, A., Johnston, M., McDonald, S., Murchie, P., Ramsay, C.R., Robertson, K., & Araujo-Soares, V. (2011). Randomised controlled feasibility trial of an evidence-informed behavioural intervention for obese adults with additional risk factors. *PloS One, 6*(8).

ter Bogt, N.C., Bemelmans, W.J., Beltman, F.W., Broer, J., Smit, A.J., & van der Meer, K. (2009). Preventing weight gain: one-year results of a randomized lifestyle intervention. *American Journal of Preventive Medicine, 37*(4), 270-277.

Tsai, A.G., Wadden, T.A., Rogers, M.A., Day, S.C., Moore, R.H., & Islam, B.J. (2010). A primary care intervention for weight loss: results of a randomized controlled pilot study. *Obesity, 18*(8), 1614-1618.

Yardley, L., Ware, L.J., Smith, E.R., Williams, S., Bradbury, K.J., Arden-Close, E.J., Mullee, M.A., Moore, M.V., Peacock, J.L., Lean, M.E.J., Margetts, B.M., Byrne, C.D., Hobbs, R.F.D., & Little, P. (2014). Randomised controlled feasibility trial of a web-based weight management intervention with nurse support for obese patients in primary care. *The International Journal of Behavioral Nutrition and Physical Activity, 11*(67), 1-11.

Behavioral interventions to reduce obesity for children: Remotely-delivered programs

Health Care: Obesity and Diabetes

Benefit-cost estimates updated May 2017. Literature review updated December 2014.

Program Description: The behavioral interventions included in this analysis target obese and overweight youth under age 18, providing them with counseling, education, and other supports to improve diet, increase physical activity, and reduce weight. The programs use techniques designed to promote and sustain behavioral changes, including goal setting, self-monitoring, stimulus control, and other strategies. The programs in this category provided were delivered remotely, usually via computer or phone.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$10	Benefit to cost ratio	$0.47
Participants	$2	Benefits minus costs	($34)
Others	$28	Chance the program will produce benefits greater than the costs	49 %
Indirect	($8)		
Total benefits	$31		
Net program cost	($65)		
Benefits minus cost	($34)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Labor market earnings associated with obesity	($3)	($2)	$0	$19	$15
Health care associated with obesity	$5	$11	$28	$5	$49
Adjustment for deadweight cost of program	$0	$0	$0	($33)	($33)
Totals	$2	$10	$28	($8)	$31

[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.

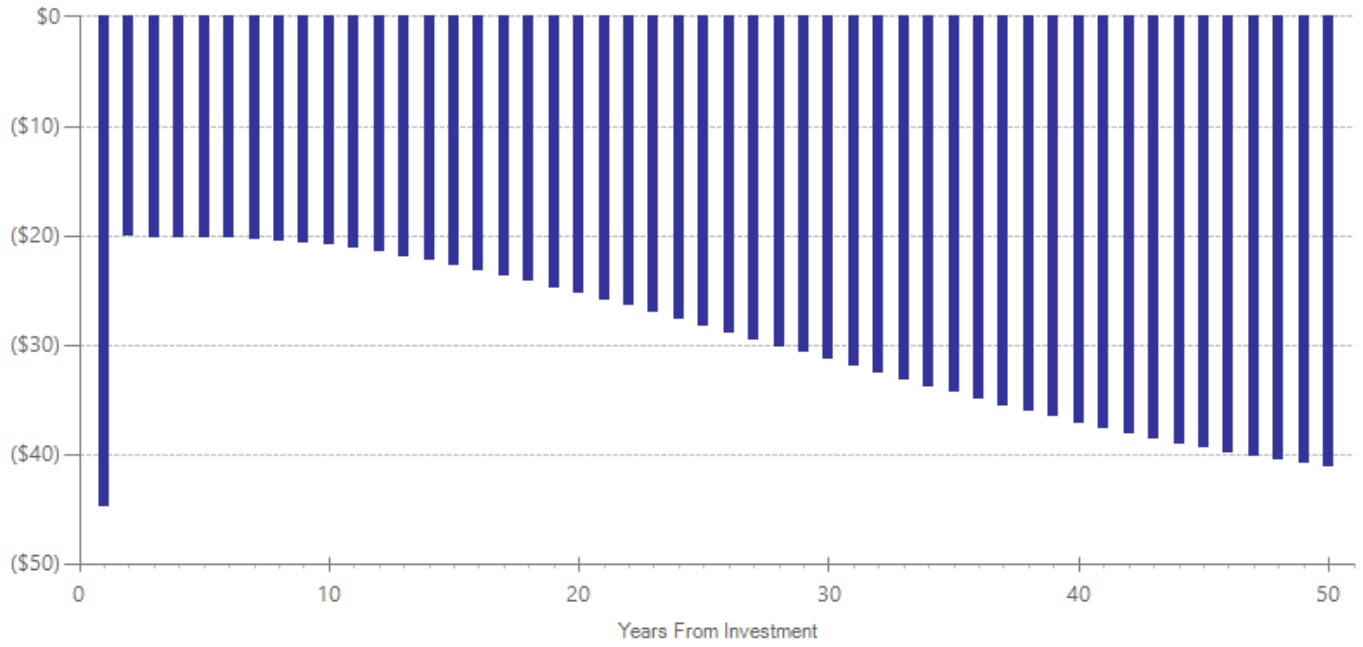
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$64	2014	Present value of net program costs (in 2016 dollars)	($65)
Comparison costs	$0	2014	Cost range (+ or -)	25 %

On average, these interventions occur over approximately four months. For programs that require intervention staff time, participants received an average of approximately four contact hours. The average per-participant cost of these programs was computed using contact hours and average Washington State 2014 hourly wages of the appropriate professionals who conducted the intervention (generally dietitians, nurses, general practitioners, or therapists). For the remote programs with "eHealth" technology (web or computer programs, automated phone programs), we estimate costs from the calculations of Ritzwoller, D.P. et al., (2013). Economic analyses of the Be Fit Be Well Program: A weight loss program for community health centers. *Journal of General Internal Medicine, 28*(12), 1581-1588.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Obesity	4	142	-0.151	0.131	12	0.000	0.101	14	-0.151	0.249
Weight change	3	74	-0.117	0.178	12	0.000	0.070	14	-0.117	0.510

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.

Citations Used in the Meta-Analysis

Doyle, A. C., Goldschmidt, A., Huang, C., Winzelberg, A. J., Taylor, C. B., & Wilfley, D. E. (2008). Reduction of Overweight and Eating Disorder Symptoms via the Internet in Adolescents: A Randomized Controlled Trial. *Journal of Adolescent Health, 43*(2), 172-179.

Estabrooks, P.A., Shoup, J.A., Gattshall, M., Dandamudi, P., Shetterly, S., & Xu, S. (2009). Automated telephone counseling for parents of overweight children: a randomized controlled trial. *American Journal of Preventive Medicine, 36*(1), 35-42.

Saelens, B.E., Sallis, J.F., Wilfley, D.E., Patrick, K., Cella, J.A., & Buchta, R. (2002). Behavioral weight control for overweight adolescents initiated in primary care.*Obesity Research, 10*(1), 22-32.

Wright, J.A., Phillips, B.D., Watson, B.L., Newby, P.K., Norman, G.J., & Adams, W.G. (2013). Randomized trial of a family-based, automated, conversational obesity treatment program for underserved populations. *Obesity, 21*(9), E369-E378.

Behavioral interventions to reduce obesity for children: Low-intensity, in-person programs

Health Care: Obesity and Diabetes

Benefit-cost estimates updated May 2017. Literature review updated December 2014.

Program Description: The behavioral interventions included in this analysis target obese and overweight youth under age 18, providing them with counseling, education, and other supports to improve diet, increase physical activity, and reduce weight. The programs use techniques designed to promote and sustain behavioral changes, including goal setting, self-monitoring, stimulus control, and other strategies.

The programs in this specific category provided less than 25 hours of face-to-face intervention.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$4	Benefit to cost ratio	($0.30)
Participants	($6)	Benefits minus costs	($215)
Others	$23	Chance the program will produce benefits greater than the costs	46 %
Indirect	($70)		
Total benefits	($50)		
Net program cost	($165)		
Benefits minus cost	($215)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Labor market earnings associated with obesity	($10)	($5)	$0	$10	($5)
Health care associated with obesity	$4	$8	$23	$3	$38
Adjustment for deadweight cost of program	$0	$0	$0	($83)	($83)
Totals	($6)	$4	$23	($70)	($50)

[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.

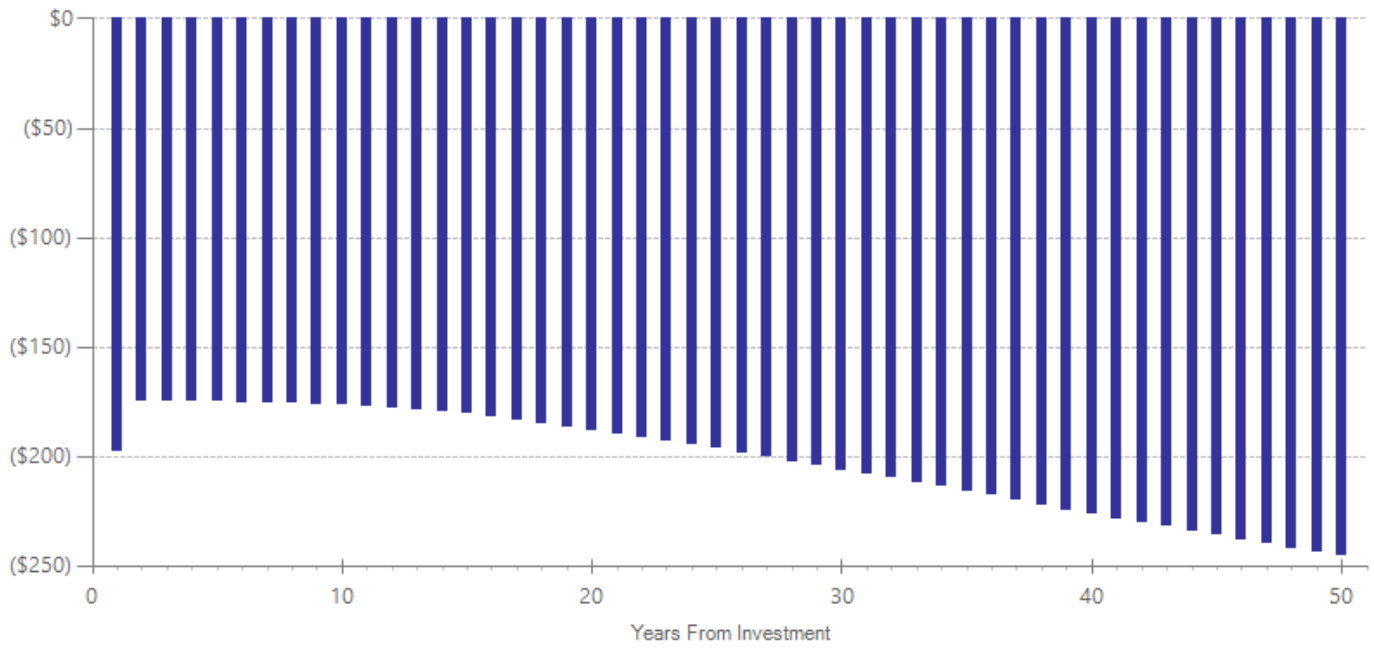
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$162	2014	Present value of net program costs (in 2016 dollars)	($165)
Comparison costs	$0	2014	Cost range (+ or -)	25 %

On average, these programs provide approximately nine contact hours over six months, including both group and individual sessions. The average per-participant cost of these programs was computed using contact hours and average Washington State 2014 hourly wages of the appropriate professionals who conducted the intervention (generally dietitians, nurses, general practitioners, or therapists).

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Obesity	12	778	-0.148	0.054	10	0.000	0.101	12	-0.148	0.006
Weight change	4	94	-0.201	0.143	10	0.000	0.070	12	-0.201	0.160

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.

Citations Used in the Meta-Analysis

Balagopal, P., George, D., Yarandi, H., Funanage, V., & Bayne, E. (2005). Reversal of obesity-related hypoadiponectinemia by lifestyle intervention: a controlled, randomized study in obese adolescents. *The Journal of Clinical Endocrinology and Metabolism, 90*(11), 6192-7.

Danielsen, Y.S., Hordhus, I.H., Juliusson, P.B., Maehle, M., & Pallesen, S. (2013). Effect of a family-based cognitive behavioural intervention on body mass index, self-esteem and symptoms of depression in children with obesity (aged 7-13): A randomised waiting list controlled trial. *Obesity Research and Clinical Practice, 7*(16), e116-e128.

Epstein, L.H., Roemmich, J.N., Robinson, J.L., Paluch, R.A., Winiewicz, D.D., Fuerch, J.H., & Robinson, T.N. (2008). A randomized trial of the effects of reducing television viewing and computer use on body mass index in young children. *Archives of Pediatrics & Adolescent Medicine, 162*(3), 239-45.

Flodmark, C., Ohlsson, T., Rydén, O., & Sveger, T. (1993). Prevention of progression to severe obesity in a group of obese schoolchildren treated with family therapy. *Pediatrics, 91*(5), 880-884.

Golley, R.K., Magarey, A.M., Baur, L.A., Steinbeck, K.S., & Daniels, L.A. (2007). Twelve-month effectiveness of a parent-led, family-focused weight-management program for prepubertal children: a randomized, controlled trial. *Pediatrics, 119*(3), 517-525.

Janicke, D.M., Sallinen, B.J., Perri, M.G., Lutes, L.D., Huerta, M., Silverstein, J.H., & Brumback, B. (2008). Comparison of parent-only vs family-based interventions for overweight children in underserved rural settings: outcomes from project STORY. *Archives of Pediatrics & Adolescent Medicine, 162*(12), 1119-1125.

Kitzman-Ulrich, H., Hampson, R., Wilson, D.K., Presnell, K., Brown, A., & O'Boyle, M. (2009). An adolescent weight-loss program integrating family variables reduces energy intake. *Journal of the American Dietetic Association, 109*(3), 491-6.

Marild, S., Gronowitz, E., Forsell, C., Dahlgren, J., & Friberg, P. (2013). A controlled study of lifestyle treatment in primary care for children with obesity. *Pediatric Obesity, 8*(3), 207-217.

McCallum, Z., Wake, M., Gerner, B., Baur, L. A., Gibbons, K., Gold, L. ... Waters, E. (2007). Outcome data from the LEAP (Live, Eat and Play) trial: A randomized controlled trial of a primary care intervention for childhood overweight/mild obesity. *International Journal of Obesity, 31,* 630-636.

O'Connor, T.M., Hilmers, A., Watson, K., Baranowski, T., & Giardino, A.P. (2013). Feasibility of an obesity intervention for paediatric primary care targeting parenting and children: Helping HAND. *Child: Care, Health and Development, 39*(1), 141-149.

Rocchini, A.P., Katch, V., Anderson, J., Hinderliter, J., Becque, D., Martin, M., & Marks, C. (1988). Blood pressure in obese adolescents: effect of weight loss. *Pediatrics, 82*(1), 16-23.

Senediak, C., & Spence, S. H. (1985). Rapid versus gradual scheduling of therapeutic contact in a family based behavioural weight control programme for children. *Behavioural Psychotherapy, 13*, 265-287.

Taveras, E.M., Gortmaker, S.L., Hohman, K.H., Horan, C.M., Kleinman, K.P., Mitchell, K., Price, S., ... Gillman, M.W. (2011). Randomized controlled trial to improve primary care to prevent and manage childhood obesity: the High Five for Kids study. *Archives of Pediatrics & Adolescent Medicine, 165*(8), 714-22.

Wake, M. B., Baur, L.A., Gerner, B., Gibbons, K. Gold, L., Gunn, J., ... Ukoumunne, O.C. (2009). Outcomes and costs of primary care surveillance and intervention for overweight or obese children: The LEAP 2 randomised controlled trial. *BMJ,* 339:b3308, doi. 10.1136/bmj.b3308.

West, F., Sanders, M. R., Cleghorn, G. J., & Davies, P. S. W. (2010). Randomised clinical trial of a family-based lifestyle intervention for childhood obesity involving parents as the exclusive agents of change. *Behaviour Research and Therapy, 48*(12), 1170-1179.

Behavioral interventions to reduce obesity for children: Moderate- to high-intensity, face-to-face programs

Health Care: Obesity and Diabetes

Benefit-cost estimates updated May 2017. Literature review updated December 2014.

Program Description: The behavioral interventions included in this analysis target obese and overweight youth under age 18, providing them with counseling, education, and other supports to improve diet, increase physical activity, and reduce weight. The programs use techniques designed to promote and sustain behavioral changes, including goal setting, self-monitoring, stimulus control, and other strategies.

The programs in this specific category provided at least 25 hours of face-to-face intervention.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$35	Benefit to cost ratio	$0.08
Participants	$19	Benefits minus costs	($306)
Others	$72	Chance the program will produce benefits greater than the costs	46 %
Indirect	($99)		
Total benefits	$27		
Net program cost	($333)		
Benefits minus cost	($306)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Labor market earnings associated with obesity	$5	$2	$0	$50	$56
Health care associated with obesity	$15	$33	$72	$16	$136
Adjustment for deadweight cost of program	$0	$0	$0	($165)	($165)
Totals	$19	$35	$72	($99)	$27

[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.

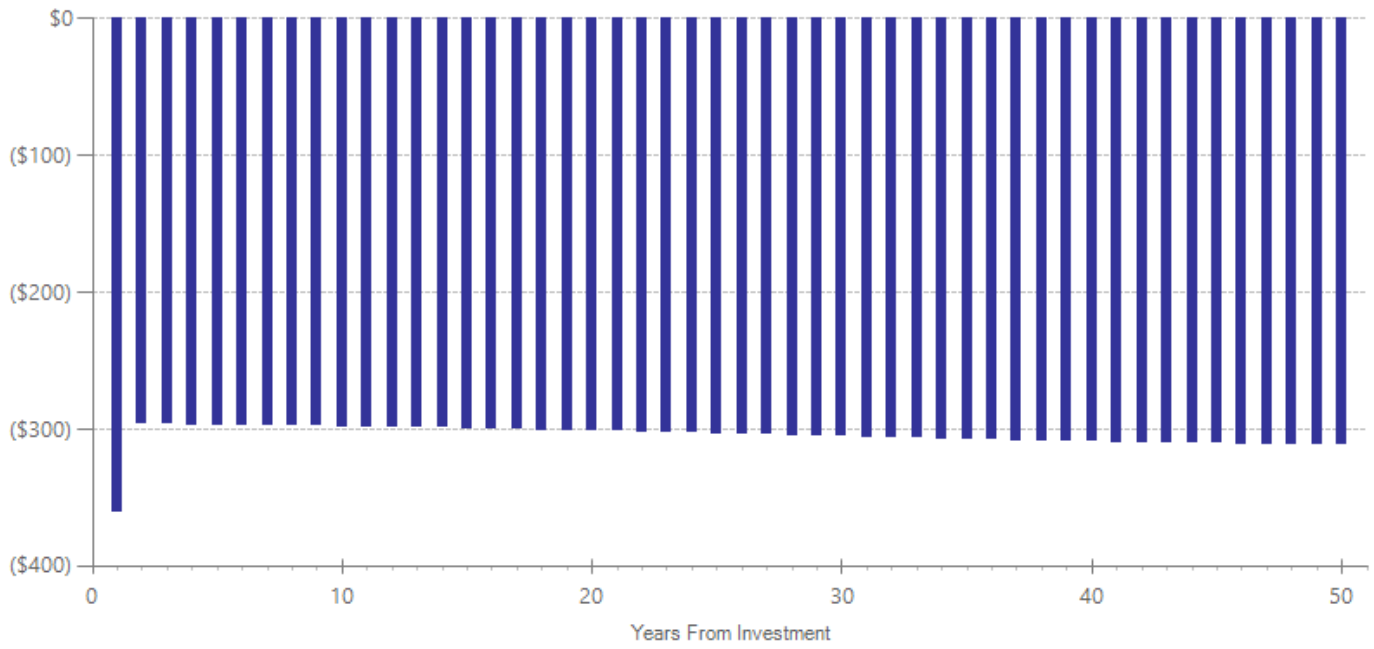
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$328	2014	Present value of net program costs (in 2016 dollars)	($333)
Comparison costs	$0	2014	Cost range (+ or -)	25 %

On average, these programs provide approximately 48 contact hours over six months, including both group and individual sessions. The average per-participant cost of these programs was computed using contact hours and average Washington State 2014 hourly wages of the appropriate professionals who conducted the intervention (generally dietitians, nurses, general practitioners, or therapists).

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Obesity	14	638	-0.378	0.087	12	0.000	0.101	14	-0.378	0.001
Weight change	11	493	-0.206	0.070	12	0.000	0.070	14	-0.206	0.003

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.

Citations Used in the Meta-Analysis

Bocca, G., Corpeleijn, E., Stolk, R.P., & Sauer, P.J. (2012). Results of a multidisciplinary treatment program in 3-year-old to 5-year-old overweight or obese children: a randomized controlled clinical trial. *Archives of Pediatrics & Adolescent Medicine, 166*(12), 1109-15.

Davis, J. N., Tung, A., Chak, S. S., Ventura, E. E., Byrd-Williams, C. E., Alexander, K. E. et al. (2009). Aerobic and strength training reduces adiposity in overweight latina adolescents. *Medicine and Science in Sports and Exercise, 41,* 1494-1503.

DeBar, L.L., Stevens, V.J., Perrin, N., Wu, P., Pearson, J., Yarborough, B.J., Dickerson, J., & Lynch, F. (2012). A primary care-based, multicomponent lifestyle intervention for overweight adolescent females. *Pediatrics, 129*(3), 611-20.

Diaz, R.G., Esparza-Romero, J., Moya-Camarena, S.Y., Robles-Sardin, A.E., & Valencia, M.E. (2010). Lifestyle intervention in primary care settings improves obesity parameters among Mexican youth. *Journal of the American Dietetic Association, 110*(2), 285-90.

Ford, A.L., Bergh, C., Sodersten, P., Sabin, M.A., Hollinghurst, S., Hunt, L.P., & Shield, J.P. (2010). Treatment of childhood obesity by retraining eating behaviour: A randomised controlled trial. *BMJ,* doi: 10.1136/bmjb5388..

Israel, A.C., Stolmaker, L., & Andrian, C.A.G. (1985). The effects of training parents in general child management skills on a behavioral weight loss program for children. *Behavior Therapy, 16*(2), 169-180.

Janicke, D.M., Sallinen, B.J., Perri, M.G., Lutes, L.D., Huerta, M., Silverstein, J.H., & Brumback, B. (2008). Comparison of parent-only vs family-based interventions for overweight children in underserved rural settings: outcomes from project STORY. *Archives of Pediatrics & Adolescent Medicine, 162*(12), 1119-1125.

Kalarchian, M.A., Levine, M.D., Arslanian, S.A., Ewing, L.J., Houck, P.R., Cheng, Y., Ringham, R.M., … Marcus, M.D. (2009). Family-based treatment of severe pediatric obesity: randomized, controlled trial. *Pediatrics, 124*(4), 1060-1068.

Kalavainen, M.P., Korppi, M.O., & Nuutinen, O.M. (2007). Clinical efficacy of group-based treatment for childhood obesity compared with routinely given individual counseling. *International Journal of Obesity, 31*(10), 1500-8.

Nemet, D., Barkan, S., Epstein, Y., Friedland, O., Kowen, G., & Eliakim, A. (2005). Short- and long-term beneficial effects of a combined dietary-behavioral-physical activity intervention for the treatment of childhood obesity. *Pediatrics, 115*(4), 443-9.

Nemet, D., Barzilay-Teeni, N., & Eliakim, A. (2008). Treatment of childhood obesity in obese families. *Journal of Pediatric Endocrinology & Metabolism, 21*(5), 461-7.

Reinehr, T., Schaefer, A., Winkel, K., Finne, E., Toschke, A.M., & Kolip, P. (2010). An effective lifestyle intervention in overweight children: findings from a randomized controlled trial on "Obeldicks light." *Clinical Nutrition, 29*(3), 331-6.

Rocchini, A.P., Katch, V., Anderson, J., Hinderliter, J., Becque, D., Martin, M., & Marks, C. (1988). Blood pressure in obese adolescents: effect of weight loss. *Pediatrics, 82*(1), 16-23.

Sacher, P.M., Kolotourou, M., Chadwick, P.M., Cole, T.J., Lawson, M.S., Lucas, A. et al. (2010). Randomized controlled trial of the MEND program: A family-based community intervention for childhood obesity. *Obesity, 18*, S62-S68.

Savoye, M., Shaw, M., Dziura, J., Tamborlane, W.V., Rose, P., Guandalini, C., Goldberg-Gell, R., … Caprio, S. (2007). Effects of a weight management program on body composition and metabolic parameters in overweight children: A randomized controlled trial. *JAMA: The Journal of the American Medical Association, 297*(24), 2697-2704.

Weigel, C., Kokocinski, K., Lederer, P., Dotsch, J., Rascher, W., & Knerr, I. (2008). Childhood obesity: Concept, feasibility, and interim results of a local group-based, long-term treatment program. *Journal of Nutrition Education and Behavior, 40*(6), 369-373.

Transitional care programs to prevent hospital readmissions: Comprehensive programs

Health Care: Health Care System Efficiency

Benefit-cost estimates updated May 2017. Literature review updated December 2014.

Program Description: Comprehensive transitional care programs focus on preventing future hospital readmissions after discharge. Interventions include pre-discharge assistance (e.g., a transition coach, enhanced discharge planning, and primary care provider communication), as well as post-discharge follow-up.

The effects in this analysis reflect the effects of comprehensive transitional care programs on high-risk patient populations.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$834	Benefit to cost ratio	$4.32
Participants	$47	Benefits minus costs	$1,390
Others	$720	Chance the program will produce benefits greater than the costs	100 %
Indirect	$208		
Total benefits	$1,809		
Net program cost	($419)		
Benefits minus cost	$1,390		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with hospital readmissions	$47	$834	$720	$417	$2,018
Adjustment for deadweight cost of program	$0	$0	$0	($209)	($209)
Totals	$47	$834	$720	$208	$1,809

[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.

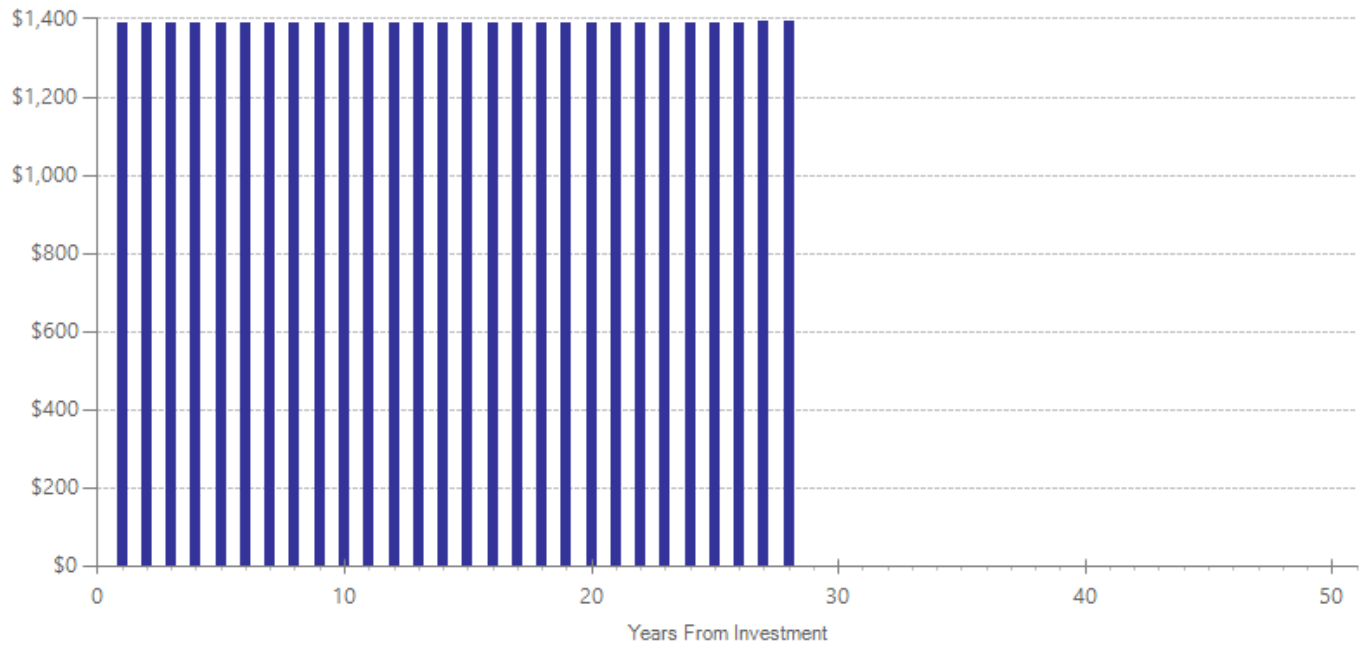
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$413	2014	Present value of net program costs (in 2016 dollars)	($419)
Comparison costs	$0	2014	Cost range (+ or -)	37 %

We estimated an average per-participant cost by computing an average of the typical costs reported in each study in our analysis. These costs include the salary of the nurse practitioner (main cost), cell phone and pager costs, mileage expenses, and costs for the reproduction of personal health record. When a study reported nursing staff hours, we estimated nursing costs by applying the most recent reported average wages reported in Washington State.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Hospital readmissions	11	1597	-0.289	0.061	72	0.000	0.000	73	-0.289	0.001

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.

Citations Used in the Meta-Analysis

Balaban, R.B., Weissman, J.S., Samuel, P.A., & Woolhandler, S. (2008). Redefining and redesigning hospital discharge to enhance patient care: a randomized controlled study. *Journal of General Internal Medicine, 23*(8), 1228-33.

Coleman, E.A., Parry, C., Chalmers, S., & Min, S.J. (2006). The care transitions intervention: results of a randomized controlled trial. *Archives of Internal Medicine, 166*(17), 1822-8.

Coleman, E.A., Smith, J.D., Frank, J.C., Min, S.-J., Parry, C., & Kramer, A.M. (2004). Preparing Patients and Caregivers to Participate in Care Delivered Across Settings: The Care Transitions Intervention. *Journal of the American Geriatrics Society, 52*(11), 1817-1825.

Jack, B.W., Chetty, V.K., Anthony, D., Greenwald, J.L., Sanchez, G.M., Johnson, A.E., Forsythe, S.R., ... Culpepper, L. (2009). A reengineered hospital discharge program to decrease rehospitalization: a randomized trial. *Annals of Internal Medicine, 150*(3), 178-87.

Laramee, A.S., Levinsky, S.K., Sargent, J., Ross, R., & Callas, P. (2003). Case management in a heterogeneous congestive heart failure population: a randomized controlled trial. *Archives of Internal Medicine, 163*(7), 809-17.

Naylor, M., Brooten, D., Jones, R., Lavizzo-Mourey, R., Mezey, M., & Pauly, M. (1994). Comprehensive discharge planning for the hospitalized elderlya randomized clinical trial. *Annals of internal Medicine, 120*(12), 999-1006.

Naylor, M.D., Brooten, D.A., Campbell, R.L., Maislin, G., McCauley, K.M., & Schwartz, J.S. (2004). Transitional Care of Older Adults Hospitalized with Heart Failure: A Randomized, Controlled Trial. *Journal of the American Geriatrics Society, 52*(5), 675-684.

Parry, C., Min, S.J., Chugh, A., Chalmers, S., & Coleman, E.A. (2009). Further application of the care transitions intervention: results of a randomized controlled trial conducted in a fee-for-service setting. *Home Health Care Services Quarterly, 28*, 2-3.

Rich, M.W., Vinson, J.M., Sperry, J.C., Shah, A.S., Spinner, L.R., Chung, M.K., & Davila-Roman, V. (1993). Prevention of readmission in elderly patients with congestive heart failure: results of a prospective, randomized pilot study. *Journal of General Internal Medicine, 8*(11), 585-90.

Rich, M.W., Beckham, V., Wittenberg, C., Leven, C.L., Freedland, K.E., & Carney, R.M. (1995). A Multidisciplinary Intervention to Prevent the Readmission of Elderly Patients with Congestive Heart Failure. *New England Journal of Medicine, 333*(18), 1190-1195.

Transitional care programs to prevent hospital readmissions: All programs, general patient populations

Health Care: Health Care System Efficiency

Benefit-cost estimates updated May 2017. Literature review updated December 2014.

Program Description: Transitional care programs focus on preventing future hospital readmissions after discharge. The programs may include coaches, patient education, medication reconciliation, individualized discharge planning, enhanced provider communication, and patient follow-up after discharge.

The effects in this analysis reflect the effects of all reviewed transitional care programs on general patient populations.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$189	Benefit to cost ratio	$8.34
Participants	$11	Benefits minus costs	$380
Others	$163	Chance the program will produce benefits greater than the costs	88 %
Indirect	$68		
Total benefits	$431		
Net program cost	($52)		
Benefits minus cost	$380		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with hospital readmissions	$11	$189	$163	$94	$457
Adjustment for deadweight cost of program	$0	$0	$0	($26)	($26)
Totals	$11	$189	$163	$68	$431

[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.

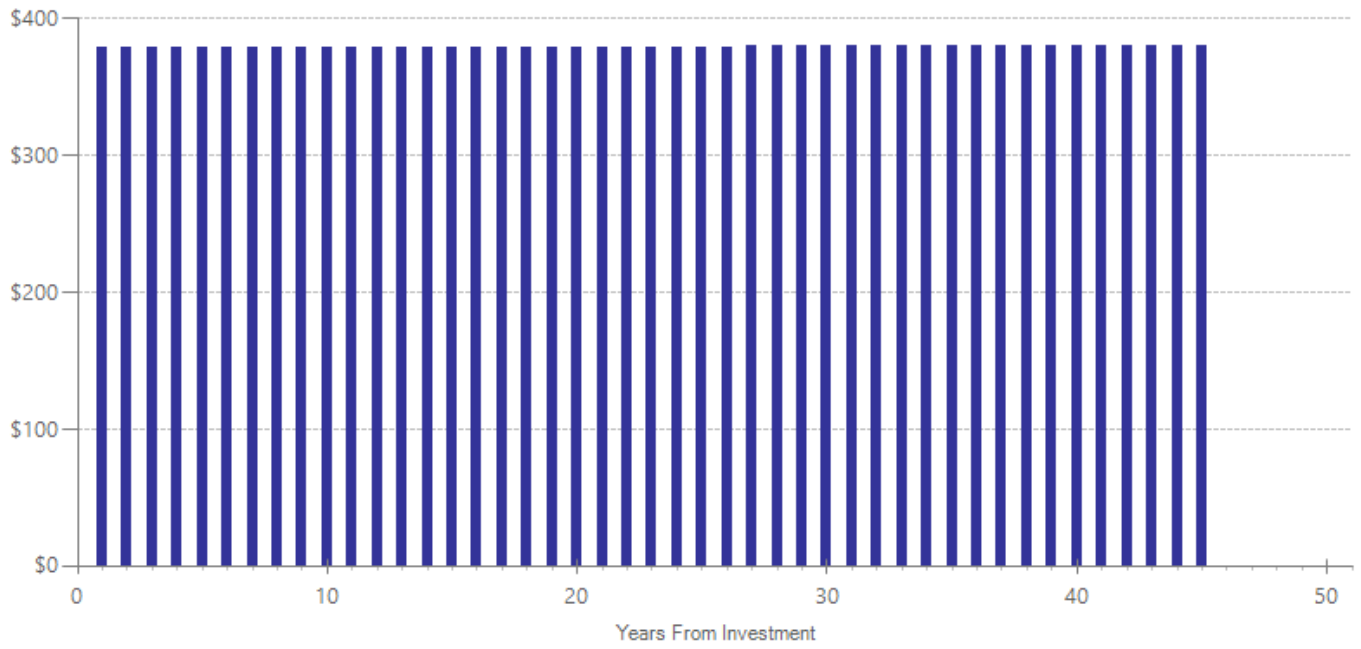
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$51	2014	Present value of net program costs (in 2016 dollars)	($52)
Comparison costs	$0	2014	Cost range (+ or -)	39 %

We estimated an average per-participant cost by computing an average of the typical costs reported in each study in our analysis. These costs include the salary of the nurse practitioner (main cost), cell phone and pager costs, mileage expenses, and costs for the reproduction of personal health record. When a study reported nursing staff hours, we estimated nursing costs by applying the most recent reported average wages reported in Washington State.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Hospital readmissions	4	972	-0.155	0.107	55	0.000	0.000	56	-0.115	0.147

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.

Citations Used in the Meta-Analysis

Balaban, R.B., Weissman, J.S., Samuel, P.A., & Woolhandler, S. (2008). Redefining and redesigning hospital discharge to enhance patient care: a randomized controlled study. *Journal of General Internal Medicine, 23*(8), 1228-33.

Bostrom, J., Caldwell, J., McGuire, K., & Everson, D. (1996). Telephone follow-up after discharge from the hospital: does it make a difference? *Applied Nursing Research: ANR, 9*(2), 47-52.

Dudas, V., Bookwalter, T., Kerr, K.M., & Pantilat, S.Z. (2001). The impact of follow-up telephone calls to patients after hospitalization. *The American Journal of Medicine, 9*(111), 26-30.

Jack, B.W., Chetty, V.K., Anthony, D., Greenwald, J.L., Sanchez, G.M., Johnson, A.E., Forsythe, S.R., ... Culpepper, L. (2009). A reengineered hospital discharge program to decrease rehospitalization: a randomized trial. *Annals of Internal Medicine, 150*(3), 178-87.

Patient-centered medical homes in physician-led practices without explicit utilization or cost incentives (high-risk populations)

Health Care: Health Care System Efficiency

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: The patient-centered medical home (PCMH) model attempts to make health care more efficient by implementing a set of changes to primary care. Medical homes are designed to provide comprehensive care, treating both acute needs and promoting population health. The medical home model emphasizes care coordination across providers, patient engagement, evidence-based care, use of health information technology, and enhanced patient access.

This category includes PCMH programs we reviewed that were implemented in physician-led practices. These results are for chronically ill or older patients.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$75	Benefit to cost ratio	$1.80
Participants	$24	Benefits minus costs	$66
Others	$92	Chance the program will produce benefits greater than the costs	45 %
Indirect	($42)		
Total benefits	$149		
Net program cost	($83)		
Benefits minus cost	$66		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care (total costs)	$24	$75	$92	$0	$191
Adjustment for deadweight cost of program	$0	$0	$0	($42)	($42)
Totals	$24	$75	$92	($42)	$149

[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.

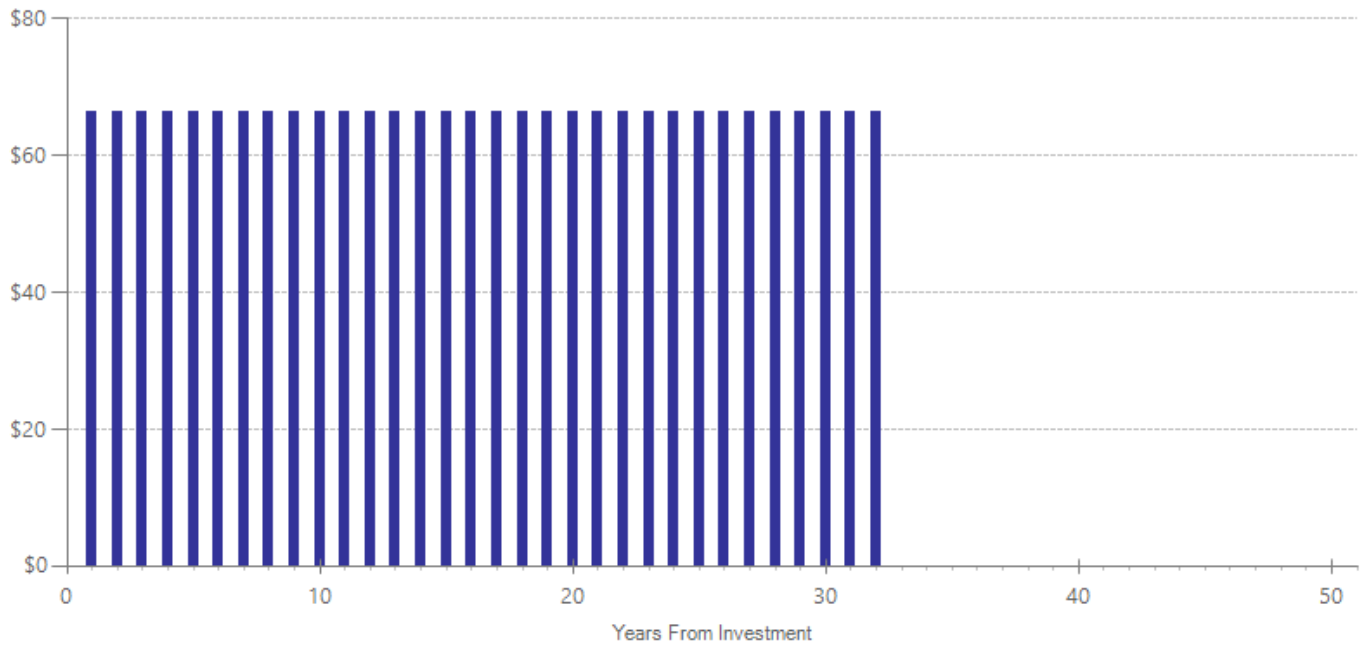
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$83	2016	Present value of net program costs (in 2016 dollars)	($83)
Comparison costs	$0	2016	Cost range (+ or -)	16 %

We estimated an average per-participant cost based on the additional payments that insurers made to medical providers for implementing medical homes as reported in the studies. These additional payments were made to fund nurse care managers, to provide incentives for achieving patient-centered medical home recognition and quality-of-care targets, and to support other costs incurred in transforming practices.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Emergency department visits*	5	178888	-0.074	0.029	68	0.000	0.000	69	-0.074	0.011
Health care costs*	3	149593	-0.025	0.036	68	0.000	0.000	69	-0.025	0.491
Hospitalization*	4	150078	0.006	0.023	68	0.000	0.000	69	0.006	0.775
Specialist visits*^	3	3668	-0.043	0.047	68	0.000	0.000	69	-0.043	0.352

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

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Boult, C., Leff, B., Boyd, C.M., Wolff, J.L., Marsteller, J.A., Frick, K.D., . . . Scharfstein, D.O. (2013). A matched-pair cluster-randomized trial of guided care for high-risk older patients. *Journal of General Internal Medicine, 28*(5), 612-621.

David, G., Gunnarsson, C., Saynisch, P.A., Chawla, R., & Nigam, S. (2014). Do patient-entered medical homes reduce emergency department visits? *Health Services Research,* 5.

Rosenthal, M.B., Alidina, S., Friedberg, M.W., Singer, S.J., Eastman, D., Li, Z., & Schneider, E.C. (2016). Impact of the Cincinnati aligning forces for quality multi-payer patient centered medical home pilot on health care quality, utilization, and costs. *Medical Care Research and Review, 73*(5), 532-45.

van Hasselt, M., McCall, N., Keyes, V., Wensky, S.G., & Smith, K.W. (2014). Total cost of care lower among Medicare fee-for service beneficiaries receiving care from patient-centered medical homes. *Health Services Research, 50*(1), 253-272.

Wang, Q.C., Chawla, R., Colombo, C.M., Snyder, R.L., & Nigam, S. (2014). Patient-centered medical home impact on health plan members with diabetes. *Journal of Public Health Management and Practice, 20*(5), E12-E20.

Interventions to reduce unnecessary emergency department visits: General education on appropriate ED use

Health Care: Health Care System Efficiency

Benefit-cost estimates updated May 2017. Literature review updated December 2014.

Program Description: The study included in this analysis evaluated the dissemination of a booklet to all members of a health insurance plan who received Medicaid benefits. The booklet explained when to use emergency services, offered assistance in finding a primary care physician, and described self-care for minor conditions.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$6	Benefit to cost ratio	$1.43
Participants	$1	Benefits minus costs	$3
Others	$7	Chance the program will produce benefits greater than the costs	50 %
Indirect	($2)		
Total benefits	$12		
Net program cost	($8)		
Benefits minus cost	$3		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with emergency department visits	$1	$6	$7	$2	$16
Adjustment for deadweight cost of program	$0	$0	$0	($4)	($4)
Totals	$1	$6	$7	($2)	$12

[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.

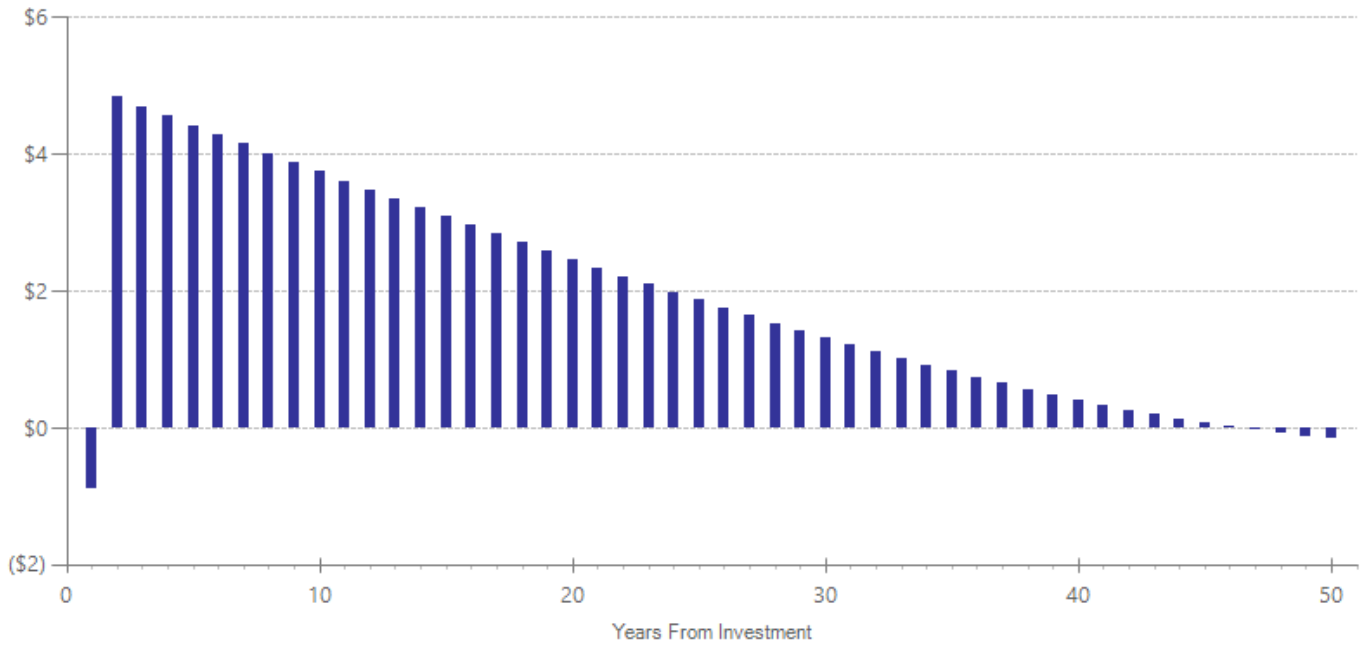
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$8	2014	Present value of net program costs (in 2016 dollars)	($8)
Comparison costs	$0	2014	Cost range (+ or -)	10 %

The single study in this analysis evaluated the dissemination of a 44 page brochure to each household in the program. Each household in this population had an average of 2.75 individuals. The per-person cost of this program is estimated by dividing the cost for Washington State Department of Enterprise Services to print and mail a booklet by the number of individuals in each household. We also assumed that one full-time administrative staff member would be needed for content development and program administration.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Emergency department visits	1	9822	-0.032	0.021	18	0.000	0.086	20	-0.032	0.128

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.

Citations Used in the Meta-Analysis

Rector, T.S., Venus, P.J., & Laine, A.J. (1999). Impact of mailing information about nonurgent care on emergency department visits by Medicaid beneficiaries enrolled in managed care. *The American Journal of Managed Care, 5*(12), 1505-1512.

Patient-centered medical homes in physician-led practices without explicit utilization or cost incentives (general population)

Health Care: Health Care System Efficiency

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: The patient-centered medical home (PCMH) model attempts to make health care more efficient by implementing a set of changes to primary care. Medical homes are designed to provide comprehensive care, treating both acute needs and promoting population health. The medical home model emphasizes care coordination across providers, patient engagement, evidence-based care, use of health information technology, and enhanced patient access.

This category includes PCMH programs we reviewed that were implemented in physician-led practices.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$29	Benefit to cost ratio	$0.39
Participants	$9	Benefits minus costs	($51)
Others	$35	Chance the program will produce benefits greater than the costs	34 %
Indirect	($41)		
Total benefits	$32		
Net program cost	($83)		
Benefits minus cost	($51)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care (total costs)	$9	$29	$35	$0	$73
Adjustment for deadweight cost of program	$0	$0	$0	($41)	($41)
Totals	$9	$29	$35	($41)	$32

[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.

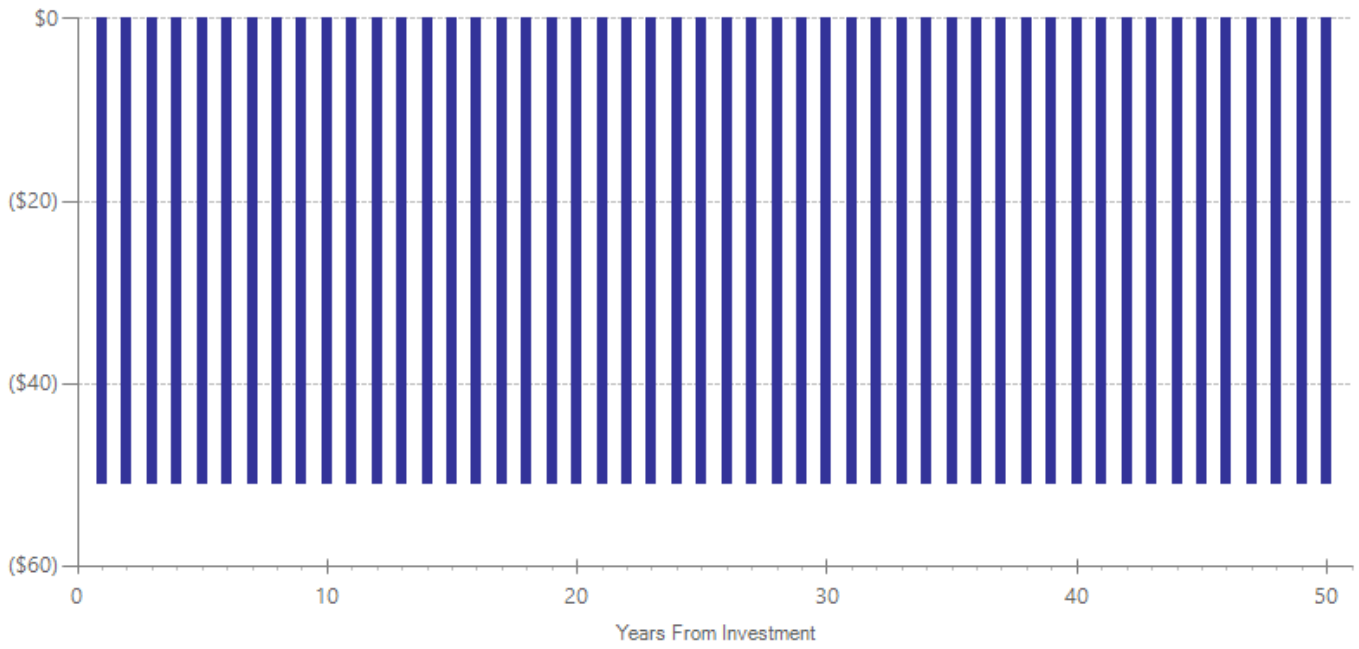
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$83	2016	Present value of net program costs (in 2016 dollars)	($83)
Comparison costs	$0	2016	Cost range (+ or -)	16 %

We estimated an average per-participant cost based on the additional payments that insurers made to medical providers for implementing medical homes as reported in the studies. These additional payments were made to fund nurse care managers, to provide incentives for achieving patient-centered medical home recognition and quality-of-care targets, and to support other costs incurred in transforming practices.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Emergency department visits*	6	112332	-0.038	0.015	45	0.000	0.000	46	-0.038	0.010
Health care costs*	4	68571	-0.013	0.024	45	0.000	0.000	46	-0.013	0.575
Hospitalization*	4	70182	-0.032	0.040	45	0.000	0.000	46	-0.032	0.425
Specialist visits*^	4	70182	-0.017	0.013	45	0.000	0.000	46	-0.017	0.179

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

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

David, G., Gunnarsson, C., Saynisch, P.A., Chawla, R., & Nigam, S. (2014). Do patient-entered medical homes reduce emergency department visits? *Health Services Research,* 5.

Friedberg, M.W., Schneider, E.C., Friedberg, M.W., Schneider, E.C., Friedberg, M.W., Schneider, E.C., . . . Volpp, K.G. (2014). Association between participation in a multipayer medical home intervention and changes in quality, utilization, and costs of care. *Jama, 311*(8), 815-825.

Rosenthal, M.B., Sinaiko, A.D., Eastman, D., Chapman, B., & Partridge, G. (2015). Impact of the Rochester medical home initiative on primary care practices, quality, utilization, and costs. *Medical Care, 53*(11), 967-973.

Rosenthal, M.B., Alidina, S., Friedberg, M.W., Singer, S.J., Eastman, D., Li, Z., & Schneider, E.C. (2016). Impact of the Cincinnati aligning forces for quality multi-payer patient centered medical home pilot on health care quality, utilization, and costs. *Medical Care Research and Review, 73*(5), 532-545.

Rosenthal, M.B. (2013). Effect of a multipayer patient-centered medical home on health care utilization and quality: the Rhode Island chronic care sustainability initiative pilot program. *Jama Internal Medicine, 173*(20), 1907.

Werner, R.M., Duggan, M., Duey, K., Zhu, J., & Stuart, E.A. (2013). The patient-centered medical home: an evaluation of a single private payer demonstration in New Jersey. *Medical Care Philadelphia, 51*(6), 487-493.

Patient-centered medical homes in physician-led practices with utilization or cost incentives (high-risk populations)

Health Care: Health Care System Efficiency

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: The patient-centered medical home (PCMH) model attempts to make health care more efficient by implementing a set of changes to primary care. Medical homes are designed to provide comprehensive care, treating both acute needs and promoting population health. The medical home model emphasizes care coordination across providers, patient engagement, evidence-based care, use of health information technology, and enhanced patient access.

This category includes PCMH programs we reviewed that were implemented in physician-led practices and where providers were offered financial incentives to reduce utilization and costs, such as shared cost-savings. These results are for chronically ill or older adults.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$65	Benefit to cost ratio	$0.57
Participants	$21	Benefits minus costs	($66)
Others	$80	Chance the program will produce benefits greater than the costs	35 %
Indirect	($78)		
Total benefits	$89		
Net program cost	($155)		
Benefits minus cost	($66)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care (total costs)	$21	$65	$80	$0	$166
Adjustment for deadweight cost of program	$0	$0	$0	($78)	($78)
Totals	$21	$65	$80	($78)	$89

[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.

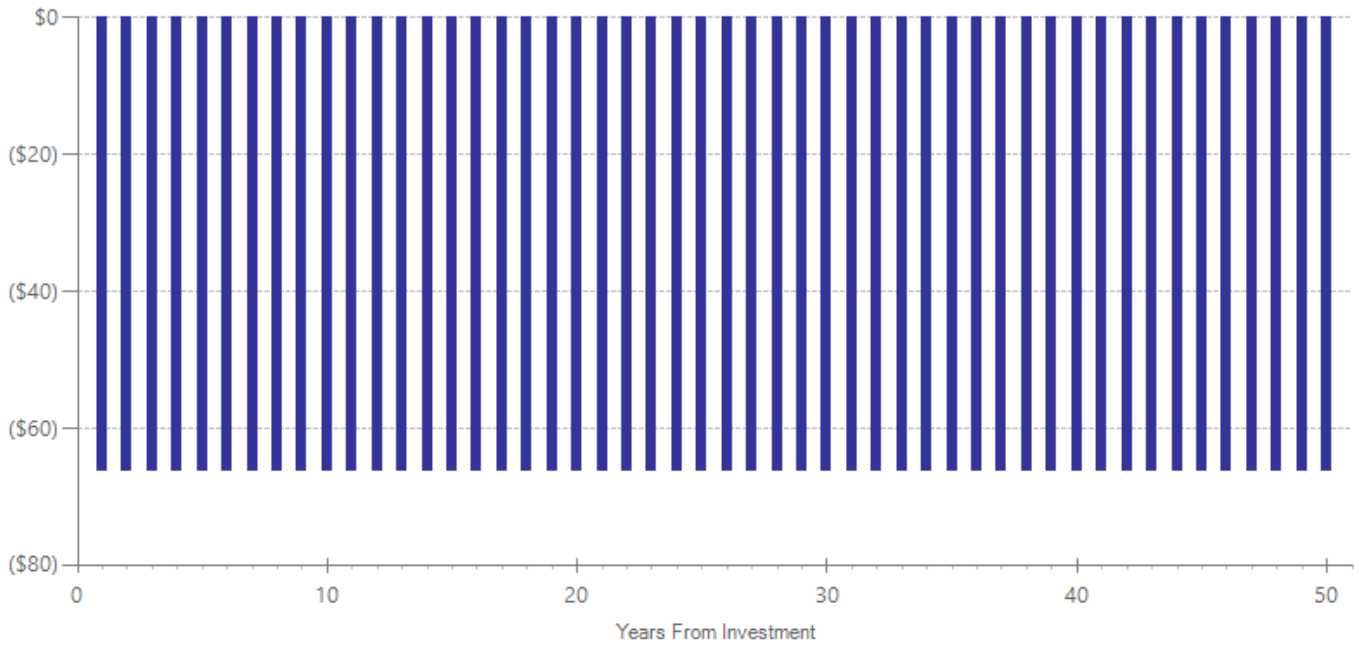
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$155	2016	Present value of net program costs (in 2016 dollars)	($155)
Comparison costs	$0	2016	Cost range (+ or -)	20 %

We estimated an average per-participant cost based on the additional payments that insurers made to medical providers for implementing medical homes. These additional payments were made to fund nurse care managers, to provide bonuses for achieving quality-of-care targets, and, in this case, to provide financial incentives to reduce utilization and costs. Information on the actual incentive payments in these implementations is sparse, and our estimates are based on a single study, Rosenthal et al. (2016).

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Health care costs*	2	297114	-0.022	0.023	47	0.000	0.000	48	-0.022	0.333

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Cuellar, A., Helmchen, L.A., Gimm, G., Want, J., Burla, S., Kells, B.J., . . . Nichols, L.M. (2016). The CareFirst patient-centered medical home program: cost and utilization effects in its first three years. *Journal of General Internal Medicine,* 1-7.

Rosenthal, M.B., Alidina, S., Friedberg, M.W., Singer, S.J., Eastman, D., Li, Z., & Schneider, E.C. (2016). A difference-in-difference analysis of changes in quality, utilization and cost following the Colorado multi-payer patient-centered medical home pilot. *Journal of General Internal Medicine, 31*(3), 289-296.

Interventions to reduce unnecessary emergency department visits: Asthma self-management education for children

Health Care: Health Care System Efficiency

Benefit-cost estimates updated May 2017. Literature review updated December 2014.

Program Description: Asthma self-management education aims to manage asthma symptoms and avoid emergency department visits by teaching children to identify and avoid asthma triggers, recognize symptoms, and take appropriate action to manage symptoms. In the studies included in this analysis, asthma self-management education was typically delivered by a social worker, nurse, or computer program. We included interventions delivered to children or children and their families in an individuals or group setting. This analysis focuses on interventions initiated in the healthcare system.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	($1)	Benefit to cost ratio	($0.48)
Participants	$2	Benefits minus costs	($116)
Others	$3	Chance the program will produce benefits greater than the costs	48 %
Indirect	($42)		
Total benefits	($38)		
Net program cost	($78)		
Benefits minus cost	($116)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with general hospitalization	($1)	($17)	($14)	($10)	($42)
Health care associated with emergency department visits	$3	$15	$18	$7	$43
Adjustment for deadweight cost of program	$0	$0	$0	($39)	($39)
Totals	$2	($1)	$3	($42)	($38)

[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.

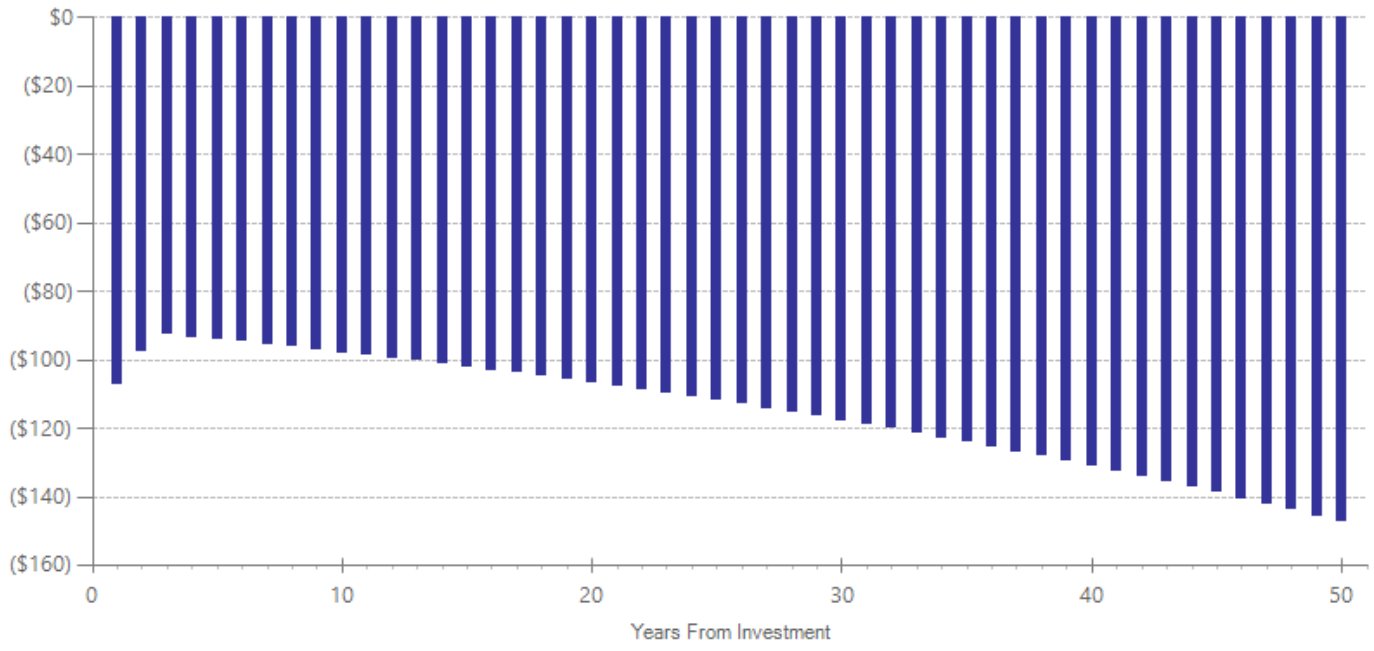
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$77	2014	Present value of net program costs (in 2016 dollars)	($78)
Comparison costs	$0	2014	Cost range (+ or -)	25 %

The asthma self-management education programs that we reviewed required an average of 1.14 hours of staff time per child. A nurse educator provided the self-management education in most of these programs. We estimated the cost of the program by multiplying the hours of staff time by the average registered nurse's hourly salary in Washington State (http://www.bls.gov/oes/current/oes_wa.htm#29-0000). This product is then multiplied by the ratio of total compensation to wages described in WSIPP's Technical Documentation.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Emergency department visits	7	688	-0.088	0.124	8	0.000	0.086	10	-0.088	0.475
Hospitalization	10	1342	0.015	0.101	8	0.000	0.086	10	0.153	0.475
School attendance^	4	142	0.002	0.219	8	0.002	0.219	8	0.002	0.994

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

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.

Citations Used in the Meta-Analysis

Alexander, J.S., Younger, R.E., Cohen, R.M., & Crawford, L.V. (1988). Effectiveness of a nurse-managed program for children with chronic asthma. *Journal of Pediatric Nursing, 3*(5), 312-317.

Clark, N.M., Feldman, C.H., Evans, D., Levison, M.J., Wasilewski, Y., & Mellins, R.B. (1986). The impact of health education on frequency and cost of health care use by low income children with asthma. *The Journal of Allergy and Clinical Immunology, 78*(1), 108-15.

Evans, R. ., Gergen, P.J., Mitchell, H., Kattan, M., Kercsmar, C., Crain, E., Anderson, J., ... Wedner, H.J. (1999). A randomized clinical trial to reduce asthma morbidity among inner-city children: results of the National Cooperative Inner-City Asthma Study. *The Journal of Pediatrics, 135*(3), 332-338.

Farber, H.J., & Oliveria, L. (2004). Trial of an Asthma Education Program in an Inner-City Pediatric Emergency Department. *Pediatric Asthma, Allergy & Immunology, 17*(2), 107-115.

Fireman, P., Friday, G.A., Gira, C., Vierthaler, W.A., & Michaels, L. (1981). Teaching self-management skills to asthmatic children and their parents in an ambulatory care setting. *Pediatrics, 68*(3), 341-8.

Homer, C., Susskind, O., Alpert, H.R., Owusu, M., Schneider, L., Rappaport, L.A., & Rubin, D.H. (2000). An evaluation of an innovative multimedia educational software program for asthma management: report of a randomized, controlled trial. *Pediatrics, 106*(1), 210-205.

Lukacs, S.L., France, E.K., Baron, A.E., & Crane, L.A. (2002). Effectiveness of an asthma management program for pediatric members of a large health maintenance organization. *Archives of Pediatrics & Adolescent Medicine, 156*(9), 872-876.

Madge, P., McColl, J., & Paton, J. (1997). Impact of a nurse-led home management training programme in children admitted to hospital with acute asthma: a randomised controlled study. *Thorax, 52*(3), 223-228.

Mitchell, E.A., Ferguson, V., & Norwood, M. (1986). Asthma education by community child health nurses. *Archives of Disease in Childhood, 61*(12), 1184-1189.

Rubin, D.H., Leventhal, J.M., Sadock, R.T., Letovsky, E., Schottland, P., Clemente, I., & McCarthy, P. (1986). Educational intervention by computer in childhood asthma: a randomized clinical trial testing the use of a new teaching intervention in childhood asthma. *Pediatrics, 77*(1), 1-10.

Shields, M.C. (1990). The Effect of a Patient Education Program on Emergency Room Use for Inner-City Children with Asthma. *American Journal of Public Health, 80*(1), 36-38.

Stevens, C.A., Wesseldine, L.J., Couriel, J.M., Dyer, A.J., Osman, L.M., & Silverman, M. (2002). Parental education and guided self-management of asthma and wheezing in the pre-school child: a randomised controlled trial. *Thorax, 57*(1), 39-44.

Patient-centered medical homes in physician-led practices with utilization or cost incentives (general population)

Health Care: Health Care System Efficiency

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: The patient-centered medical home (PCMH) model attempts to make health care more efficient by implementing a set of changes to primary care. Medical homes are designed to provide comprehensive care, treating both acute needs and promoting population health. The medical home model emphasizes care coordination across providers, patient engagement, evidence-based care, use of health information technology, and enhanced patient access.

This category includes PCMH programs we reviewed that were implemented in physician-led practices and where providers were offered financial incentives to reduce utilization and costs, such as shared cost-savings.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$44	Benefit to cost ratio	$0.23
Participants	$14	Benefits minus costs	($119)
Others	$55	Chance the program will produce benefits greater than the costs	31 %
Indirect	($78)		
Total benefits	$36		
Net program cost	($155)		
Benefits minus cost	($119)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care (total costs)	$14	$44	$55	$0	$113
Adjustment for deadweight cost of program	$0	$0	$0	($78)	($78)
Totals	$14	$44	$55	($78)	$36

[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.

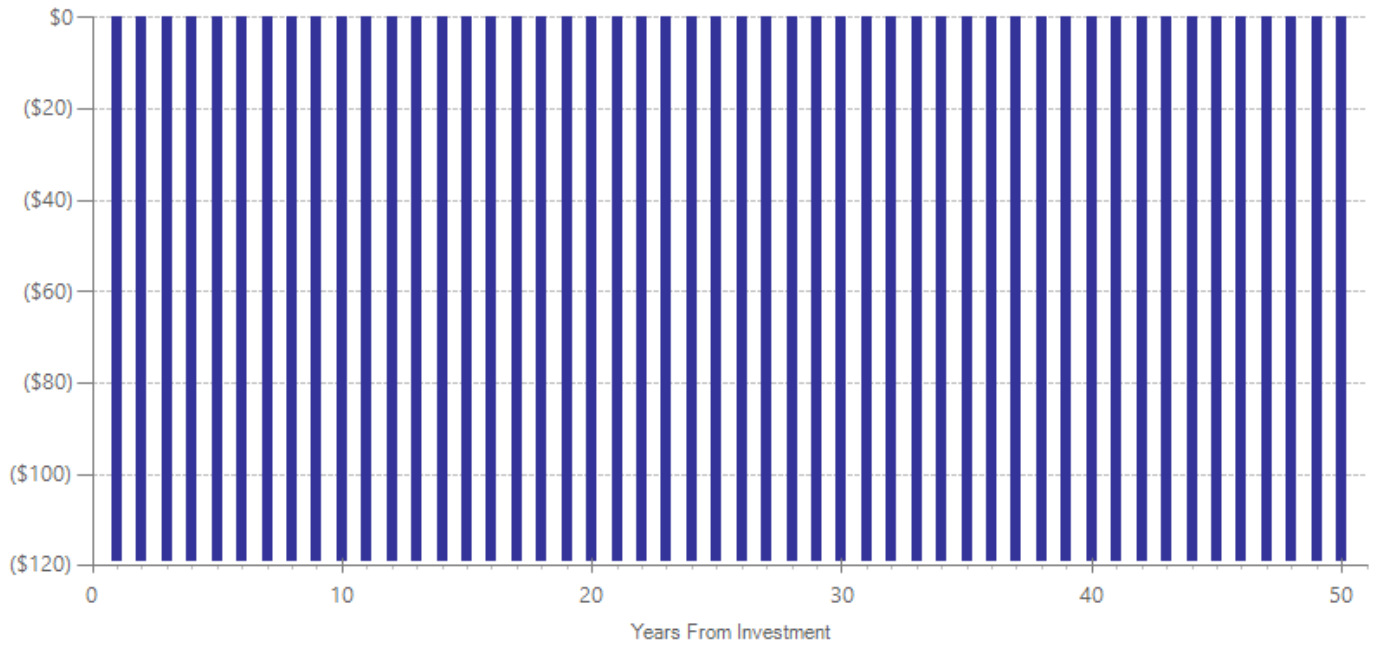
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$155	2016	Present value of net program costs (in 2016 dollars)	($155)
Comparison costs	$0	2016	Cost range (+ or -)	20 %

We estimated an average per-participant cost based on the additional payments that insurers made to medical providers for implementing medical homes. These additional payments were made to fund nurse care managers, to provide bonuses for achieving quality-of-care targets, and, in this case, to provide financial incentives to reduce utilization and costs. Information on the actual incentive payments in these implementations is sparse, and our estimates are based on a single study, Rosenthal et al. (2016).

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Emergency department visits*	3	622252	-0.073	0.030	43	0.000	0.000	44	-0.073	0.014
Health care costs*	2	604331	-0.022	0.016	43	0.000	0.000	44	-0.022	0.172
Hospitalization*	3	622252	-0.044	0.031	43	0.000	0.000	44	-0.044	0.150
Specialist visits*^	2	29366	-0.077	0.061	43	0.000	0.000	44	-0.077	0.207

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

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Cuellar, A., Helmchen, L.A., Gimm, G., Want, J., Burla, S., Kells, B.J., . . . Nichols, L.M. (2016). The CareFirst patient-centered medical home program: cost and utilization effects in its first three years. *Journal of General Internal Medicine,* 1-7.

Friedberg, M.W., Schneider, E.C., Friedberg, M.W., Schneider, E.C., Friedberg, M.W., Schneider, E.C., Rosenthal, M.B., ... Volpp, K.G. (2015). Effects of a medical home and shared savings intervention on quality and utilization of care. *Jama Internal Medicine, 175*(8), 1362-1368.

Rosenthal, M.B., Alidina, S., Friedberg, M.W., Singer, S.J., Eastman, D., Li, Z., & Schneider, E.C. (2016). A difference-in-difference analysis of changes in quality, utilization and cost following the Colorado multi-payer patient-centered medical home pilot. *Journal of General Internal Medicine, 31*(3), 289-296.

Interventions to reduce unnecessary emergency department visits: Intensive case management for frequent ED users

Health Care: Health Care System Efficiency

Benefit-cost estimates updated May 2017. Literature review updated December 2014.

Program Description: These interventions target the highest-frequency emergency department visitors, providing a case manager or clinical case management team to assist in accessing appropriate medical care and community resources with the aim of reducing unnecessary emergency department visits.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$3,205	Benefit to cost ratio	$0.36
Participants	$324	Benefits minus costs	($6,151)
Others	$3,082	Chance the program will produce benefits greater than the costs	44 %
Indirect	($3,182)		
Total benefits	$3,430		
Net program cost	($9,581)		
Benefits minus cost	($6,151)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with general hospitalization	$122	$2,139	$1,845	$1,074	$5,179
Health care associated with emergency department visits	$203	$1,067	$1,237	$533	$3,039
Adjustment for deadweight cost of program	$0	$0	$0	($4,789)	($4,789)
Totals	$324	$3,205	$3,082	($3,182)	$3,430

[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.

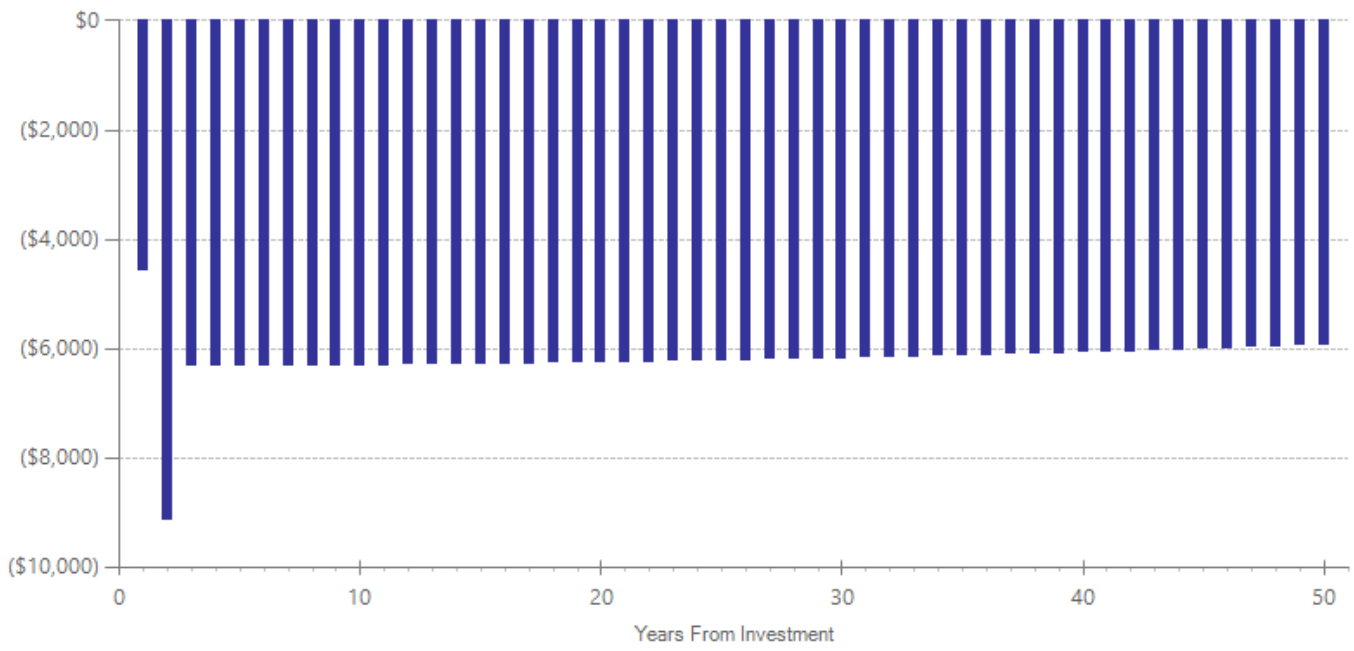
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$3,730	2001	Present value of net program costs (in 2016 dollars)	($9,581)
Comparison costs	$0	2001	Cost range (+ or -)	20 %

The costs for case management for frequent emergency department users was estimated using the average per client costs during the first two years of the clinical case management program at San Francisco General Hospital described in Shumway et al. (2008). Cost-effectiveness of clinical case management for ED frequent users: results of a randomized trial. *The American Journal of Emergency Medicine, 26*(2), 155-164. We estimated the per-client costs as the average the first and second year of the program ($4,270 and $3,190 respectively in 2001 dollars) (Martha Shumway, personal communication, May 18, 2015).

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Emergency department visits	2	252	-0.438	0.095	46	0.000	0.118	47	-0.438	0.001
Hospitalization	2	252	-0.173	0.094	46	0.000	0.118	47	-0.173	0.067

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.

Citations Used in the Meta-Analysis

Shah, R., Chen, C., O'Rourke, S., Lee, M., Mohanty, S.A., & Abraham, J. (2011). Evaluation of care management for the uninsured. *Medical Care, 49*(2), 166-171.

Shumway, M., Boccellari, A., O'Brien, K., & Okin, R.L. (2008). Cost-effectiveness of clinical case management for ED frequent users: results of a randomized trial. *The American Journal of Emergency Medicine, 26*(2), 155-164.

Other prenatal home visiting programs

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: This grouping of "other" prenatal home visiting programs provides services to women, children, and families during the prenatal period. In these programs, nurses, social workers, or trained paraprofessional providers make regular home visits to provide one or more non-clinical services that support maternal wellness and infant health during the prenatal period. Services may include case management, health education, risk assessment, psychosocial support, or nutritional counseling.

Programs are intended for women with high-risk pregnancies based on socioeconomic status, age, race, or other pregnancy risk factors. We exclude programs that solely target adolescent women from this analysis. Women are eligible for these programs during their pregnancy. Some program services continued for up to 12 months postpartum. All women in treatment and comparison groups receive clinical prenatal care (treatment as usual).

We performed sensitivity analysis on provider type (paraprofessional versus nurses/social workers) and length of program. We found no difference in cost or effect size, so all provider types are included in this analysis. This analysis does not include "name-brand" programs that provide prenatal home visiting as part of a larger model (e.g., Nurse Family Partnership, Healthy Families America).

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$748	Benefit to cost ratio	$16.77
Participants	$1,210	Benefits minus costs	$10,932
Others	$0	Chance the program will produce benefits greater than the costs	100 %
Indirect	$9,668		
Total benefits	$11,625		
Net program cost	($693)		
Benefits minus cost	$10,932		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with Cesarean sections	$0	$29	$0	$15	$44
Health care associated with small for gestational age births	$0	($2)	$0	($1)	($3)
Subtotals	$0	$27	$0	$14	$41
From secondary participant					
Health care associated with small for gestational age births	$0	($40)	$0	($20)	($60)
Infant mortality	$1,210	$549	$0	$9,914	$11,673
Health care associated with very low birthweight births	$0	$212	$0	$107	$318
Subtotals	$1,210	$721	$0	$10,001	$11,931
Adjustment for deadweight cost of program	$0	$0	$0	($347)	($347)
Totals	$1,210	$748	$0	$9,668	$11,625

[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.

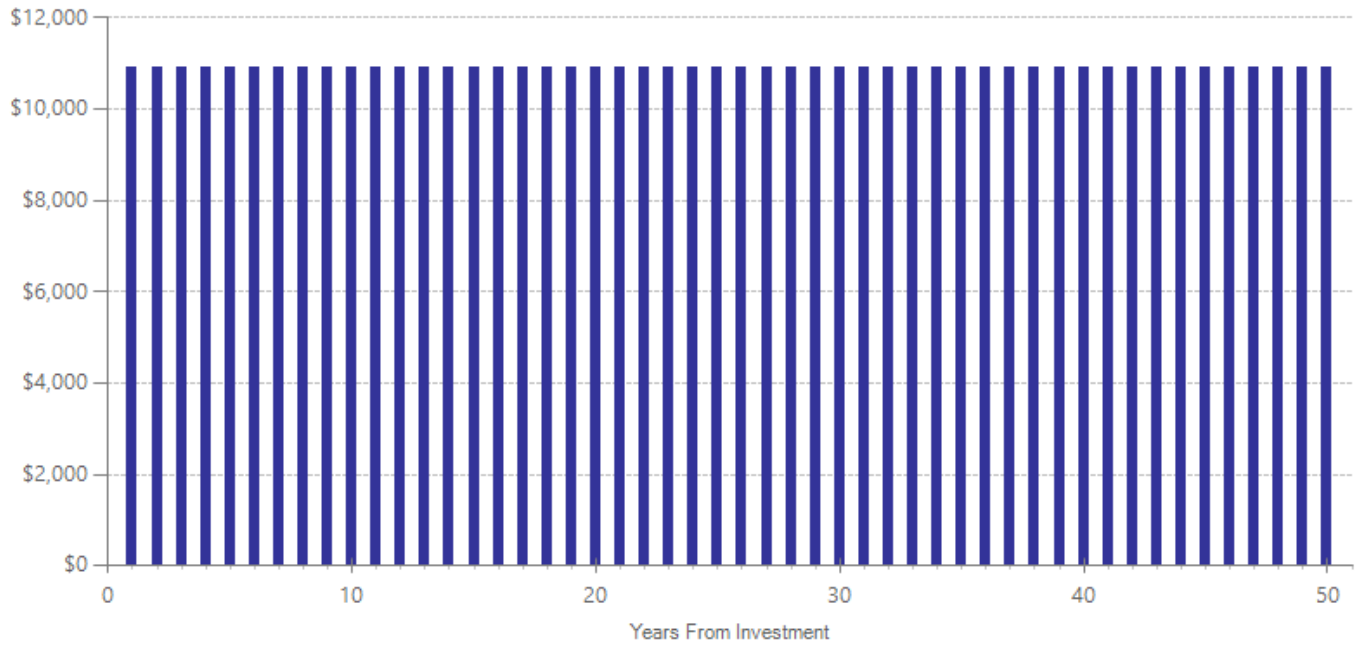
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$692	2016	Present value of net program costs (in 2016 dollars)	($693)
Comparison costs	$0	2016	Cost range (+ or -)	15 %

Treatment cost estimates for this group of programs reflect costs beyond treatment as usual. Per-participant estimates are based on average costs for all included studies. We estimate provider hours including home visiting hours, training hours, and supervisory hours; apply the mean hourly wage estimate for Washington State reported by the Bureau of Labor Statistics (September 2016) for the appropriate provider; and increase wages by a factor of 1.441 to account for the cost of employee benefits. Included studies averaged 7 home visiting hours, 0.5 training hours, and 1 supervisory hour per participant. Supervisors varied by program and included social workers or nurses.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Adequate prenatal care^	Primary	3	19008	0.118	0.105	25	0.000	0.000	26	0.118	0.261
Cesarean sections	Primary	1	1033	-0.030	0.180	25	0.000	0.000	26	-0.084	0.167
Low birthweight births***	Primary	8	17785	-0.058	0.026	25	0.000	0.000	26	-0.060	0.108
Preterm birth (< 37 weeks)***	Primary	7	17670	-0.065	0.043	25	0.000	0.000	26	-0.068	0.087
Small for gestational age (SGA)***	Primary	2	1128	0.087	0.126	25	0.000	0.000	26	0.066	0.372
Very low birthweight birth (< 1500g)***	Primary	3	16139	-0.094	0.073	25	0.000	0.000	26	-0.094	0.198
Infant mortality	Secondary	2	63440	-0.195	0.045	1	0.000	0.000	2	-0.195	0.001
Low birthweight births***	Secondary	8	17785	-0.058	0.026	1	0.000	0.000	2	-0.060	0.108
NICU admission	Secondary	1	1033	-0.007	0.285	1	0.000	0.000	2	-0.018	0.825
Preterm birth (< 37 weeks)***	Secondary	7	17670	-0.065	0.043	1	0.000	0.000	2	-0.068	0.087
Small for gestational age (SGA)***	Secondary	2	1128	0.087	0.126	1	0.000	0.000	2	0.066	0.372
Very low birthweight birth (< 1500g)***	Secondary	3	16139	-0.094	0.073	1	0.000	0.000	2	-0.094	0.198

^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.

Citations Used in the Meta-Analysis

Jewell, N.A., & Russell, K.M. (2000). Increasing access to prenatal care: an evaluation of Minority Health Coalitions' Early Pregnancy Project. *Journal of Community Health Nursing, 17*(2), 93-105.

Kothari, C.L., Zielinski, R., James, A., Charoth, R.M., & Sweezy, L.C. (2014). Improved birth weight for Black infants: outcomes of a Healthy Start program. *American Journal of Public Health, 104*(96).

Meghea, C.I., Raffo, J.E., Zhu, Q., & Roman, L. (2013). Medicaid home visitation and maternal and infant healthcare utilization. *American Journal of Preventive Medicine, 45*(4), 441-7.

Meghea, C.I., You, Z., Raffo, J., Leach, R.E., & Roman, L.A. (2015). Statewide Medicaid Enhanced Prenatal Care Programs and infant mortality. *Pediatrics, 136*(2), 334-42.

Redding, S., Conrey, E., Porter, K., Paulson, J., Hughes, K., & Redding, M. (2015). Pathways community care coordination in low birth weight prevention. *Maternal and Child Health Journal, 19*(3), 643-50.

Roman, L., Raffo, J.E., Zhu, Q., & Meghea, C.I. (2014). A statewide Medicaid enhanced prenatal care program: impact on birth outcomes. *Jama Pediatrics, 168*(3), 220-7.

Stabile, I., & Graham, M. (2000). *Florida Panhandle Healthy Start: A randomized trial of prenatal home visitation.* Head Start National Research Conference.

Villar, J., Farnot, U., Barros, F., Victora, C., Langer, A., & Belizan, J.M. (1992). A randomized trial of psychosocial support during high-risk pregnancies. The Latin American Network for Perinatal and Reproductive Research. *The New England Journal of Medicine, 327*(18), 1266-71.

Smoking cessation programs for pregnant women: Contingency management

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: Contingency management is a supplement to counseling treatment that rewards participants for attending treatment and/or abstaining from substance use. The intervention reviewed here focused on women who smoked during pregnancy who were also receiving smoking cessation counseling, and provided rewards contingent on quitting and remaining abstinent. Rewards were in the form of vouchers that could be exchanged for goods. Individuals received treatment for an average of three months.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$970	Benefit to cost ratio	$47.61
Participants	$917	Benefits minus costs	$9,763
Others	$564	Chance the program will produce benefits greater than the costs	98 %
Indirect	$7,520		
Total benefits	$9,972		
Net program cost	($209)		
Benefits minus cost	$9,763		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with low birthweight births	$2	$47	$47	$24	$119
Subtotals	$2	$47	$47	$24	$119
From secondary participant					
Infant mortality	$894	$406	$0	$7,342	$8,642
Health care associated with NICU admissions	$21	$517	$517	$261	$1,316
Subtotals	$916	$923	$517	$7,603	$9,959
Adjustment for deadweight cost of program	$0	$0	$0	($106)	($106)
Totals	$917	$970	$564	$7,520	$9,972

[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.

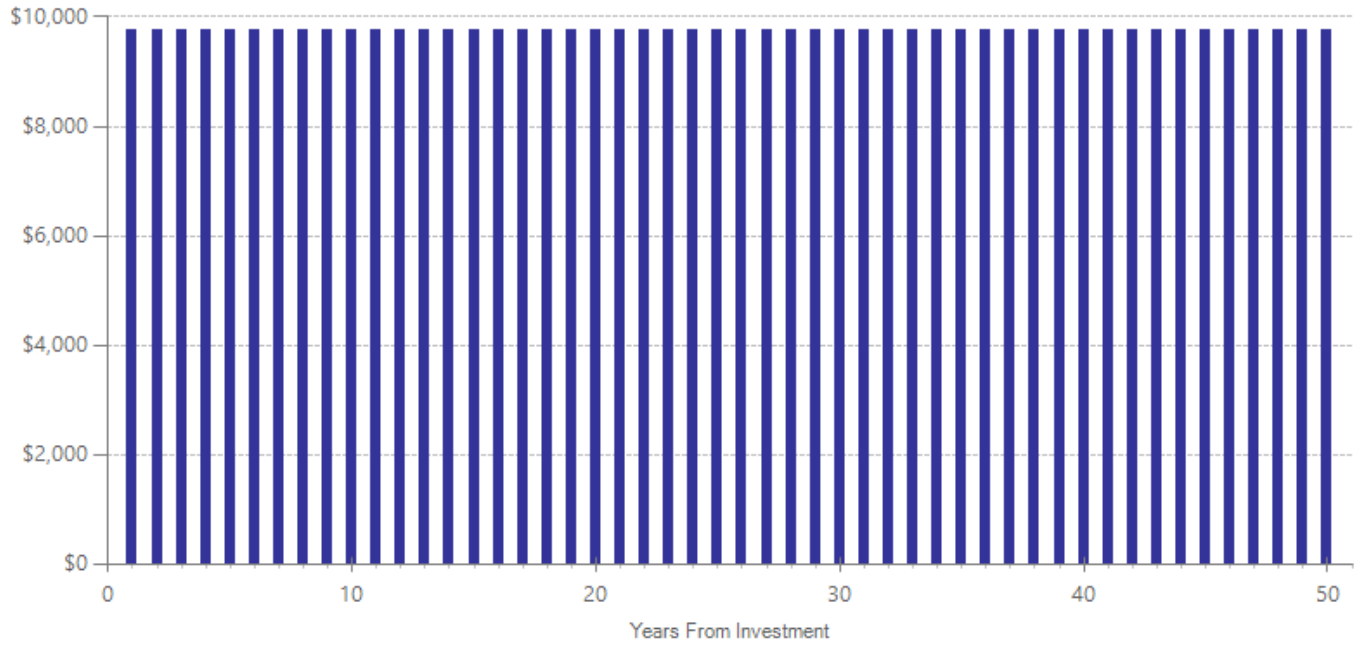
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$446	2016	Present value of net program costs (in 2016 dollars)	($209)
Comparison costs	$237	2016	Cost range (+ or -)	30 %

The per-participant cost of treatment is based on average provider time reported in studies, plus the average incentive amount received by treatment participants. Physician/therapist time reported for smoking cessation counseling was 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. Provider time reported for abstinence monitoring during contingency management was calculated using the mean hourly wage for Washington State reported by the Bureau of Labor Statistics for the appropriate provider, and wages were increased by a factor of 1.441 to account for the cost of employee benefits. Costs were obtained from Heil et al. (2008), Higgins et al. (2004), Higgins et al. (2014), Ondersma et al. (2012), Tappin et al. (2015), and Tuten et al. (2012).

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Low birthweight births***	Primary	4	151	-0.494	0.217	27	0.000	0.000	28	-0.494	0.023
Preterm birth (< 37 weeks)***	Primary	5	457	-0.340	0.130	27	0.000	0.000	28	-0.340	0.009
Regular smoking	Primary	4	422	-0.498	0.121	27	-0.498	0.121	37	-0.498	0.001
Smoking during late pregnancy^	Primary	7	516	-0.752	0.110	27	0.000	0.000	28	-0.752	0.001
Low birthweight births***	Secondary	4	151	-0.494	0.217	1	0.000	0.000	2	-0.494	0.023
NICU admission	Secondary	4	151	-0.339	0.213	1	0.000	0.000	2	-0.339	0.112
Preterm birth (< 37 weeks)***	Secondary	5	457	-0.340	0.130	1	0.000	0.000	2	-0.340	0.009

^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.

Citations Used in the Meta-Analysis

Heil, S.H., Higgins, S.T., Bernstein, I.M., Solomon, L.J., Rogers, R.E., Thomas, C.S., . . . Lynch, M.E. (2008). Effects of voucher-based incentives on abstinence from cigarette smoking and fetal growth among pregnant women. *Addiction 103*(6), 1009-18.

Higgins, S.T., Heil, S.H., Solomon, L.J., Bernstein, I.M., Lussier, J.P., Abel, R.L., . . . Badger, G.J. (2004). A pilot study on voucher-based incentives to promote abstinence from cigarette smoking during pregnancy and postpartum. *Nicotine & Tobacco Research, 6*(6), 1015-20.

Higgins, S.T., Washio, Y., Lopez, A.A., Heil, S.H., Solomon, L.J., Lynch, M.E., . . . Bernstein, I.M. (2014). Examining two different schedules of financial incentives for smoking cessation among pregnant women. *Preventive Medicine, 68,* 51-57.

Ondersma, S.J., Svikis, D.S., Lam, P.K., Connors-Burge, V.S., Ledgerwood, D.M., & Hopper, J.A. (2012). A randomized trial of computer-delivered brief intervention and low-intensity contingency management for smoking during pregnancy. *Nicotine & Tobacco Research, 14*(3), 351-60.

Tappin, D., Bauld, L., Purves, D., Boyd, K., Sinclair, L., MacAskill, S., . . . Cessation in Pregnancy Incentives Trial Team. (2015). Financial incentives for smoking cessation in pregnancy: randomized controlled trial. *BMJ (Clinical Research Ed.), 350,* h134.

Tuten, M., Fitzsimons, H., Chisolm, M.S., Nuzzo, P.A., & Jones, H.E. (2012). Contingent incentives reduce cigarette smoking among pregnant, methadone-maintained women: results of an initial feasibility and efficacy randomized clinical trial. *Addiction, 107*(10), 1868-1877.

Enhanced prenatal care programs delivered through Medicaid

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: Enhanced prenatal care programs delivered through Medicaid provide non-clinical services that support maternal wellness and infant health during the prenatal period, such as care coordination, health education, risk assessment, psychosocial support, or nutritional counseling. These programs are delivered in the primary healthcare setting and provided by either a nurse or a social worker. Women are eligible for these programs during their pregnancy, with some benefits continuing through the first 12 months postpartum. Participants typically receive program benefits for 3-16 months, including both prenatal and postpartum services.

All programs included in this analysis were implemented by Medicaid in their respective states. All women in treatment and comparison groups receive clinical prenatal care (treatment as usual).

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$841	Benefit to cost ratio	$15.42
Participants	$595	Benefits minus costs	$5,981
Others	$0	Chance the program will produce benefits greater than the costs	98 %
Indirect	$4,961		
Total benefits	$6,396		
Net program cost	($415)		
Benefits minus cost	$5,981		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with preterm births	$0	$30	$0	$15	$45
Subtotals	$0	$30	$0	$15	$45
From secondary participant					
Infant mortality	$595	$270	$0	$4,882	$5,747
Health care associated with NICU admissions	$0	$541	$0	$272	$813
Subtotals	$595	$811	$0	$5,154	$6,560
Adjustment for deadweight cost of program	$0	$0	$0	($208)	($208)
Totals	$595	$841	$0	$4,961	$6,396

[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.

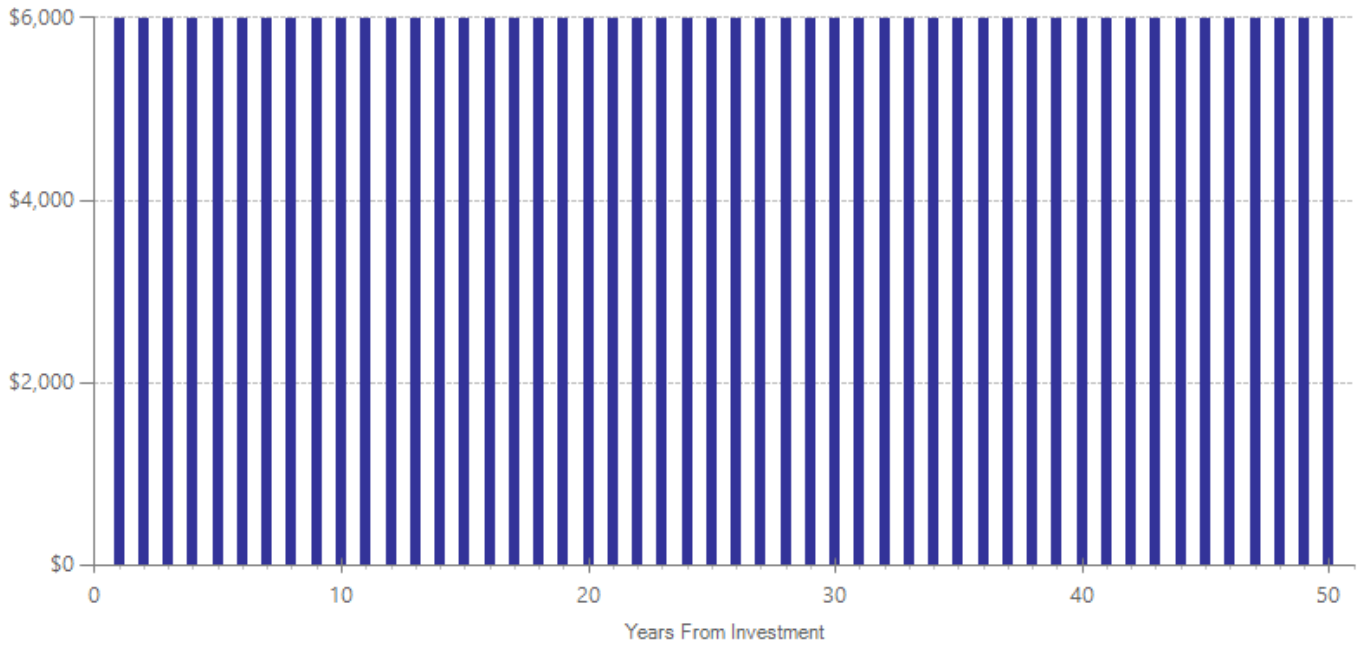
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$1,792	2014	Present value of net program costs (in 2016 dollars)	($415)
Comparison costs	$1,383	2014	Cost range (+ or -)	10 %

Per-participant program cost estimates are based on costs of Maternity Support and Case Management programs in Washington State (Washington State Department of Health, September 2016). Participants typically receive program benefits for 3-16 months, including both prenatal and postpartum services. Both groups receive treatment as usual. The costs of treatment as usual are the average costs of usual prenatal care in Washington State (Washington State Department of Health, September 2016).

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Low birthweight births***	Primary	5	51826	-0.087	0.017	25	0.000	0.000	26	-0.087	0.001
Preterm birth (< 37 weeks)***	Primary	3	32638	-0.089	0.035	25	0.000	0.000	26	-0.089	0.011
Small for gestational age (SGA)***	Primary	3	25588	-0.037	0.032	25	0.000	0.000	26	-0.037	0.252
Very low birthweight birth (< 1500g)***	Primary	2	26241	-0.224	0.040	25	0.000	0.000	26	-0.224	0.001
Infant mortality	Secondary	2	35194	-0.088	0.049	1	0.000	0.000	2	-0.088	0.075
Low birthweight births***	Secondary	5	51826	-0.087	0.017	1	0.000	0.000	2	-0.087	0.001
NICU admission	Secondary	1	10715	-0.114	0.027	1	0.000	0.000	2	-0.114	0.001
Preterm birth (< 37 weeks)***	Secondary	3	32638	-0.089	0.035	1	0.000	0.000	2	-0.089	0.011
Small for gestational age (SGA)***	Secondary	3	25588	-0.037	0.032	1	0.000	0.000	2	-0.037	0.252
Very low birthweight birth (< 1500g)***	Secondary	2	26241	-0.224	0.040	1	0.000	0.000	2	-0.224	0.001

***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.

Citations Used in the Meta-Analysis

Arima, Y., Guthrie, B.L., Rhew, I.C., & De Roos, A.J. (2009). The impact of the First Steps prenatal care program on birth outcomes among women receiving Medicaid in Washington State. *Health Policy (Amsterdam, Netherlands), 92*(1), 49-54.

Buescher, P.A., Roth, M.S., Williams, D., & Goforth, C.M. (1991). An evaluation of the impact of maternity care coordination on Medicaid birth outcomes in North Carolina. *American Journal of Public Health, 81*(12), 1625-9.

Hillemeier, M.M., Domino, M.E., Wells, R., Goyal, R.K., Kum, H.C., Cilenti, D., . . . Basu, A. (2015). Effects of maternity care coordination on pregnancy outcomes: propensity-weighted analyses. *Maternal and Child Health Journal, 19*(1), 121-7.

Korenbrot, C.C., Gill, A., Clayson, Z., & Patterson, E. (1995). Evaluation of California's statewide implementation of enhanced perinatal services as Medicaid benefits. *Public Health Reports, 110*(2).

Nason, C.S., Alexander, G.R., Pass, M.A., & Bolland, J.M. (2003). An evaluation of a Medicaid managed maternity program: the impact of comprehensive care coordination on utilization and pregnancy outcomes. *Journal of Health and Human Services Administration, 26*(2), 239-67.

Willems Van Dijk, J., Anderko, L., & Stetzer, F. (2011). The impact of prenatal care coordination on birth outcomes. *Journal of Obstetric, Gynecologic, & Neonatal Nursing, 40*(1), 98-108.

Group prenatal care (compared to standard prenatal care)

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: Traditionally, prenatal care visits are conducted by an obstetrician or midwife in a clinical setting. Group prenatal care is an alternative strategy to deliver prenatal education and conduct clinical assessments in a non-clinical and group setting. Groups are typically led by an obstetrician or midwife and may also include a registered nurse or medical assistant as a second staff member. Five out of six studies included in this analysis use the CenteringPregnancy model of prenatal care, which includes ten sessions of education and clinical assessments in a group setting. On average, sessions are two hours long with groups of six to twelve women. One study in this analysis provided prenatal education in groups of six to eight and taught pregnant teens to conduct routine clinical measurements on their peers. In this analysis, individuals received group prenatal care for about seven months.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$176	Benefit to cost ratio	n/a
Participants	$203	Benefits minus costs	$3,791
Others	$85	Chance the program will produce benefits greater than the costs	94 %
Indirect	$2,231		
Total benefits	$2,695		
Net program cost	$1,095		
Benefits minus cost	$3,791		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with Cesarean sections	$1	$25	$25	$13	$64
Subtotals	$1	$25	$25	$13	$64
From secondary participant					
Infant mortality	$200	$91	$0	$1,639	$1,930
Health care associated with low birthweight births	$4	$93	$93	$47	$237
Health care associated with NICU admissions	($1)	($33)	($33)	($17)	($85)
Subtotals	$202	$151	$60	$1,669	$2,082
Adjustment for deadweight cost of program	$0	$0	$0	$550	$550
Totals	$203	$176	$85	$2,231	$2,695

[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.

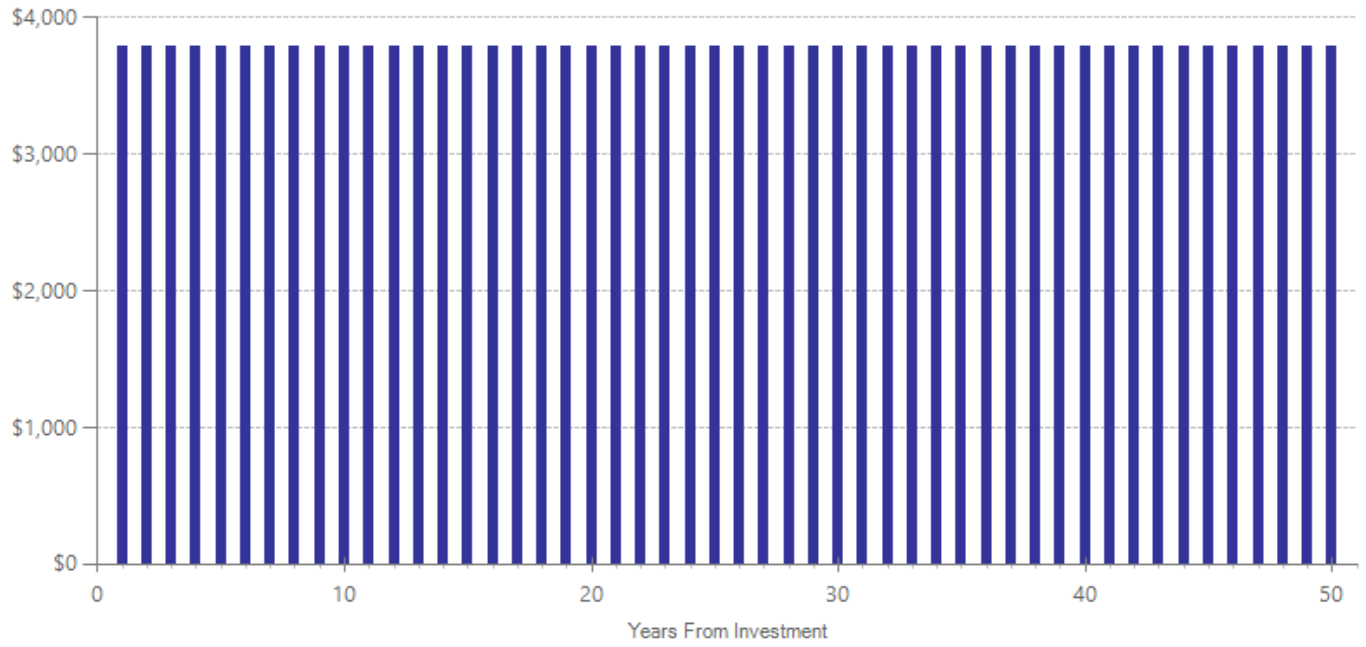
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$264	2015	Present value of net program costs (in 2016 dollars)	$1,095
Comparison costs	$1,348	2015	Cost range (+ or -)	20 %

Treatment cost estimates for this program reflect costs compared to treatment as usual. Costs are based on a weighted average of per-participant costs from included studies with sufficient staffing and programming information. The per-participant cost for the intervention group was calculated by multiplying the average staff hours per participant by the staffing costs from each study. We estimated average staffing hours from Fausett (2014), Ickovics et al. (2016), and Kennedy et al. (2011). We estimated staff salaries using the mean hourly wage estimate for Washington State reported by the Bureau of Labor Statistics, and multiplied the hourly wage by 1.441 to account for employee benefits. Comparison group costs were estimated in a similar way, assuming women received twelve prenatal care visits (the recommended number of visits for an uncomplicated pregnancy of 39 weeks), and that visits were either staffed by an obstetrician or midwife (Guidelines for Perinatal Care. The American Academy of Pediatrics and the American College of Obstetrics and Gynecologists. 2012).

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Cesarean sections	Primary	1	162	-0.048	0.150	20	0.000	0.000	21	-0.048	0.750
Low birthweight births***	Primary	4	1523	-0.084	0.070	20	0.000	0.000	21	-0.084	0.229
Postpartum depression^	Primary	2	785	0.000	0.057	20	0.000	0.000	21	0.000	1.000
Preterm birth (< 37 weeks)***	Primary	4	1989	-0.054	0.072	20	0.000	0.000	21	-0.054	0.453
Small for gestational age (SGA)***	Primary	2	1196	-0.176	0.080	20	0.000	0.000	21	-0.176	0.028
Low birthweight births***	Secondary	4	1523	-0.084	0.070	1	0.000	0.000	2	-0.084	0.229
NICU admission	Secondary	3	1358	0.016	0.085	1	0.000	0.000	2	0.016	0.853
Preterm birth (< 37 weeks)***	Secondary	4	1989	-0.054	0.072	1	0.000	0.000	2	-0.054	0.453
Small for gestational age (SGA)***	Secondary	2	1196	-0.176	0.080	1	0.000	0.000	2	-0.176	0.028

^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.

Citations Used in the Meta-Analysis

Fausett, M.B. (2014). *Centering Pregnancy (CP): A Longitudinal Correlational Study Designed to Evaluate Maternal and Fetal Outcomes After Participation in CP.*

Ford, K., Weglicki, L., Kershaw, T., Schram, C., Hoyer, P.J., & Jacobson, M.L. (2002). Effects of a prenatal care intervention for adolescent mothers on birth weight, repeat pregnancy, and educational outcomes at one year postpartum. *The Journal of Perinatal Education, 11*(1), 35-38.

Ickovics, J.R. (2007). Group prenatal care and perinatal outcomes: A randomized controlled trial. *Obstetrics and Gynecology, 111*(4), 993-994.

Ickovics, J.R., Earnshaw, V., Lewis, J.B., Kershaw, T.S., Magriples, U., Stasko, E., . . . Tobin, J.N. (2016). Cluster randomized controlled trial of group prenatal care: perinatal outcomes among adolescents in New York City health centers. *American Journal of Public Health, 106*(2), 359-365.

Ickovics, J.R., Reed, E., Magriples, U., Westdahl, C., Schindler, R.S., & Kershaw, T.S. (2011). Effects of group prenatal care on psychosocial risk in pregnancy: Results from a randomised controlled trial. *Psychology & Health, 26*(2), 235-250.

Kennedy, H.P., Farrell, T., Paden, R., Hill, S., Jolivet, R.R., Cooper, B.A., & Rising, S.S. (2011). A randomized clinical trial of group prenatal care in two military settings. *Military Medicine, 176*(10), 1169-77.

Smoking cessation programs for pregnant women: Nicotine replacement treatment

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: Nicotine replacement therapy (in the form of patches or gum) was provided to individuals in conjunction with behavioral counseling for smoking cessation during pregnancy. Individuals in comparison groups received either no nicotine replacement or a placebo patch along with behavioral counseling for smoking cessation. Individuals received treatment between 6 and 12 weeks.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$312	Benefit to cost ratio	$28.82
Participants	$317	Benefits minus costs	$3,231
Others	$171	Chance the program will produce benefits greater than the costs	75 %
Indirect	$2,548		
Total benefits	$3,347		
Net program cost	($116)		
Benefits minus cost	$3,231		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with preterm births	$1	$19	$19	$9	$48
Subtotals	$1	$19	$19	$9	$48
From secondary participant					
Infant mortality	$310	$141	$0	$2,520	$2,971
Health care associated with preterm births	$6	$152	$152	$76	$386
Subtotals	$316	$293	$152	$2,596	$3,356
Adjustment for deadweight cost of program	$0	$0	$0	($58)	($58)
Totals	$317	$312	$171	$2,548	$3,347

[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.

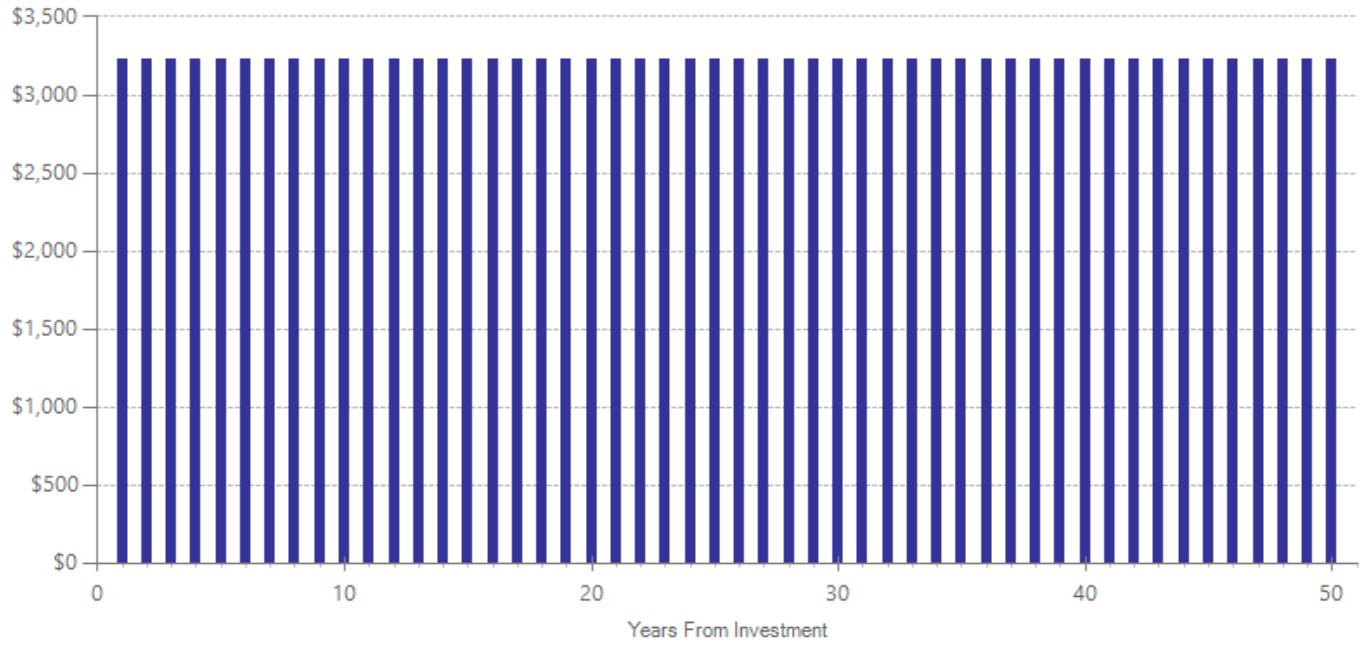
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$177	2016	Present value of net program costs (in 2016 dollars)	($116)
Comparison costs	$61	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 service) plus the average unit cost of nicotine replacement treatments (either transdermal patches or gum) reported in Smoking Cessation During Pregnancy: Guidelines for Intervention. Washington State Department of Health. 2016. Costs were obtained from Berlin et al. (2014), Coleman et al. (2012), Oncken et al. (2008), and Pollak et al. (2007).

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Low birthweight births***	Primary	4	830	-0.134	0.196	27	0.000	0.000	28	-0.134	0.494
Preterm birth (< 37 weeks)***	Primary	3	638	-0.138	0.125	27	0.000	0.000	28	-0.138	0.269
Smoking during late pregnancy^	Primary	5	972	-0.168	0.101	27	0.000	0.000	28	-0.168	0.096
Low birthweight births***	Secondary	4	830	-0.134	0.196	1	0.000	0.000	2	-0.134	0.494
NICU admission	Secondary	2	612	-0.073	0.135	1	0.000	0.000	2	-0.073	0.592
Preterm birth (< 37 weeks)***	Secondary	3	638	-0.138	0.125	1	0.000	0.000	2	-0.138	0.269

^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.

Citations Used in the Meta-Analysis

Berlin, I., Grange, G., Jacob, N., & Tanguy, M.L. (2014). Nicotine patches in pregnant smokers: randomised, placebo controlled, multicentre trial of efficacy. *BMJ, 348,* g1622.

Coleman, T., Cooper, S., Thornton, J.G., Grainge, M.J., Watts, K., Britton, J., & Lewis, S. (2012). A randomized trial of nicotine-replacement therapy patches in pregnancy. *Obstetrical & Gynecological Survey, 67*(7), 387-388.

El-Mohandes, A.A., Windsor, R., Tan, S., Perry, D.C., Gantz, M.G., & Kiely, M. (2013). A randomized clinical trial of transdermal nicotine replacement in pregnant African-American smokers. *Maternal and Child Health Journal, 17*(5), 897-906.

Oncken, C., Dornelas, E., Greene, J., Sankey, H., Glasmann, A., Feinn, R., & Kranzler, H.R. (2008). Nicotine gum for pregnant smokers: a randomized controlled trial. *Obstetrics and Gynecology, 112*(4), 859-67.

Pollak, K.I., Oncken, C.A., Lipkus, I.M., Lyna, P., Swamy, G.K., Pletsch, P.K., . . . Myers, E.R. (2007). Nicotine replacement and behavioral therapy for smoking cessation in pregnancy. *American Journal of Preventive Medicine, 33*(4), 297-305.

Non-Medicaid enhanced prenatal care programs for African-American women

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: Non-Medicaid enhanced prenatal care programs for African-American women provide psychosocial support and health education regarding risk reduction. Some programs also include case management and nutritional counseling. Services are provided by paraprofessionals or nurses. Participants typically receive the program for five months, including prenatal and postpartum services. All women in treatment and comparison groups receive clinical prenatal care (treatment as usual).

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$561	Benefit to cost ratio	$5.66
Participants	$279	Benefits minus costs	$2,763
Others	$442	Chance the program will produce benefits greater than the costs	69 %
Indirect	$2,074		
Total benefits	$3,355		
Net program cost	($592)		
Benefits minus cost	$2,763		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with Cesarean sections	$3	$82	$82	$41	$209
Health care associated with low birthweight births	$0	($2)	($2)	($1)	($6)
Subtotals	$3	$80	$80	$40	$203
From secondary participant					
Infant mortality	$261	$118	$0	$2,149	$2,528
Health care associated with low birthweight births	($1)	($20)	($20)	($10)	($50)
Health care associated with NICU admissions	$16	$382	$382	$192	$970
Subtotals	$276	$481	$362	$2,331	$3,449
Adjustment for deadweight cost of program	$0	$0	$0	($297)	($297)
Totals	$279	$561	$442	$2,074	$3,355

[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.

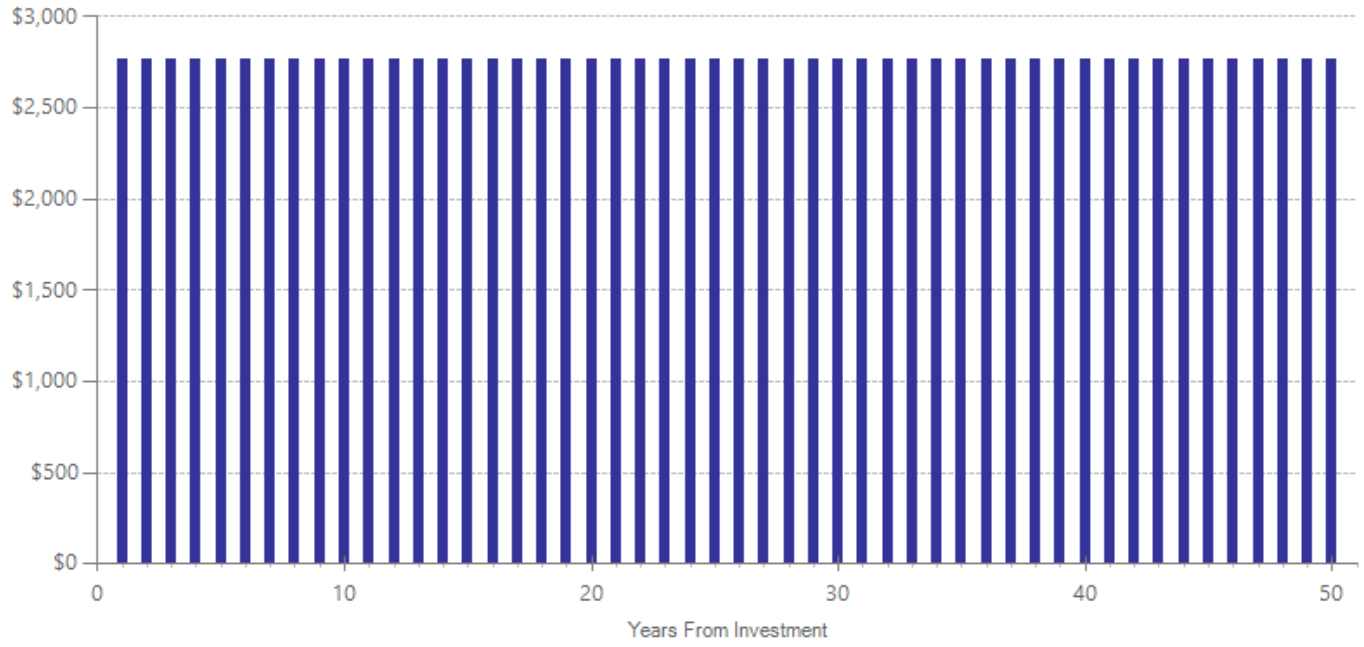
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$1,967	2014	Present value of net program costs (in 2016 dollars)	($592)
Comparison costs	$1,383	2014	Cost range (+ or -)	15 %

Per-participant program cost estimates are based on average costs for included studies. We estimate provider hours, apply the mean hourly wage estimate for Washington State reported by the Bureau of Labor Statistics (September 2016) for the appropriate provider, and increase wages by a factor of 1.441 to account for the cost of employee benefits. Studies averaged ten provider hours, and providers varied (paraprofessionals or nurses). Both groups receive treatment as usual. The costs of treatment as usual are the average costs of usual prenatal care in Washington State (Washington State Department of Health, September 2016).

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Cesarean sections	Primary	1	311	-0.158	0.136	23	0.000	0.000	24	-0.158	0.248
Low birthweight births***	Primary	4	1432	0.015	0.086	23	0.000	0.000	24	-0.031	0.759
Preterm birth (< 37 weeks)***	Primary	1	311	-0.192	0.151	23	0.000	0.000	24	-0.192	0.203
Very low birthweight birth (< 1500g)***	Primary	1	669	-0.199	0.142	23	0.000	0.000	24	-0.199	0.161
Low birthweight births***	Secondary	4	1432	0.015	0.086	1	0.000	0.000	2	-0.031	0.759
NICU admission	Secondary	1	311	-0.234	0.149	1	0.000	0.000	2	-0.234	0.115
Preterm birth (< 37 weeks)***	Secondary	1	311	-0.192	0.151	1	0.000	0.000	2	-0.192	0.203
Very low birthweight birth (< 1500g)***	Secondary	1	669	-0.199	0.142	1	0.000	0.000	2	-0.199	0.161

***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.

Citations Used in the Meta-Analysis

Herman, A.A., Berendes, H.W., Yu, K.F., Cooper, L.C., Overpeck, M.D., Rhoads, G., . . . Coates, D.L. (1996). Evaluation of the effectiveness of a community-based enriched model prenatal intervention project in the District of Columbia. *Health Services Research, 31*(5), 609-21.

Klerman, L.V., Ramey, S.L., Goldenberg, R.L., Marbury, S., Hou, J., & Cliver, S.P. (2001). A randomized trial of augmented prenatal care for multiple-risk, Medicaid-eligible African American women. *American Journal of Public Health, 91*(1), 105-11.

Norbeck, J.S., DeJoseph, J.F., & Smith, R.T. (1996). A randomized trial of an empirically-derived social support intervention to prevent low birthweight among African American women. *Social Science & Medicine, 43*(6), 947-954.

Peoples, M.D., Grimson, R.C., & Daughtry, G.L. (1984). Evaluation of the effects of the North Carolina Improved Pregnancy Outcome Project: implications for state-level decision-making. *American Journal of Public Health, 74*(6), 549-54.

Non-Medicaid enhanced prenatal care programs for adolescents

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: Non-Medicaid enhanced prenatal care programs for pregnant adolescents include intensive case management, group classes, or both, provided by either a paraprofessional or team of health service providers. Adolescent women are eligible for these programs if they are 18 or under during their pregnancy. Participants typically receive services for four months during the prenatal period, with an average of 12 one-hour sessions. All women in treatment and comparison groups receive clinical prenatal care (treatment as usual).

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$644	Benefit to cost ratio	$5.84
Participants	$255	Benefits minus costs	$2,483
Others	$0	Chance the program will produce benefits greater than the costs	73 %
Indirect	$2,096		
Total benefits	$2,996		
Net program cost	($513)		
Benefits minus cost	$2,483		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with preterm births	$0	$57	$0	$29	$86
Subtotals	$0	$57	$0	$29	$86
From secondary participant					
Infant mortality	$255	$116	$0	$2,089	$2,460
Health care associated with preterm births	$0	$471	$0	$235	$706
Subtotals	$255	$587	$0	$2,323	$3,166
Adjustment for deadweight cost of program	$0	$0	$0	($256)	($256)
Totals	$255	$644	$0	$2,096	$2,996

[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.

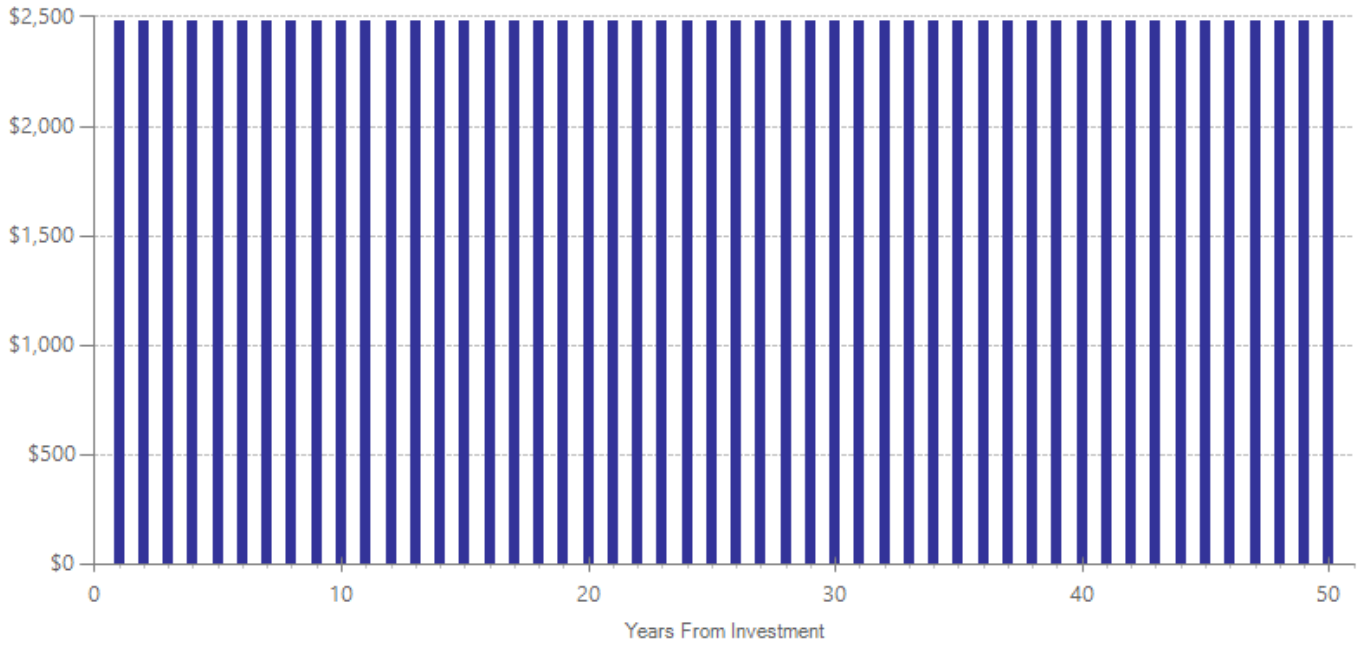
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$1,888	2014	Present value of net program costs (in 2016 dollars)	($513)
Comparison costs	$1,383	2014	Cost range (+ or -)	15 %

Per-participant program cost estimates are based on estimated costs for included studies. For each study, we estimate provider hours, apply the mean hourly wage estimate for Washington State reported by the Bureau of Labor Statistics (September 2016), and increase wages by a factor of 1.441 to account for the cost of employee benefits. Studies averaged 12 provider hours, and providers varied (paraprofessional, social workers, nurse, or multiple providers). Program participants also receive treatment as usual, so we include the average cost of prenatal care in Washington in the total program cost. The comparison costs include the cost of treatment as usual, per participant. The costs of treatment as usual are the average costs of usual prenatal care in Washington State (Washington State Department of Health, September 2016).

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Low birthweight births***	Primary	4	2556	-0.106	0.105	16	0.000	0.000	17	-0.155	0.185
Preterm birth (< 37 weeks)***	Primary	2	2004	-0.181	0.140	16	0.000	0.000	17	-0.216	0.041
Very low birthweight birth (< 1500g)***	Primary	1	744	-0.058	0.069	16	0.000	0.000	17	-0.162	0.019
Infant mortality	Secondary	1	744	-0.037	0.069	1	0.000	0.000	2	-0.102	0.141
Low birthweight births***	Secondary	4	2556	-0.106	0.105	1	0.000	0.000	2	-0.155	0.185
Preterm birth (< 37 weeks)***	Secondary	2	2004	-0.181	0.140	1	0.000	0.000	2	-0.216	0.041
Very low birthweight birth (< 1500g)***	Secondary	1	744	-0.058	0.069	1	0.000	0.000	2	-0.162	0.019

***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.

Citations Used in the Meta-Analysis

Hardy, J.B., King, T.M., & Repke, J.T. (1987). The Johns Hopkins Adolescent Pregnancy Program: an evaluation. *Obstetrics and Gynecology, 69*(3), 300-6.

Korenbrot, C.C., Showstack, J., Loomis, A., & Brindis, C. (1989). Birth weight outcomes in a teenage pregnancy case management project. *Journal of Adolescent Health Care, 10*(2), 97-104.

Sangalang, B.B., Barth, R.P., & Painter, J.S. (2006). First birth outcomes and timing of second births: A statewide case management program for adolescent mothers. *Health & Social Work, 31*(1), 54-63.

Covington, D.L., Peoples-Sheps, M.D., Buescher, P.A., Bennett, T.A., & Paul, M.V. (1998). An Evaluation of an Adolescent Prenatal Education Program. *American Journal of Health Behavior, 22*(5), 323-33.

Smoking cessation programs for pregnant women: Intensive behavioral interventions

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

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	$204	Benefit to cost ratio	$23.90
Participants	$215	Benefits minus costs	$2,168
Others	$109	Chance the program will produce benefits greater than the costs	89 %
Indirect	$1,735		
Total benefits	$2,262		
Net program cost	($95)		
Benefits minus cost	$2,168		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with low birthweight births	$0	$11	$11	$5	$28
Subtotals	$0	$11	$11	$5	$28
From secondary participant					
Infant mortality	$210	$96	$0	$1,728	$2,034
Health care associated with low birthweight births	$4	$98	$98	$49	$248
Subtotals	$214	$193	$98	$1,777	$2,282
Adjustment for deadweight cost of program	$0	$0	$0	($47)	($47)
Totals	$215	$204	$109	$1,735	$2,262

[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.

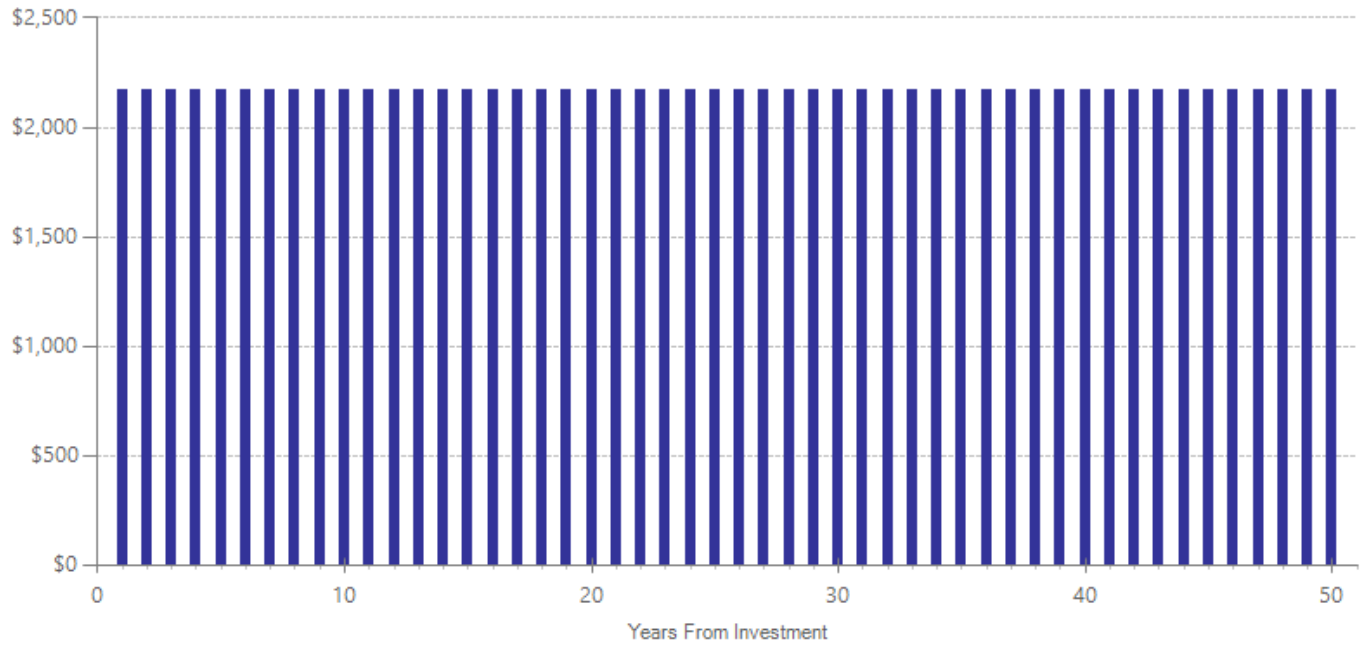
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$99	2016	Present value of net program costs (in 2016 dollars)	($95)
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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Low birthweight births***	Primary	3	793	-0.088	0.066	26	0.000	0.000	27	-0.088	0.183
Regular smoking	Primary	6	895	-0.043	0.074	26	-0.043	0.074	36	-0.043	0.559
Smoking during late pregnancy^	Primary	16	2370	-0.228	0.079	26	0.000	0.000	27	-0.228	0.004
Low birthweight births***	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.

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.

Resource Mothers Program

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: The Resource Mothers Program is a prenatal home visiting programs for pregnant adolescents age 19 and under. Adolescent women are eligible for this program during their pregnancy and for 12 months postpartum. In this program, a paraprofessional provider called a "resource mother" makes monthly visits to the adolescents' home to provide case management, risk assessments, psychosocial support, or health education. Resource mothers are supervised by a social worker.

The Resource Mothers Program provides an average of 16 home visiting hours, 1 training hour, and 1 supervisory hour per participant. All women in treatment and comparison groups receive clinical prenatal care (treatment as usual). Both studies included in this analysis were implemented in South Carolina.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$358	Benefit to cost ratio	$2.80
Participants	$205	Benefits minus costs	$1,290
Others	$0	Chance the program will produce benefits greater than the costs	84 %
Indirect	$1,442		
Total benefits	$2,005		
Net program cost	($716)		
Benefits minus cost	$1,290		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with preterm births	$0	$29	$0	$14	$43
Subtotals	$0	$29	$0	$14	$43
From secondary participant					
Infant mortality	$205	$93	$0	$1,668	$1,966
Health care associated with preterm births	$0	$237	$0	$119	$356
Subtotals	$205	$330	$0	$1,787	$2,322
Adjustment for deadweight cost of program	$0	$0	$0	($360)	($360)
Totals	$205	$358	$0	$1,442	$2,005

[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.

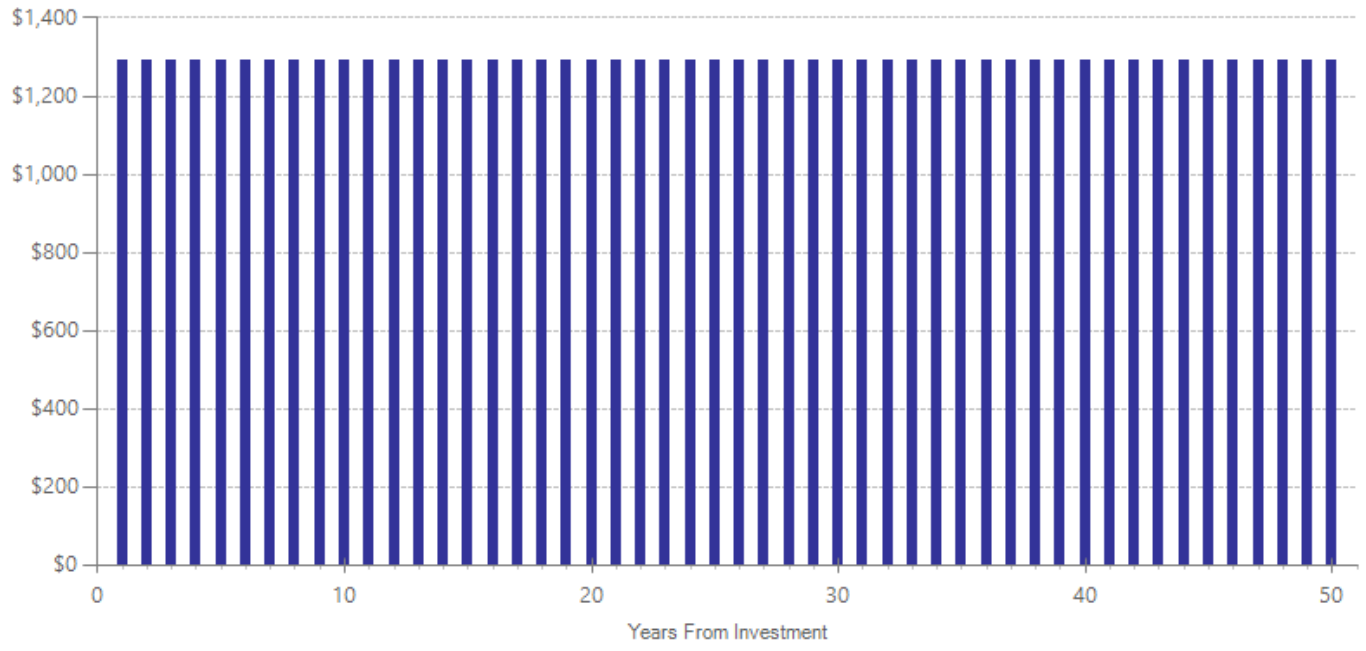
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$715	2016	Present value of net program costs (in 2016 dollars)	($716)
Comparison costs	$0	2016	Cost range (+ or -)	10 %

Treatment cost estimates for this program reflect costs beyond treatment as usual. We estimate provider hours including home visiting hours, training hours, and supervisory hours; apply the mean hourly wage estimate for Washington State reported by the Bureau of Labor Statistics (September 2016) for the appropriate provider; and increase wages by a factor of 1.441 to account for the cost of employee benefits. Included studies averaged 16 home visiting hours, 1 training hour, and 1 supervisory hour per participant.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Low birthweight births***	Primary	2	2466	-0.037	0.044	16	0.000	0.000	17	-0.111	0.271
Preterm birth (< 37 weeks)***	Primary	1	1901	-0.085	0.045	16	0.000	0.000	17	-0.085	0.058
Small for gestational age (SGA)***	Primary	1	565	-0.088	0.079	16	0.000	0.000	17	-0.245	0.002
Very low birthweight birth (< 1500g)***	Primary	1	565	-0.042	0.079	16	0.000	0.000	17	-0.118	0.137
Low birthweight births***	Secondary	2	2466	-0.037	0.044	1	0.000	0.000	2	-0.111	0.271
Preterm birth (< 37 weeks)***	Secondary	1	1901	-0.085	0.045	1	0.000	0.000	2	-0.085	0.058
Small for gestational age (SGA)***	Secondary	1	565	-0.088	0.079	1	0.000	0.000	2	-0.245	0.002
Very low birthweight birth (< 1500g)***	Secondary	1	565	-0.042	0.079	1	0.000	0.000	2	-0.118	0.137

***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.

Citations Used in the Meta-Analysis

Heins, H.C. Jr., Nance, N.W., & Ferguson, J.E. (1987). Social support in improving perinatal outcome: the Resource Mothers Program. *Obstetrics and Gynecology, 70*(2), 263-6.

Rogers, M.M., Peoples-Sheps, M.D., & Suchindran, C. (1996). Impact of a social support program on teenage prenatal care use and pregnancy outcomes. *Journal of Adolescent Health, 19*(2), 132-140.

Cesarean section reduction programs: Multi-faceted hospital-based interventions (Medicaid population)

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated November 2015.

Program Description: These interventions encompass bundled reform packages adopted by hospitals in order to change physician decision-making in performing cesarean sections. While the specific components of these bundled reform packages vary, they typically include the adoption of physician best practices, especially guidelines on when cesarean sections should be performed, and the limitation of inductions before 39 weeks of gestation. Most reform packages also attempt to change physician behavior by publishing either their anonymous or identified cesarean section rates via a report card or by creating a physician review board that regularly audits the appropriateness of performed cesarean sections. These packages can also include the recruitment of physicians to serve as local opinion leaders or potentially other clinical or non-clinical interventions.

The benefits presented in the benefit-cost analysis are specific to the Medicaid population.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$202	Benefit to cost ratio	$8.31
Participants	$0	Benefits minus costs	$251
Others	$0	Chance the program will produce benefits greater than the costs	100 %
Indirect	$84		
Total benefits	$286		
Net program cost	($34)		
Benefits minus cost	$251		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with Cesarean sections	$0	$202	$0	$101	$303
Adjustment for deadweight cost of program	$0	$0	$0	($17)	($17)
Totals	$0	$202	$0	$84	$286

[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.

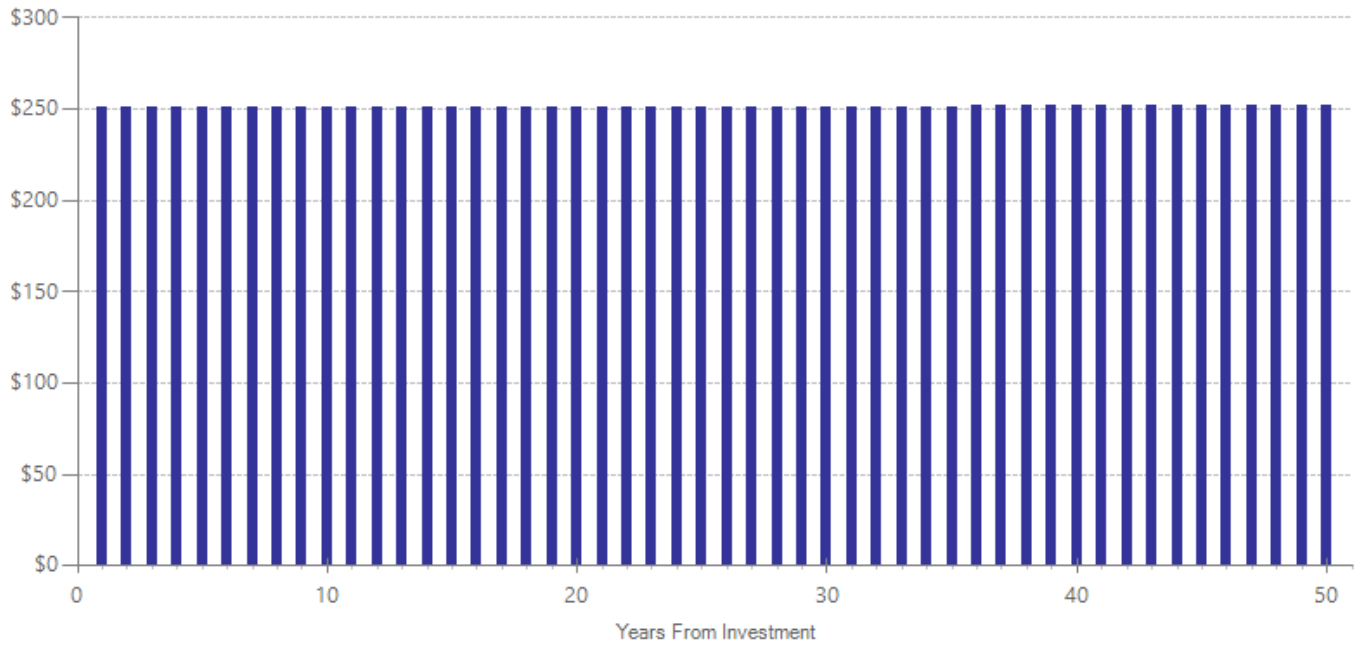
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$34	2014	Present value of net program costs (in 2016 dollars)	($34)
Comparison costs	$0	2014	Cost range (+ or -)	20 %

The average per-participant cost of these programs was computed as the product of 80 hours per health care provider and average Washington State 2014 hourly wages of the appropriate professionals (typically obstetrician/gynecologists, general practitioners and nurse staff) for training in best practices, implementation of guidelines, and quarterly audit and review of hospital cesarean section rates. The estimate of the required staff hours were taken from Chaillet et al. (2015). A cluster-randomized trial to reduce cesarean delivery rates in Quebec. *New England Journal of Medicine, 372*(18), 1710-1721.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Cesarean sections	7	115838	-0.243	0.075	26	0.000	0.000	27	-0.243	0.001

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.

Citations Used in the Meta-Analysis

Chaillet, N., Pasquier, J.-C., Dube, E., Fraser, W.D., Abrahamowicz, M., Dugas, M., Burne, R., et al. (2015). A cluster-randomized trial to reduce cesarean delivery rates in Quebec. *New England Journal of Medicine, 372*(18), 1710-1721.

Liang, W.H., Yuan, C.C., Hung, J.H., Yang, M.L., Yang, M.J., Chen, Y.J., & Yang, T.S. (2004). Effect of peer review and trial of labor on lowering cesarean section rates. *Journal of the Chinese Medical Association, 6*(6), 281-6.

Main, E.K. (1999). Reducing cesarean birth rates with data-driven quality improvement activities. *Pediatrics, 103*(1), 374-83.

Myers, S.A., & Gleicher, N. (1993). The Mount Sinai cesarean section reduction program: an update after 6 years. *Social Science & Medine, 3*(10), 1219-22.

Poma, P.A. (1998). Effect of departmental policies on cesarean delivery rates: a community hospital experience. *Obstetrics and Gynecology, 91*(6), 1013-8.

Robson, M.S., Scudamore, I.W., & Walsh, S.M. (1996). Using the medical audit cycle to reduce cesarean section rates. *American Journal of Obstetrics and Gynecology, 174*(1), 199-205.

Sanchez-Ramos, L., Kaunitz, A.M., Peterson, H.B., Martinez-Schnell, B., & Thompson, R.J. (1990). Reducing cesarean sections at a teaching hospital. *American Journal of Obstetrics and Gynecology, 163*(3), 1081-7.

Cesarean section reduction programs: Multi-faceted hospital-based interventions (private pay population)

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated November 2015.

Program Description: These interventions encompass bundled reform packages adopted by hospitals in order to change physician decision-making in performing cesarean sections. While the specific components of these bundled reform packages vary, they typically include the adoption of physician best practices, especially guidelines on when cesarean sections should be performed, and the limitation of inductions before 39 weeks of gestation. Most reform packages also attempt to change physician behavior by publishing either their anonymous or identified cesarean section rates via a report card or by creating a physician review board that regularly audits the appropriateness of performed cesarean sections. These packages can also include the recruitment of physicians to serve as local opinion leaders or potentially other clinical or non-clinical interventions.

The benefits presented in the benefit-cost analysis are specific to the privately insured population.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$0	Benefit to cost ratio	$7.87
Participants	$14	Benefits minus costs	$236
Others	$273	Chance the program will produce benefits greater than the costs	100 %
Indirect	($17)		
Total benefits	$271		
Net program cost	($34)		
Benefits minus cost	$236		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with Cesarean sections	$14	$0	$273	$0	$288
Adjustment for deadweight cost of program	$0	$0	$0	($17)	($17)
Totals	$14	$0	$273	($17)	$271

[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.

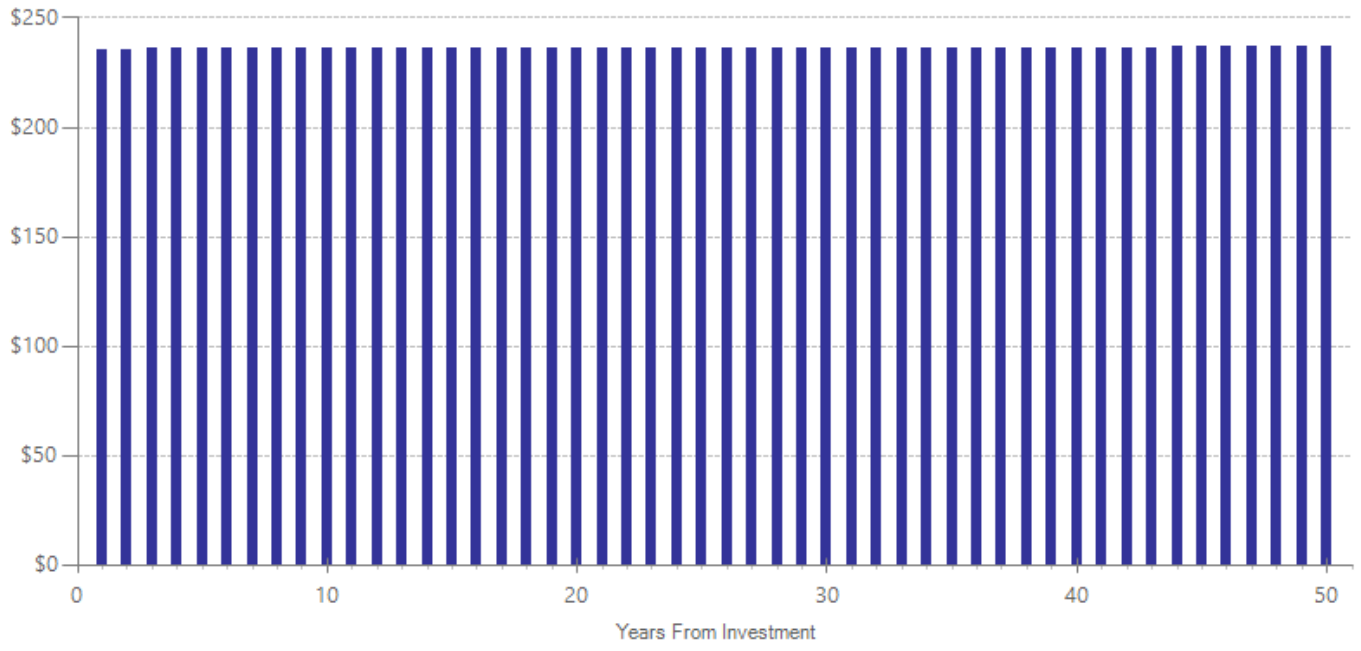
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$34	2014	Present value of net program costs (in 2016 dollars)	($34)
Comparison costs	$0	2014	Cost range (+ or -)	20 %

The average per-participant cost of these programs was computed as the product of 80 hours per health care provider and average Washington State 2014 hourly wages of the appropriate professionals (typically obstetrician/gynecologists, general practitioners and nurse staff) for training in best practices, implementation of guidelines, and quarterly audit and review of hospital cesarean section rates. The estimate of the required staff hours were taken from Chaillet et al. (2015). A cluster-randomized trial to reduce cesarean delivery rates in Quebec. *New England Journal of Medicine, 372*(18), 1710-1721.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Cesarean sections	7	115838	-0.243	0.075	26	0.000	0.000	27	-0.243	0.001

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.

Citations Used in the Meta-Analysis

Chaillet, N., Pasquier, J.-C., Dube, E., Fraser, W.D., Abrahamowicz, M., Dugas, M., Burne, R., et al. (2015). A cluster-randomized trial to reduce cesarean delivery rates in Quebec. *New England Journal of Medicine, 372*(18), 1710-1721.

Liang, W.H., Yuan, C.C., Hung, J.H., Yang, M.L., Yang, M.J., Chen, Y.J., & Yang, T.S. (2004). Effect of peer review and trial of labor on lowering cesarean section rates. *Journal of the Chinese Medical Association : Jcma, 6*(6), 281-6.

Main, E. K. (1999). Reducing cesarean birth rates with data-driven quality improvement activities. *Pediatrics, 103*(1), 374-83.

Myers, S.A., & Gleicher, N. (1993). The Mount Sinai cesarean section reduction program: an update after 6 years. *Social Science & Medine, 3*(10), 1219-22.

Poma, P.A. (1998). Effect of departmental policies on cesarean delivery rates: a community hospital experience. *Obstetrics and Gynecology, 91*(6), 1013-8.

Robson, M.S., Scudamore, I.W., & Walsh, S.M. (1996). Using the medical audit cycle to reduce cesarean section rates. *American Journal of Obstetrics and Gynecology, 174*(1), 199-205.

Sanchez-Ramos, L., Kaunitz, A.M., Peterson, H.B., Martinez-Schnell, B., & Thompson, R.J. (1990). Reducing cesarean sections at a teaching hospital. *American Journal of Obstetrics and Gynecology, 163*(3), 1081-7.

Cesarean section reduction programs: Audit and feedback (Medicaid population)

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated November 2015.

Program Description: Audit and feedback is a physician-centered approach to reducing cesarean section rates by reviewing cesarean sections for their appropriateness according to pre-established guidelines. These interventions vary in the frequency with which the audits are performed and the feedback provided. There is also variation in whether information is provided anonymously or if physicians or departments are associated with their cesarean section rates.

The benefits presented in the benefit-cost analysis are specific to the Medicaid population.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$124	Benefit to cost ratio	$6.25
Participants	$0	Benefits minus costs	$144
Others	$0	Chance the program will produce benefits greater than the costs	85 %
Indirect	$48		
Total benefits	$172		
Net program cost	($28)		
Benefits minus cost	$144		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with Cesarean sections	$0	$124	$0	$62	$186
Adjustment for deadweight cost of program	$0	$0	$0	($14)	($14)
Totals	$0	$124	$0	$48	$172

[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.

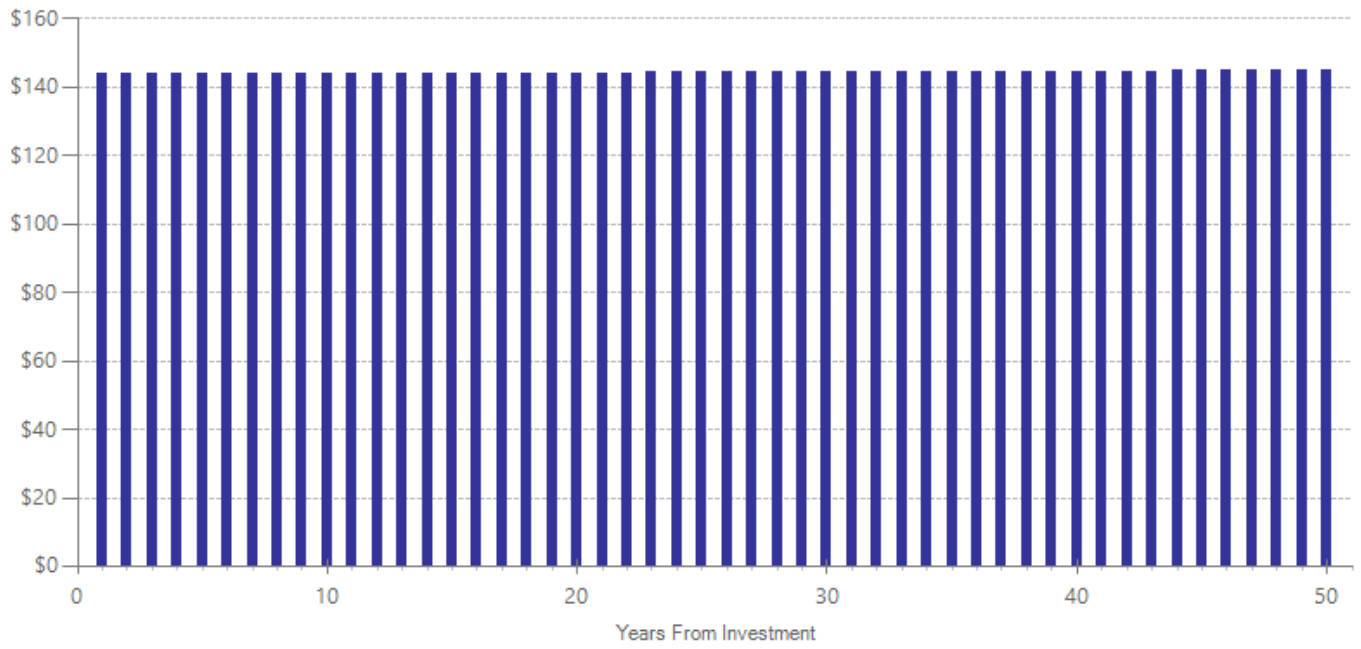
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$27	2014	Present value of net program costs (in 2016 dollars)	($28)
Comparison costs	$0	2014	Cost range (+ or -)	20 %

The average per-participant cost of these programs was computed as the product of hours and average Washington State 2014 hourly wages of the appropriate professionals (typically obstetrician/gynecologists, general practitioners and nurse staff) for a typical quarterly audit and review of hospital cesarean section rates.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Cesarean sections	3	2881	-0.142	0.109	26	0.000	0.000	27	-0.142	0.193

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.

Citations Used in the Meta-Analysis

Lomas, J., Enkin, M., Anderson, G.M., Hannah, W.J., Vayda, E., & Singer, J. (1991). Opinion leaders vs audit and feedback to implement practice guidelines. Delivery after previous cesarean section. *Jama, 265*(17), 2202-7.

Scarella, A., Chamy, V., Sepulveda, M., & Belizan, J.M. (2011). Medical audit using the Ten Group Classification System and its impact on the cesarean section rate. *European Journal of Obstetrics and Gynecology, 154*(2), 136-140.

van, D.J., Lim, F., & van, R.E. (2008). Introducing caesarean section audit in a regional teaching hospital in The Netherlands. *European Journal of Obstetrics & Gynecology and Reproductive Biology, 139*(2), 151-156.

Cesarean section reduction programs: Audit and feedback (private pay population)

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated November 2015.

Program Description: Audit and feedback is a physician-centered approach to reducing cesarean section rates by reviewing cesarean sections for their appropriateness according to pre-established guidelines. These interventions vary in the frequency with which the audits are performed and the feedback provided. There is also variation in whether information is provided anonymously or if physicians or departments are associated with their cesarean section rates.

The benefits presented in the benefit-cost analysis are specific to the privately insured population.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$0	Benefit to cost ratio	$5.80
Participants	$9	Benefits minus costs	$132
Others	$165	Chance the program will produce benefits greater than the costs	84 %
Indirect	($14)		
Total benefits	$160		
Net program cost	($28)		
Benefits minus cost	$132		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with Cesarean sections	$9	$0	$165	$0	$174
Adjustment for deadweight cost of program	$0	$0	$0	($14)	($14)
Totals	$9	$0	$165	($14)	$160

[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.

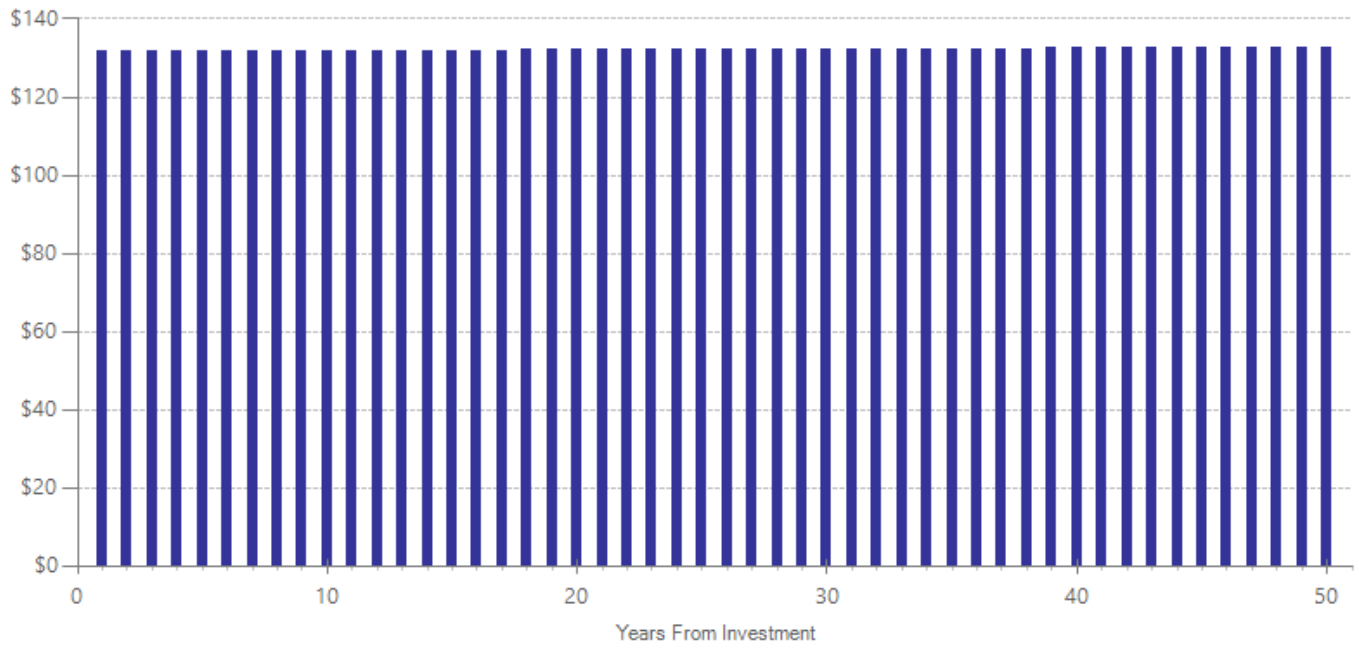
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$27	2014	Present value of net program costs (in 2016 dollars)	($28)
Comparison costs	$0	2014	Cost range (+ or -)	20 %

The average per-participant cost of these programs was computed as the product of hours and average Washington State 2014 hourly wages of the appropriate professionals (typically obstetrician/gynecologists, general practitioners and nurse staff) for a typical quarterly audit and review of hospital cesarean section rates.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Cesarean sections	3	2881	-0.142	0.109	26	0.000	0.000	27	-0.142	0.193

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.

Citations Used in the Meta-Analysis

Lomas, J., Enkin, M., Anderson, G.M., Hannah, W.J., Vayda, E., & Singer, J. (1991). Opinion leaders vs audit and feedback to implement practice guidelines. Delivery after previous cesarean section. *Jama, 265*(17), 2202-7.

Scarella, A., Chamy, V., Sepulveda, M., & Belizan, J.M. (2011). Medical audit using the Ten Group Classification System and its impact on the cesarean section rate. *European Journal of Obstetrics and Gynecology, 154*(2), 136-140.

van, D.J., Lim, F., & van, R.E. (2008). Introducing caesarean section audit in a regional teaching hospital in The Netherlands. *European Journal of Obstetrics & Gynecology and Reproductive Biology, 139*(2), 151-156.

Cesarean section reduction programs: Mandatory second opinion (Medicaid population)

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated November 2015.

Program Description: These programs require physicians to consult an additional physician for a second opinion before conducting a cesarean section.

The benefits presented in the benefit-cost analysis are specific to the Medicaid population.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$124	Benefit to cost ratio	$1.92
Participants	$0	Benefits minus costs	$71
Others	$0	Chance the program will produce benefits greater than the costs	100 %
Indirect	$24		
Total benefits	$148		
Net program cost	($77)		
Benefits minus cost	$71		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with Cesarean sections	$0	$124	$0	$62	$186
Adjustment for deadweight cost of program	$0	$0	$0	($38)	($38)
Totals	$0	$124	$0	$24	$148

[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.

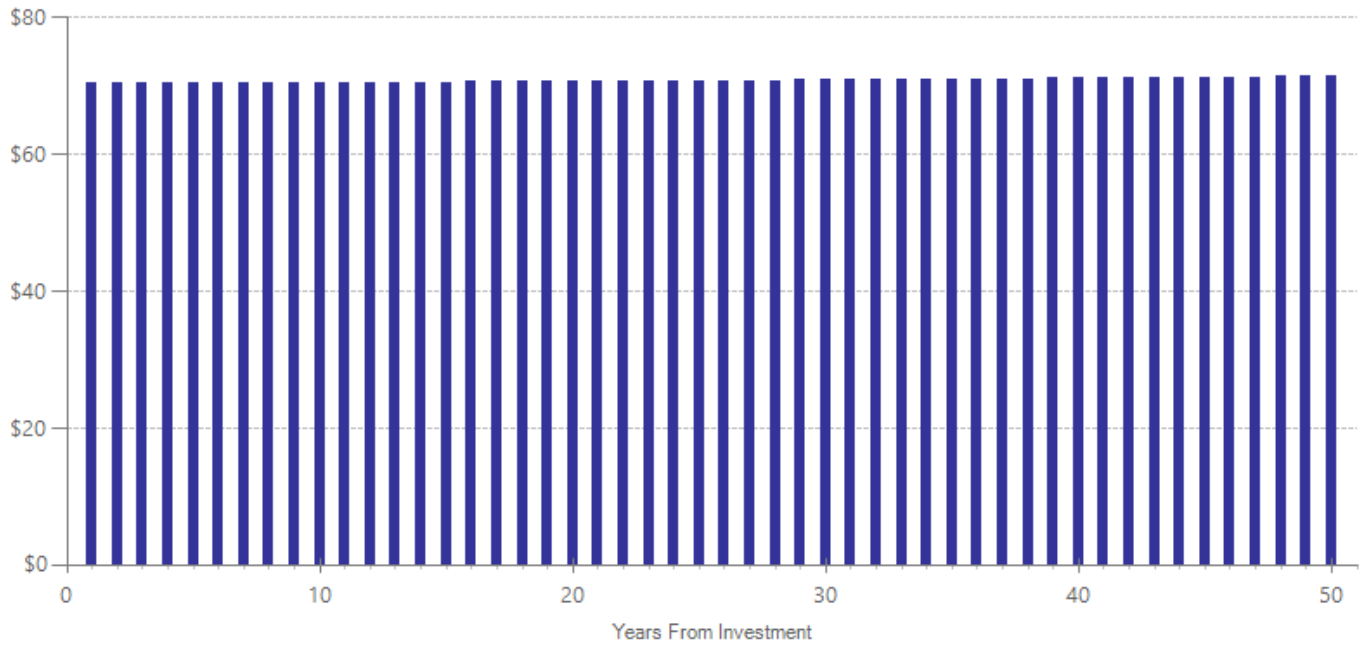
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$76	2014	Present value of net program costs (in 2016 dollars)	($77)
Comparison costs	$0	2014	Cost range (+ or -)	20 %

The average cost of these programs was computed as the product of 30 minutes of contact time and average Washington State 2014 hourly wages of a consulting obstetrician. This cost estimate does not account for the possibility of increased costs due to an increased requirement for the number of physicians on shift.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Cesarean sections	2	82761	-0.143	0.016	26	0.000	0.000	27	-0.143	0.001

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.

Citations Used in the Meta-Analysis

Althabe, F., Belizán, J.M., Villar, J., Alexander, S., Bergel, E., Ramos, S., . . . Latin American Caesarean Section Study Group. (2004). Mandatory second opinion to reduce rates of unnecessary caesarean sections in Latin America: a cluster randomised controlled trial. *The Lancet, 363*(9425), 1934-1940.

Sloan, N.L., Pinto, E., Calle, A., Langer, A., Winikoff, B., & Fassihian, G. (2000). Reduction of the cesarean delivery rate in Ecuador. *International Journal of Gynecology & Obstetrics, 69*(3), 229-236.

Cesarean section reduction programs: Mandatory second opinion (private pay population)

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated November 2015.

Program Description: These programs require physicians to consult an additional physician for a second opinion before conducting a cesarean section.

The benefits presented in the benefit-cost analysis are specific to the privately insured population.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$0	Benefit to cost ratio	$1.79
Participants	$9	Benefits minus costs	$61
Others	$167	Chance the program will produce benefits greater than the costs	98 %
Indirect	($39)		
Total benefits	$138		
Net program cost	($77)		
Benefits minus cost	$61		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with Cesarean sections	$9	$0	$167	$0	$176
Adjustment for deadweight cost of program	$0	$0	$0	($39)	($39)
Totals	$9	$0	$167	($39)	$138

[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.

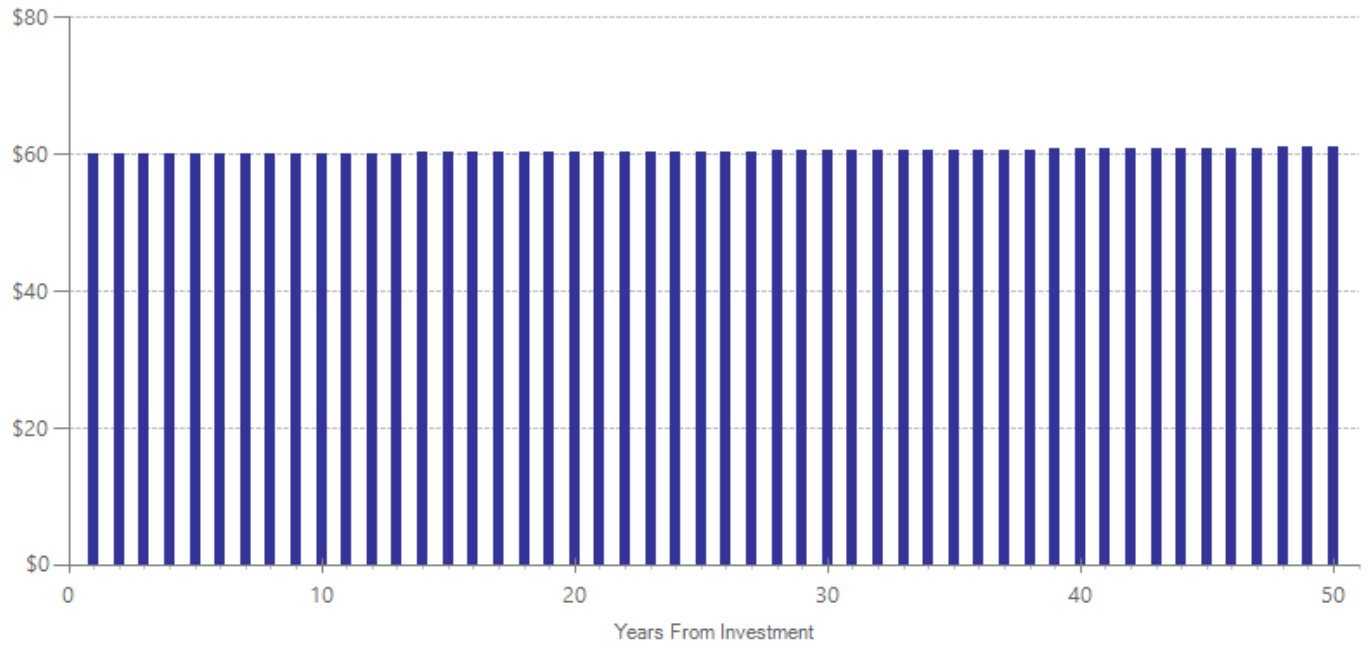
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$76	2014	Present value of net program costs (in 2016 dollars)	($77)
Comparison costs	$0	2014	Cost range (+ or -)	20 %

The average cost of these programs was computed as the product of 30 minutes of contact time and average Washington State 2014 hourly wages of a consulting obstetrician. This cost estimate does not account for the possibility of increased costs due to an increased requirement for the number of physicians on shift.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Cesarean sections	2	82761	-0.143	0.016	26	0.000	0.000	27	-0.143	0.001

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.

Citations Used in the Meta-Analysis

Althabe, F., Belizán, J.M., Villar, J., Alexander, S., Bergel, E., Ramos, S., . . . Latin American Caesarean Section Study Group. (2004). Mandatory second opinion to reduce rates of unnecessary caesarean sections in Latin America: a cluster randomised controlled trial. *The Lancet, 363*(9425), 1934-1940.

Sloan, N.L., Pinto, E., Calle, A., Langer, A., Winikoff, B., & Fassihian, G. (2000). Reduction of the cesarean delivery rate in Ecuador. *International Journal of Gynecology & Obstetrics, 69*(3), 229-236.

Cesarean section reduction programs: Continuous support (Medicaid population)

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated November 2015.

Program Description: These hospital-based interventions measure the influence of continuous emotional and physical support for women in labor in reducing medical interventions, specifically cesarean sections. The scope of the interventions varies, from solely intrapartum support to pre-natal education and post-partum care and lactation support. Similarly, the nature of the practitioner also varies, including nurses with additional training, doulas who are not included in hospital staff, or friends or family of the laboring mother who have received additional training. Only studies that use a control group—women with a support person (e.g. partner or family member)—are included here to increase generalizability to Washington State's population.

The benefits presented in the benefit-cost analysis are specific to the Medicaid population.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$83	Benefit to cost ratio	($0.03)
Participants	$0	Benefits minus costs	($267)
Others	$0	Chance the program will produce benefits greater than the costs	1 %
Indirect	($89)		
Total benefits	($7)		
Net program cost	($261)		
Benefits minus cost	($267)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with Cesarean sections	$0	$83	$0	$41	$124
Adjustment for deadweight cost of program	$0	$0	$0	($130)	($130)
Totals	$0	$83	$0	($89)	($7)

[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.

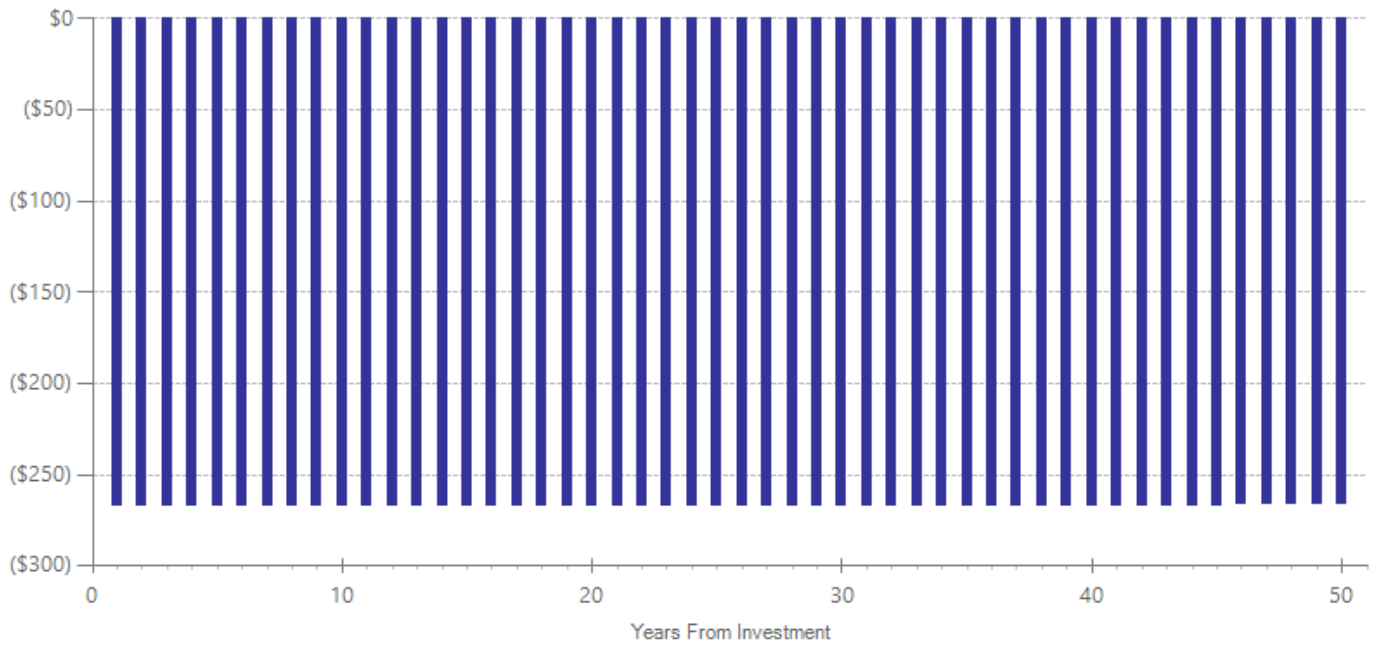
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$257	2014	Present value of net program costs (in 2016 dollars)	($261)
Comparison costs	$0	2014	Cost range (+ or -)	10 %

Per-participant cost is the reimbursement rate from Minnesota Medicaid for the cost of a doula for a labor and delivery session. This does not include reimbursement for additional prenatal or postnatal education and/or counseling.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Cesarean sections	5	4327	-0.093	0.090	26	0.000	0.000	27	-0.093	0.304

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.

Citations Used in the Meta-Analysis

Campbell, D.A., Lake, M.F., Falk, M., & Backstrand, J.R. (2006). A randomized control trial of continuous support in labor by a lay doula. *Journal of Obstetric, Gynecologic, and Neonatal Nursing, 35*(4), 456-464.

Gagnon, A.J., Waghorn, K., & Covell, C. (1997). A randomized trial of one-to-one nurse support of women in labor. *Birth, 24*(2), 71-77.

Gordon, N.P., Walton, D., McAdam, E., Derman, J., Gallitero, G., & Garrett, L. (1999). Effects of providing hospital-based doulas in health maintenance organization hospitals. *Obstetrics & Gynecology, 93*(3), 422–426.

Hodnett, E.D., Lowe, N.K., Hannah, M.E., Willan, A.R., Stevens, B., Weston, J.A., . . . Nursing Supportive Care in Labor Trial Group. (2002). Effectiveness of nurses as providers of birth labor support in North American hospitals: a randomized controlled trial. *Jama, 288*(11), 1373-1381.

McGrath, S.K., & Kennell, J.H. (2008). A randomized controlled trial of continuous labor support for middle-class couples: Effect on cesarean delivery rates. *Birth, 35*(2), 92-97.

Cesarean section reduction programs: Continuous support (private pay population)

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated November 2015.

Program Description: These hospital-based interventions measure the influence of continuous emotional and physical support for women in labor in reducing medical interventions, specifically cesarean sections. The scope of the interventions varies, from solely intrapartum support to pre-natal education and post-partum care and lactation support. Similarly, the nature of the practitioner also varies, including nurses with additional training, doulas who are not included in hospital staff, or friends or family of the laboring mother who received additional training. Only studies that use a control group—women with a support person (e.g. partner or family member)—are included here to increase generalizability to Washington State's population.

The benefits presented in the benefit-cost analysis are specific to the privately insured population.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	$0	Benefit to cost ratio	($0.05)
Participants	$6	Benefits minus costs	($274)
Others	$112	Chance the program will produce benefits greater than the costs	1 %
Indirect	($131)		
Total benefits	($13)		
Net program cost	($261)		
Benefits minus cost	($274)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with Cesarean sections	$6	$0	$112	$0	$117
Adjustment for deadweight cost of program	$0	$0	$0	($131)	($131)
Totals	$6	$0	$112	($131)	($13)

[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.

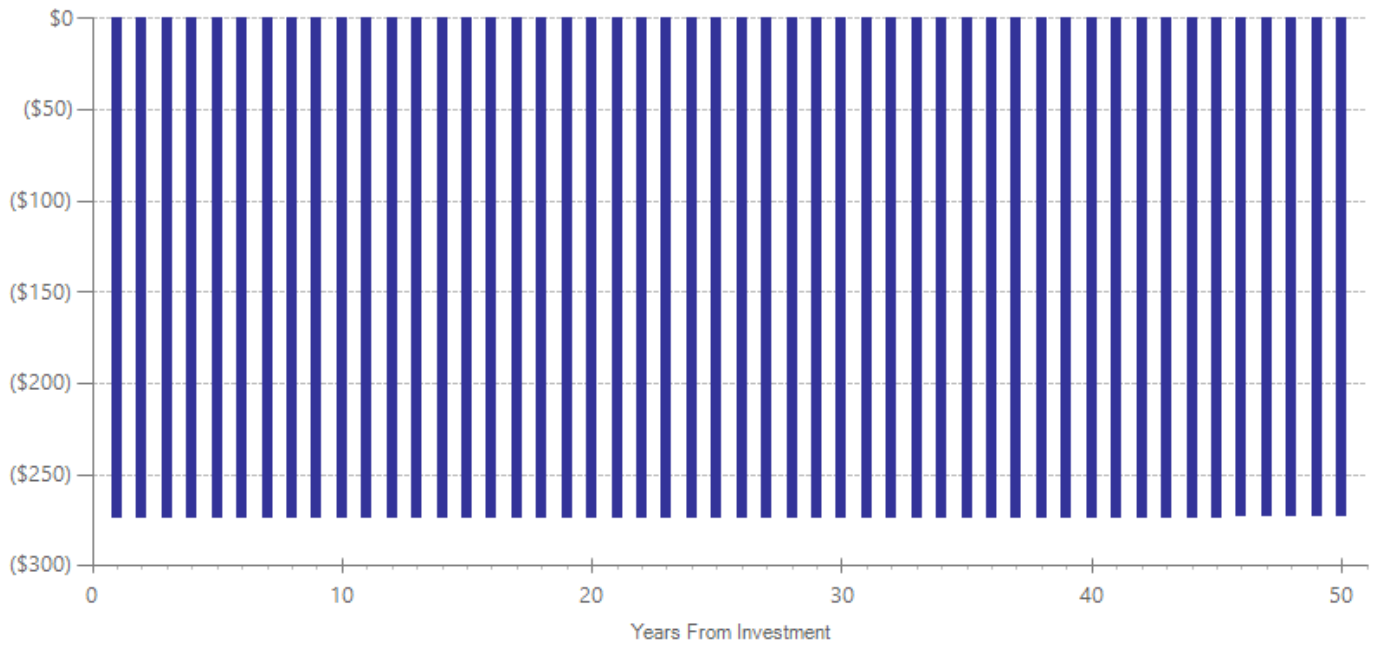
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$257	2014	Present value of net program costs (in 2016 dollars)	($261)
Comparison costs	$0	2014	Cost range (+ or -)	10 %

Per-participant cost is the reimbursement rate from Minnesota Medicaid for the cost of a doula for a labor and delivery session. This does not include reimbursement for additional prenatal or postnatal education and/or counseling.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the "break-even" point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Cesarean sections	5	4327	-0.093	0.090	26	0.000	0.000	27	-0.093	0.304

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.

Citations Used in the Meta-Analysis

Campbell, D.A., Lake, M.F., Falk, M., & Backstrand, J.R. (2006). A randomized control trial of continuous support in labor by a lay doula. *Journal of Obstetric, Gynecologic, and Neonatal Nursing, 35*(4), 456-464.

Gagnon, A.J., Waghorn, K., & Covell, C. (1997). A randomized trial of one-to-one nurse support of women in labor. *Birth, 24*(2), 71-77.

Gordon, N.P., Walton, D., McAdam, E., Derman, J., Gallitero, G., & Garrett, L. (1999). Effects of providing hospital-based doulas in health maintenance organization hospitals. *Obstetrics & Gynecology, 93*(3), 422–426.

Hodnett, E.D., Lowe, N.K., Hannah, M.E., Willan, A.R., Stevens, B., Weston, J.A., . . . Nursing Supportive Care in Labor Trial Group. (2002). Effectiveness of nurses as providers of birth labor support in North American hospitals: a randomized controlled trial. *Jama, 288*(11), 1373-1381.

McGrath, S.K., & Kennell, J.H. (2008). A randomized controlled trial of continuous labor support for middle-class couples: Effect on cesarean delivery rates. *Birth, 35*(2), 92-97.

Interventions to prevent excessive gestational weight gain (population with obesity-related risk factors)

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: A wide range of programs aim to prevent excessive gestational weight gain in a population with obesity-related risk factors (based on their pre-pregnancy BMI). We included programs that offer an exercise class and programs that offer counseling on recommended weight gain during pregnancy. Typically athletic trainers lead exercise programs in groups and counseling is delivered one-on-one in a clinical setting by a health educator, midwife, psychologist, or obstetrician.

Benefit-Cost Summary Statistics Per Participant

Benefits to:			
Taxpayers	($212)	Benefit to cost ratio	($3.71)
Participants	($17)	Benefits minus costs	($953)
Others	($215)	Chance the program will produce benefits greater than the costs	47 %
Indirect	($307)		
Total benefits	($751)		
Net program cost	($202)		
Benefits minus cost	($953)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with general hospitalization	$3	$49	$42	$24	$118
Health care associated with low birthweight births	($2)	($41)	($41)	($21)	($104)
Subtotals	$1	$8	$1	$4	$14
From secondary participant					
Infant mortality	($9)	($4)	$0	($99)	($113)
Health care associated with preterm births	$6	$148	$148	$74	$375
Health care associated with low birthweight births	($15)	($363)	($363)	($184)	($926)
Subtotals	($18)	($220)	($216)	($209)	($663)
Adjustment for deadweight cost of program	$0	$0	$0	($101)	($101)
Totals	($17)	($212)	($215)	($307)	($751)

[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.

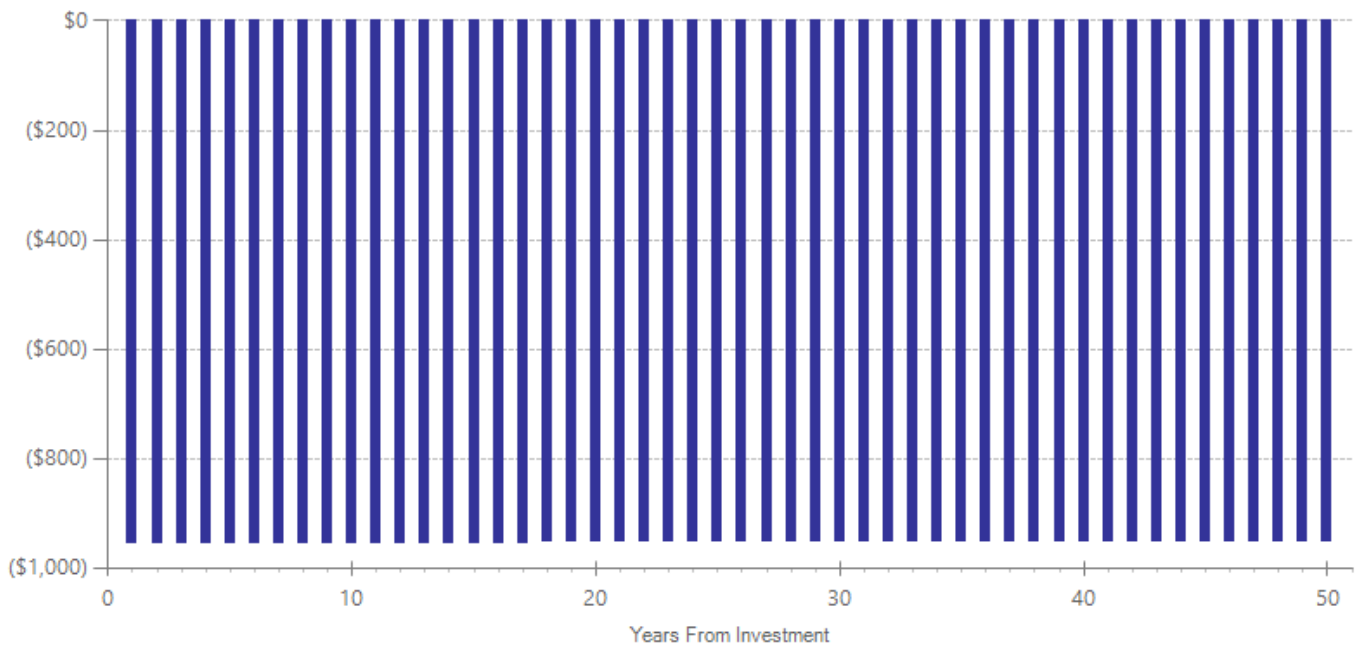
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$200	2015	Present value of net program costs (in 2016 dollars)	($202)
Comparison costs	$0	2015	Cost range (+ or -)	50 %

These interventions varied in length, from a single session to seven months. The per-participant cost was calculated by multiplying the number of staff hours per participant by the average 2015 salary of the staff member as reported by the Bureau of Labor Statistics (http://www.bls.gov/oes/current/oes_wa.htm#29-0000). We multiplied the average salary by 1.441 to estimate the total staff costs including benefits.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Blood pressure^	Primary	6	1641	-0.038	0.070	30	0.000	0.000	31	-0.038	0.584
Cesarean sections	Primary	8	2525	-0.063	0.058	30	0.000	0.000	31	-0.063	0.276
Excess gestational weight gain^	Primary	10	1846	-0.240	0.110	30	0.000	0.000	31	-0.240	0.029
Gestational diabetes^	Primary	13	2906	-0.124	0.074	30	0.000	0.000	31	-0.124	0.093
Hospitalization	Primary	1	1075	-0.034	0.041	30	0.000	0.000	31	-0.034	0.398
Low birthweight births***	Primary	3	1101	0.252	0.209	30	0.000	0.000	31	0.252	0.230
Postpartum depression^	Primary	2	134	0.000	0.285	30	0.000	0.000	31	0.000	1.000
Preeclampsia^	Primary	5	2432	0.019	0.076	30	0.000	0.000	31	0.019	0.805
Preterm birth (< 37 weeks)***	Primary	4	2016	-0.132	0.087	30	0.000	0.000	31	-0.132	0.132
Small for gestational age (SGA)***	Primary	1	124	0.190	0.267	30	0.000	0.000	31	0.190	0.476
Infant mortality	Secondary	1	783	0.001	0.221	1	0.000	0.000	2	0.001	0.997
Low birthweight births***	Secondary	3	1101	0.252	0.209	1	0.000	0.000	2	0.252	0.230
Macrosomia (birth weight > 4000g)***^	Secondary	7	2565	-0.118	0.053	1	0.000	0.000	2	-0.118	0.026
NICU admission	Secondary	3	1891	-0.005	0.050	1	0.000	0.000	2	-0.005	0.926
Preterm birth (< 37 weeks)***	Secondary	4	2016	-0.132	0.087	1	0.000	0.000	2	-0.132	0.132
Small for gestational age (SGA)***	Secondary	1	124	0.190	0.267	1	0.000	0.000	2	0.190	0.476

^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.

Citations Used in the Meta-Analysis

Bogaerts, A.F., Devlieger, R., Nuyts, E., Witters, I., Gyselaers, W., & Van den Bergh, B.R. (2013). Effects of lifestyle intervention in obese pregnant women on gestational weight gain and mental health: a randomized controlled trial. *International Journal of Obesity, 37*(6), 814-21.

Dodd, J.M., Turnbull, D., McPhee, A.J., Deussen, A.R., Grivell, R.M., Yelland, L.N., . . . Robinson, J.S. (2014). Antenatal lifestyle advice for women who are overweight or obese. *Obstetrical & Gynecological Survey, 69*(6), 311-313.

Harrison, C.L., Lombard, C.B., Strauss, B.J., & Teede, H.J. (2013). Optimizing healthy gestational weight gain in women at high risk of gestational diabetes: a randomized controlled trial. *Obesity, 21*(5), 904-909.

Hawkins, M., Hosker, M., Marcus, B.H., Rosal, M.C., Braun, B., Stanek, E.J., . . . Chasan-Taber, L. (2015). A pregnancy lifestyle intervention to prevent gestational diabetes risk factors in overweight Hispanic women: a feasibility randomized controlled trial. *Diabetic Medicine, 32*(1), 108-15.

Luoto, R., Kinnunen, T.I., Aittasalo, M., Kolu, P., Raitanen, J., Ojala, K., Mansikkamaki, K., . . . Tulokas, S. (2011). Primary prevention of gestational diabetes mellitus and large-for-gestational-age newborns by lifestyle counseling: A cluster-randomized controlled trial. *Plos Medicine, 8*(5), e1001036.

Nobles, C., Marcus, B.H., Stanek, E.J., Braun, B., Whitcomb, B.W., Solomon, C.G., . . . Chasan-Taber, L. (2015). Effect of an exercise intervention on gestational diabetes mellitus: a randomized controlled trial. *Obstetrics and Gynecology, 125*(5), 1195-204.

Oostdam, N., van Poppel, M.N.M., Wouters, M.G.A.J., Eekhoff, E.M.W., Bekedam, D.J., Kuchenbecker, W.K.H., . . . Mechelen, W. van. (2012). No effect of the FitFor2 exercise programme on blood glucose, insulin sensitivity, and 32 birthweight in pregnant women who were overweight and at risk for gestational diabetes: Results of a randomised controlled trial. *BJOG: An International Journal of Obstetrics & Gynaecology, 119*, 1098-1107.

Poston, L., Briley, A.L., Barr, S., Bell, R., Croker, H., Coxon, K., . . . Sandall, J. (2013). Developing a complex intervention for diet and activity behaviour change in obese pregnant women (the UPBEAT trial); assessment of behavioural change and process evaluation in a pilot randomised controlled trial. *BMC Pregnancy and Childbirth, 13*(1) 148- 164.

Poston, L., Bell, R., Croker, H., Flynn, A.C., Godfrey, K.M., Goff, L., . . . Briley, A. (2015). Effect of a behavioural intervention in obese pregnant women (the UPBEAT study): a multicentre, randomised controlled trial. *The Lancet. Diabetes & Endocrinology, 3*(10), 767-777.

Quinlivan, J.A., Lam, L.T., & Fisher, J. (2011). A randomised trial of a four-step multidisciplinary approach to the antenatal care of obese pregnant women. *Australian and New Zealand Journal of Obstetrics and Gynecology, 51*(2), 141- 146.

Renault, K.M., Norgaard, K., Nilas, L., Carlsen, E.M., Cortes, D., Pryds, O., & Secher, N.J. (2014). The Treatment of Obese Pregnant Women (TOP) study: a randomized controlled trial of the effect of physical activity intervention assessed by pedometer with or without dietary intervention in obese pregnant women. *American Journal of Obstetrics and Gynecology, 210*(2), 134.el-9.

Thornton, Y.S., Smarkola, C., Kopacz, S.M., & Ishoof, S.B. (2009). Perinatal outcomes in nutritionally monitored obese pregnant women: a randomized clinical trial. *Journal of the National Medical Association, 101*(6), 569-577.

Vesco, K.K., Karanja, N., King, J.C., Gillman, M.W., Leo, M.C., Perrin, N., . . . Stevens, V.J. (2014). Efficacy of a group-based dietary intervention for limiting gestational weight gain among obese women: a randomized trial. *Obesity, 22*(9), 1989-96.

Interventions to prevent excessive gestational weight gain (general population)

Health Care: Maternal and Infant Health

Benefit-cost estimates updated May 2017. Literature review updated December 2016.

Program Description: A wide range of programs aim to prevent excessive gestational weight gain. We included programs that offer an exercise class and programs that offer counseling on recommended weight gain during pregnancy. Typically athletic trainers lead exercise programs in groups and counseling is delivered one-on-one in a clinical setting by a health educator, midwife, or obstetrician. Counseling ranged from one to nine sessions.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$119	Benefit to cost ratio	($5.03)
Participants	($133)	Benefits minus costs	($1,112)
Others	$183	Chance the program will produce benefits greater than the costs	36 %
Indirect	($1,097)		
Total benefits	($928)		
Net program cost	($184)		
Benefits minus cost	($1,112)		

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2016). 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.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Labor market earnings associated with diabetes	($8)	($4)	$0	$0	($12)
Health care associated with Cesarean sections	$2	$45	$45	$22	$114
Health care associated with preterm births	$0	($11)	($11)	($6)	($28)
Subtotals	($6)	$30	$34	$17	$74
From secondary participant					
Infant mortality	($133)	($60)	$0	($1,097)	($1,289)
Health care associated with preterm births	($4)	($90)	($90)	($44)	($227)
Health care associated with NICU admissions	$10	$239	$239	$119	$606
Subtotals	($127)	$89	$149	($1,022)	($910)
Adjustment for deadweight cost of program	$0	$0	$0	($92)	($92)
Totals	($133)	$119	$183	($1,097)	($928)

[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.

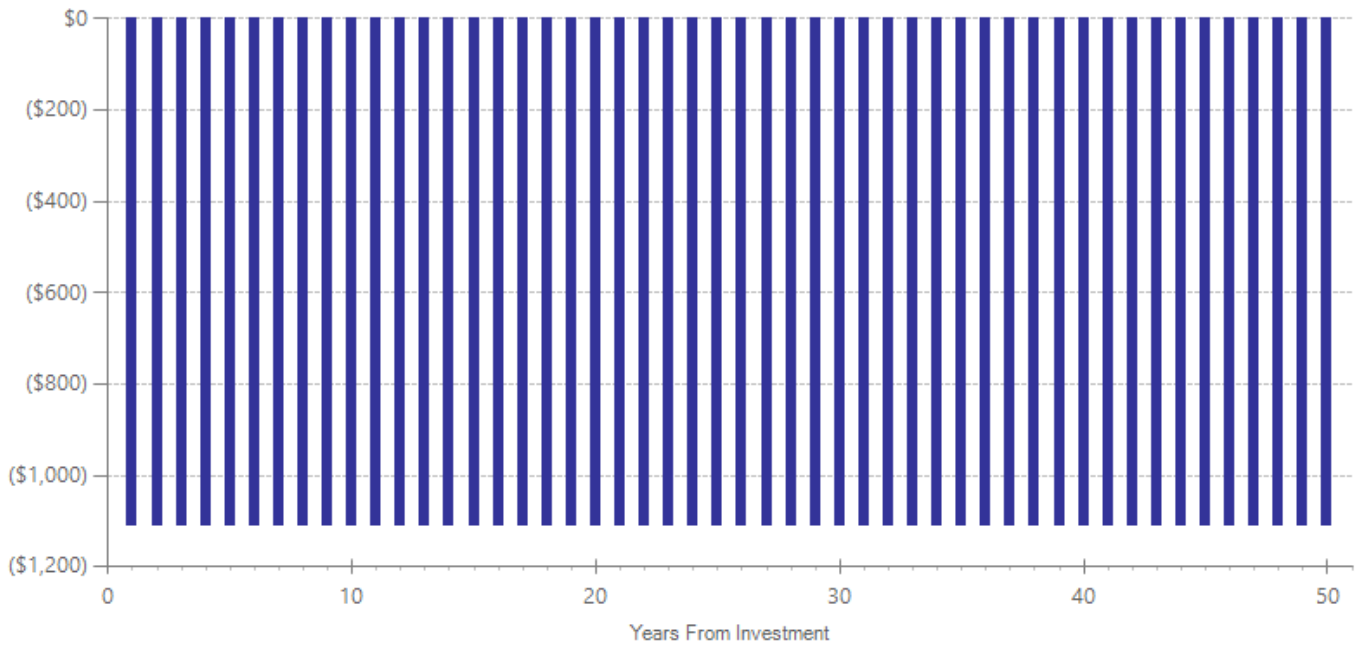
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$182	2015	Present value of net program costs (in 2016 dollars)	($184)
Comparison costs	$0	2015	Cost range (+ or -)	50 %

The length of these interventions vary from a single session up to seven months. The average per-participant cost was calculated by multiplying the number of staff hours per participant by the average 2015 salary of the staff member as reported by the Bureau of Labor Statistics (http://www.bls.gov/oes/current/oes_wa.htm#29-0000). We multiplied the average salary by 1.441 to estimate the total staff costs including benefits.

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.

Detailed Annual Cost Estimates Per Participant



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 non-discounted dollars to simplify the “break-even” point from a budgeting perspective. 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.

Meta-Analysis of Program Effects

Outcomes measured	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
Blood pressure^	Primary	2	468	-0.461	0.189	31	0.000	0.000	32	-0.461	0.015
Cesarean sections	Primary	5	1054	-0.081	0.102	31	0.000	0.000	32	-0.081	0.425
Excess gestational weight gain^	Primary	10	1172	-0.184	0.052	31	0.000	0.000	32	-0.184	0.001
Gestational diabetes^	Primary	5	621	-0.256	0.120	31	0.000	0.000	32	-0.256	0.033
Low birthweight births***	Primary	4	719	0.025	0.070	31	0.000	0.000	32	0.025	0.722
Preeclampsia^	Primary	3	706	-0.009	0.136	31	0.000	0.000	32	-0.009	0.945
Preterm birth (< 37 weeks)***	Primary	6	1247	0.070	0.066	31	0.000	0.000	32	0.070	0.287
Weight change	Primary	2	148	0.048	0.117	31	0.000	0.000	32	0.048	0.682
Low birthweight births***	Secondary	4	719	0.025	0.070	1	0.000	0.000	2	0.025	0.722
Macrosomia (birth weight > 4000g)^	Secondary	7	1272	-0.131	0.111	1	0.000	0.000	2	-0.131	0.239
NICU admission	Secondary	1	421	-0.135	0.327	1	0.000	0.000	2	-0.135	0.680
Preterm birth (< 37 weeks)***	Secondary	6	1247	0.070	0.066	1	0.000	0.000	2	0.070	0.287

^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.

Citations Used in the Meta-Analysis

Althuizen, E., Wijden, C.L.V.D., Mechelen, W.V., Seidell, J.C., & Poppel, M.N.M.V. (2012). The effect of a counseling intervention on weight changes during and after pregnancy: a randomised trial. *BJOG: an International Journal of Obstetrics & Gynecology, 120*(1), 92-99.

Barakat, R., Lucia, A., & Ruiz, J.R. (2009). Resistance exercise training during pregnancy and newborn's birth size: a randomised controlled trial. *International Journal of Obesity, 33*(9), 1048-1057.

Barakat, R., Pelaez, M., Lopez, C., Lucia, A., & Ruiz, J.R. (2013). Exercise during pregnancy and gestational diabetes-related adverse effects: a randomised controlled trial. *British Journal of Sports Medicine, 47*(10), 630-36.

Haakstad, L.A.H., & Bø, K. (2011). Effect of regular exercise on prevention of excessive weight gain in pregnancy: A randomised controlled trial. *The European Journal of Contraception and Reproductive Health Care, 16*(2), 116-125.

Hui, A.L., Ludwig, S.M., Gardiner, P., Sevenhuysen, G., Murray, R., Morris, M., & Shen, G.X. (2006). Community-based exercise and dietary intervention during pregnancy: A pilot study. *Canadian Journal of Diabetes, 30*(2), 169-175.

Hui, A.L., Back, L., Ludwig, S., Gardiner, P., Sevenhuysen, G., Dean, H.J., . . . Shen, G.X. (2014). Effects of lifestyle intervention on dietary intake, physical activity level, and gestational weight gain in pregnant women with different prepregnancy Body Mass Index in a randomized control trial. *BMC Pregnancy and Childbirth, 14*(1), 331-40.

Olson, C.M., Strawderman, M.S., & Reed, R.G. (2004). Efficacy of an intervention to prevent excessive gestational weight gain. *American Journal of Obstetrics and Gynecology, 191*(2), 530-536.

Polley, B.A., Wing, R.R., & Sims, C.J. (2002). Randomized controlled trial to prevent excessive weight gain in pregnant women. *International Journal of Obesity, 26*(11), 1494-1502.

Ronnberg, A.K., Ostlund, I., Fadl, H., Gottvall, T., & Nilsson, K. (2015). Intervention during pregnancy to reduce excessive gestational weight gain-a randomised controlled trial. *BJOG: an International Journal of Obstetrics & Gynaecology, 122*(4), 537-544.

Ruiz, J.R., Perales, M., Pelaez, M., Lopez, C., Lucia, A., & Barakat, R. (2013). Supervised exercise-based intervention to prevent excessive gestational weight gain: a randomized controlled trial. *Mayo Clinic Proceedings, 88*(12), 1388- 97.

Smith, K.M. (2014). *The Blossom Project Online: Use of a behaviorally-based website to promote physical activity and prevent excessive gestational weight gain in previously sedentary pregnant women.* Digital Repository @ Iowa State University.

Stafne, S.N., Salvesen, K.A., Romundstad, P.R., Eggebø, T.M., Carlsen, S.M., & Mørkved, S. (2012). Regular exercise during pregnancy to prevent gestational diabetes: a randomized controlled trial. *Obstetrics and Gynecology, 119*(1), 29- 36.

Oral health: Fluoride varnish treatment for permanent teeth

Health Care: Obesity and Diabetes

Literature review updated October 2014.

Program Description: Fluoride varnish is a form of fluoride that temporarily adheres to the tooth in order to maintain contact between the fluoride and the tooth for several hours. In the studies we reviewed, fluoride varnish was applied every three to six months over a 12- to 36-month time period.

The analysis presented here reflects the effect of fluoride varnish applied to permanent teeth.

Meta-Analysis of Program Effects

Outcomes measured	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
Tooth decay	14	3589	-0.267	0.086	8	n/a	n/a	n/a	-0.267	0.002

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.

Citations Used in the Meta-Analysis

Bravo, M., Llodra, J.C., Baca, P., & Osorio, E. (1996). Effectiveness of visible light fissure sealant (Delton) versus fluoride varnish (Duraphat): 24-month clinical trial. *Community Dentistry and Oral Epidemiology, 24*(1), 42-46.

Clark, D.C., Stamm, J.W., Robert, G., & Tessier, C. (1985). Results of a 32-month fluoride varnish study in Sherbrooke and Lac-Megantic, Canada. *Journal of the American Dental Association, 111*(6), 949-53.

Hardman, M.C., Davies, G.M., Duxbury, J.T., & Davies, R.M. (2007). A cluster randomised controlled trial to evaluate the effectiveness of fluoride varnish as a public health measure to reduce caries in children. *Caries Research, 41*(5), 371-376.

Holm, G.B., Holst, K., & Mejare, I. (1984). The caries-preventive effect of a fluoride varnish in the fissures of the first permanent molar. *Acta Odontologica Scandinavica, 42*(4), 193-197.

Koch, G., & Petersson, L.G. (1975). Caries preventive effect of a fluoride-containing varnish (Duraphat) after 1 year's study. *Community Dentistry and Oral Epidemiology, 3*(6), 262-266.

Liu, B.Y., Lo, E.C., Chu, C.H., & Lin, H.C. (2012). Randomized trial on fluorides and sealants for fissure caries prevention. *Journal of Dental Research, 91*(8), 753-758.

Milsom, K.M., Blinkhorn, A.S., Walsh, T., Worthington, H.V., Kearney-Mitchell, P., Whitehead, H., & Tickle, M. (2011). A cluster-randomized controlled trial: fluoride varnish in school children. *Journal of Dental Research, 90*(11), 1306-1311.

Modeer, T., Twetman, S., & Bergstrand, F. (1984). Three-year study of the effect of fluoride varnish (Duraphat) on proximal caries progression in teenagers. *European Journal of Oral Sciences, 92*(5), 400-407.

Skold, U.M., Petersson, L.G., Lith, A., & Birkhed, D. (2005). Effect of school-based fluoride varnish programmes on approximal caries in adolescents from different caries risk areas. *Caries Research, 39*(4), 273-279.

Tagliaferro, E.P., Pardi, V., Ambrosano, G.M., Meneghim, M.C., da, S.S.R., & Pereira, A. C. (2011). Occlusal caries prevention in high and low risk schoolchildren. A clinical trial. *American Journal of Dentistry, 24*(2), 109-114.

Tewari, A., Chawla, H. S., & Utreja, A. (1991). Comparative evaluation of the role of NaF, APF & Duraphat topical fluoride applications in the prevention of dental caries--a 2 1/2 years study. *Journal of the Indian Society of Pedodontics and Preventive Dentistry, 8*(1), 28-35.

Oral health: Fluoride varnish treatment for primary teeth

Health Care: Obesity and Diabetes

Literature review updated October 2014.

Program Description: Fluoride varnish is a form of fluoride that temporarily adheres to the tooth in order to maintain contact between the fluoride and the tooth for several hours. In the studies we reviewed, fluoride varnish was applied every three to six months over a 12- to 36-month time period.

The analysis presented here reflects the effect of fluoride varnish applied to primary teeth.

Meta-Analysis of Program Effects

Outcomes measured	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
Tooth decay	6	1042	-0.198	0.095	6	n/a	n/a	n/a	-0.198	0.036

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.

Citations Used in the Meta-Analysis

Chu, C.H., Lo, E.C., & Lin, H.C. (2002). Effectiveness of silver diamine fluoride and sodium fluoride varnish in arresting dentin caries in Chinese pre-school children. *Journal of Dental Research, 81*(11), 767-770.

Clark, D.C., Stamm, J.W., Robert, G., & Tessier, C. (1985). Results of a 32-month fluoride varnish study in Sherbrooke and Lac-Megantic, Canada. *Journal of the American Dental Association, 111*(6), 949-53.

Frostell, G., Birkhed, D., Edwardsson, S., Goldberg, P., Petersson, L.-G., Priwe, C., & Winholt, A.-S. (1991). Effect of partial substitution of invert sugar for sucrose in combination with Duraphat® treatment on caries development in preschool children: The Malmo study. *Caries Research, 25*(4), 304-310.

Hardman, M.C., Davies, G.M., Duxbury, J.T., & Davies, R.M. (2007). A cluster randomised controlled trial to evaluate the effectiveness of fluoride varnish as a public health measure to reduce caries in children. *Caries Research, 41*(5), 371-376.

Holm, A. (1979). Effect of a fluoride varnish (Duraphat®) in preschool children. *Community Dentistry and Oral Epidemiology, 7*(5), 241-245.

Oral health: Resin sealants for molars

Health Care: Obesity and Diabetes

Literature review updated October 2014.

Program Description: Sealants are plastic films applied to the biting surfaces of molars to prevent decay. This analysis focuses on the effect of resin sealants compared to no treatment.

Meta-Analysis of Program Effects

Outcomes measured	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
Tooth decay	12	2978	-0.973	0.117	8	n/a	n/a	n/a	-0.973	0.001

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.

Citations Used in the Meta-Analysis

Bravo, M., Llodra, J.C., Baca, P., & Osorio, E. (1996). Effectiveness of visible light fissure sealant (Delton) versus fluoride varnish (Duraphat): 24-month clinical trial. *Community Dentistry and Oral Epidemiology, 24*(1), 42-46.

Brooks, J.D., Mertz-Fairhurst, E.J., Della-Giustina, V.E., Williams, J.E., & Fairhurst, C.W. (1979). A comparative study of two pit and fissure sealants: two-year results in Augusta, GA. *Journal of the American Dental Association, 98*(5), 722-725.

Charbeneau, G.T., & Dennison, J.B. (1979). Clinical success and potential failure after single application of a pit and fissure sealant: a four-year report. *Journal of the American Dental Association, 98*(4), 559-564.

Hunter, P.B. (1988). A study of pit and fissure sealing in the School Dental Service. *The New Zealand Dental Journal, 84*(375), 10-12.

Liu, B.Y., Lo, E.C., Chu, C.H., & Lin, H.C. (2012). Randomized trial on fluorides and sealants for fissure caries prevention. *Journal of Dental Research, 91*(8), 753-758.

McCune, R.J., Bojanini, J., & Abodeely, R.A. (1979). Effectiveness of a pit and fissure sealant in the prevention of caries: three-year clinical results. *Journal of the American Dental Association, 99*(4), 619-623.

Richardson, A.S., Waldman, R., Gibson, G.B., & Vancouver, B.C. (1978). The effectiveness of a chemically polymerized sealant in preventing occlusal caries: two year results. *Dental Journal, 44*(6), 269-272.

Rock, W.P., Gordon, P.H., & Bradnock, G. (1978). The effect of operator variability and patient age on the retention of fissure sealant resin. *British Dental Journal, 145*(3), 72-75.

Sheykholeslam, Z., & Houpt, M. (1978). Clinical effectiveness of an autopolymerized fissure sealant after 2 years. *Community Dentistry and Oral Epidemiology, 6*(4), 181-4.

Songpaisan, Y., Bratthall, D., Phantumvanit, P., & Somridhivej, Y. (1995). Effects of glass ionomer cement, resin-based pit and fissure sealant and HF applications on occlusal caries in a developing country field trial. *Community Dentistry and Oral Epidemiology, 23*(1), 25-29.

Accountable Care Organizations: (a) Alternative Quality Contract

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

An Accountable Care Organization (ACO) is a provider group that is responsible for the cost and quality of medical care for a patient population. ACO contracts provide financial incentives for providers to reduce costs and improve the quality of care.

The Alternative Quality Contract (AQC) is an ACO model implemented in 2009 by Blue Cross Blue Shield (BCBS) of Massachusetts with providers in their commercial health plans. These ACOs cover general patient populations of children and adults under the age of 65.

Providers are paid a global budget (a fixed payment for expected patient costs), a share of savings relative to spending targets, and incentive payments for meeting quality thresholds. BCBS also provides technical support. Providers are required to absorb some of the costs if spending exceeds targets.

AQC contracts last for five years. Studies have examined provider performance during the first four contract years. The reductions in medical costs reported below do not represent net savings to BCBS. These estimates do not account for BCBS costs from shared savings payments, quality incentive payments, and other support costs.

Meta-Analysis of Program Effects

Outcomes measured	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
Emergency department visits*	1	380142	0.007	0.013	34	n/a	n/a	n/a	0.007	0.607
Health care costs*	4	1348235	-0.075	0.013	34	n/a	n/a	n/a	-0.075	0.001
Prescription drug costs*	1	332624	-0.002	0.019	34	n/a	n/a	n/a	-0.002	0.923

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Afendulis, C.C., Fendrick, A.M., Song, Z., Landon, B.E., Safran, D.G., Mechanic, R.E., & Chernew, M.E. (2014). The impact of global budgets on pharmaceutical spending and utilization: early experience from the alternative quality contract. *Inquiry: a Journal of Medical Care Organization, Provision and Financing, 51.*

Sharp, A. L., Song, Z., Safran, D.G., Chernew, M.E., & Mark, F.A. (2013). The effect of bundled payment on emergency department use: alternative quality contract effects after year one. *Academic Emergency Medicine: Official Journal of the Society for Academic Emergency Medicine, 20*(9), 961-4.

Song, Z., Rose, S., Safran, D.G., Landon, B.E., Day, M.P., & Chernew, M.E. (2014). Changes in health care spending and quality 4 years into global payment. *The New England Journal of Medicine, 371*(18), 1704-14.

Accountable Care Organizations: (b) Medicare Physician Group Practice Demonstration (PGPD)

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

An Accountable Care Organization (ACO) is a provider group that is responsible for the cost and quality of medical care for a patient population. ACO contracts provide financial incentives for providers to reduce costs and improve the quality of care.

The Centers for Medicare and Medicaid Services (CMS) implemented the Medicare Physician Group Practice Demonstration (PGPD) in 2005. Ten provider organizations entered five-year ACO contracts with Medicare. These organizations received up to 80% of savings relative to spending targets, if they demonstrated improvement on 32 quality measures. Providers were not responsible for costs above target (upside risk only), though they faced the financial risk of not covering the investments required to become an ACO (e.g., IT systems, additional staff).

The cost reduction reported below does not represent actual savings to Medicare. The estimate does not reflect cost sharing or performance bonus payments made by CMS.

Meta-Analysis of Program Effects

Outcomes measured	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
Health care costs*	2	1213380	-0.019	0.002	71	n/a	n/a	n/a	-0.019	0.001

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Colla, C.H., Wennberg, D.E., Meara, E., Skinner, J.S., Gottlieb, D., Lewis, V.A., . . . Fisher, E.S. (2012). Spending differences associated with the Medicare Physician Group Practice Demonstration. *Jama : the Journal of the American Medical Association, 308*(10), 1015-23.

Pope, G., Kautter, J., Leung, M., Trisolini, M., Adamache, W., & Smith, K. (2014). Financial and quality impacts of the Medicare physician group practice demonstration. *Medicare & Medicaid Research Review, 4,* 3.

Accountable Care Organizations: (c) Medicare Pioneer ACOs

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

An Accountable Care Organization (ACO) is a provider group that is responsible for the cost and quality of medical care for a patient population. ACO contracts provide financial incentives for providers to reduce costs and improve the quality of care. In contracts with "upside and downside" financial risk, providers are able to share in savings relative to a spending target but they are required to absorb some of the costs if spending exceeds the target. In contracts with "upside" risk only, providers are not responsible for costs above target. The Centers for Medicare and Medicaid Services have established both types of ACO contracts.

The Medicare Pioneer ACO program was implemented for providers willing to assume both upside and downside financial risk. Pioneer ACOs can receive up to 60% of estimated savings relative to a spending benchmark, contingent upon performance on quality measures.

Thirty-two organizations entered the Pioneer ACO program in 2012, though 13 subsequently withdrew from the program. Studies have examined performance over the first two contract years. The cost reductions presented below do not represent actual savings to Medicare. The estimates do not reflect cost-sharing payments made to providers.

Meta-Analysis of Program Effects

Outcomes measured	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
Health care costs*	3	1683614	-0.021	0.010	71	n/a	n/a	n/a	-0.021	0.030
Hospital costs (inpatient)*	3	1683614	-0.025	0.009	71	n/a	n/a	n/a	-0.025	0.004
Hospital costs (outpatient)*	3	1683614	-0.027	0.016	71	n/a	n/a	n/a	-0.027	0.092
Skilled nursing facility costs*	3	1683614	-0.019	0.004	71	n/a	n/a	n/a	-0.019	0.001

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

McWilliams, J.M., Chernew, M.E., Landon, B.E., & Schwartz, A.L. (2015). Performance differences in year 1 of pioneer accountable care organizations. *The New England Journal of Medicine, 372*(20), 1927-36.

Nyweide, D.J., Lee, W., Cuerdon, T.T., Pham, H.H., Cox, M., Rajkumar, R., & Conway, P.H. (2015). Association of Pioneer Accountable Care Organizations vs traditional Medicare fee for service with spending, utilization, and patient experience. *Jama, 313*(21), 2152-61.

Cost sharing: (I) Copays for nonemergent emergency department visits, Medicaid adult population

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

The effect reported below is for implementation of modest copays (in the range of $3 to $15) for emergency department visits that are judged not to be emergent (in these cases, a hospital determines, after an appropriate medical screening, that the individual does not need emergency medical services). These copays have been implemented by some state Medicaid programs.

Meta-Analysis of Program Effects

Outcomes measured	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
Emergency department visits*	2	21074	0.031	0.064	40	n/a	n/a	n/a	0.031	0.630

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Mortensen, K. (2010). Copayments did not reduce medicaid enrollees' nonemergency use of emergency departments. *Health Affairs (project Hope), 29*(9), 1643-50.

Siddiqui, M., Roberts, E.T., & Pollack, C.E. (2015). The effect of emergency department copayments for Medicaid beneficiaries following the Deficit Reduction Act of 2005. *Jama Internal Medicine, 175*(3), 393-8.

Cost sharing: (n) Copays for prescription drugs, adults with a chronic illness

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

The effect reported below is for increases in prescription drug copays (ranging from $8 to $23) in employer-sponsored health plans. The estimate is for patients taking medications for hypertension and high cholesterol (ACE inhibitors and statins).

Meta-Analysis of Program Effects

Outcomes measured	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
Medication adherence	2	652	-0.602	0.118	30	n/a	n/a	n/a	-0.602	0.001

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.

Citations Used in the Meta-Analysis

Huskamp, H.A., Deverka, P.A., Epstein, A.M., Epstein, R.S., McGuigan, K.A., & Frank, R.G. (2003). The effect of incentive-based formularies on prescription-drug utilization and spending. *The New England Journal of Medicine, 349*(23), 2224-32.

Cost sharing: (p) Copays for prescription drugs, low-income children (CHIP)

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

The effect reported below is for modest increases (e.g., $3 to $5) in prescription drug copays for low-income children enrolled in Alabama's Children's Health Insurance Program (CHIP).

Meta-Analysis of Program Effects

Outcomes measured	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
Prescription drug costs*	1	17200	-0.079	0.031	10	n/a	n/a	n/a	-0.079	0.009

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Sen, B., Blackburn, J., Morrisey, M., Becker, D., Kilgore, M., Caldwell, C., & Menachemi, N. (2014). Can increases in CHIP copayments reduce program expenditures on prescription drugs? *Medicare & Medicaid Research Review, 4,* 2.

Cost sharing: (q) Copays for prescription drugs, low-income children (CHIP) with a chronic illness

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

The effect reported below is for modest increases (e.g., $3 to $5) in prescription drug copays for low-income children with a chronic illness enrolled in Alabama's Children's Health Insurance Program (CHIP).

Meta-Analysis of Program Effects

Outcomes measured	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
Prescription drug costs*	1	4644	-0.036	0.014	10	n/a	n/a	n/a	-0.036	0.009

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Sen, B., Blackburn, J., Morrisey, M., Becker, D., Kilgore, M., Caldwell, C., & Menachemi, N. (2014). Can increases in CHIP copayments reduce program expenditures on prescription drugs? *Medicare & Medicaid Research Review, 4,* 2.

Cost sharing: (i) Copay increases across multiple services, low-income and chronically-ill population

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

The effect reported below reflects changes in medical costs resulting from increases in patient copays for multiple services (prescription drugs, office visits, emergency department visits, and outpatient surgery). The effect size is the price elasticity for medical expenditures. Estimates are derived from data for low-income adults (< 300% Federal Poverty Line) with a chronic condition in a subsidized health plan.

Meta-Analysis of Program Effects

Outcomes measured	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
Health care costs**	1	37961	-0.057	0.094	41	n/a	n/a	n/a	-0.057	0.545

**The effect size for this outcome represents an elasticity, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Chandra, A., Gruber, J., & McKnight, R. (2014). The impact of patient cost-sharing on low-income populations: evidence from Massachusetts. *Journal of Health Economics, 33*, 57-66.

Cost sharing: (j) Emergency department copays, general patient population

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

The effects reported below are for emergency department copays (ranging from $25 to $50 in 2014 dollars) versus no emergency department copays. The effects are for general patient populations.

Meta-Analysis of Program Effects

Outcomes measured	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
Emergency department visits*	2	1158999	-0.121	0.003	33	n/a	n/a	n/a	-0.121	0.001
Emergency department visits (higher-severity)*	1	30276	-0.058	0.095	33	n/a	n/a	n/a	-0.058	0.543
Emergency department vists (lower-severity)*	1	30276	-0.292	0.046	33	n/a	n/a	n/a	-0.292	0.001
Hospitalization*	2	1158999	-0.039	0.009	33	n/a	n/a	n/a	-0.039	0.001

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Hsu, J., Price, M., Brand, R., Ray, G.T., Fireman, B., Newhouse, J.P., & Selby, J.V. (2006). Cost-sharing for emergency care and unfavorable clinical events: Findings from the Safety and Financial Ramifications of ED Copayments Study. *Health Services Research, 41*(5), 1801-1820.

Selby, J.V., Fireman, B.H., & Swain, B.E. (1996). Effect of a copayment on use of the emergency department in a health maintenance organization. *The New England Journal of Medicine, 334*(10), 635-41.

Cost sharing: (k) Emergency department copays, low-income patient population

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

The effects reported below are for emergency department copays (ranging from $25 to $50 in 2014 dollars) versus no emergency department copays. The effects are for low-income patients (living in census blocks with more than 20% of residents below the federal poverty line).

Meta-Analysis of Program Effects

Outcomes measured	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
Emergency department visits*	1	254431	-0.153	0.006	33	n/a	n/a	n/a	-0.153	0.001
Hospitalization*	1	254431	-0.053	0.019	33	n/a	n/a	n/a	-0.053	0.004

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Hsu, J., Price, M., Brand, R., Ray, G.T., Fireman, B., Newhouse, J.P., & Selby, J.V. (2006). Cost-sharing for emergency care and unfavorable clinical events: Findings from the Safety and Financial Ramifications of ED Copayments Study. *Health Services Research, 41*(5), 1801-1820.

Cost sharing: (r) Copays for prescription drugs, Medicare beneficiaries

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

The effects reported below are for increases (ranging for $5 to $10) in prescription drug copays among Medicare beneficiaries in an HMO. Note that a $10 office visit copay was also implemented for this population.

Meta-Analysis of Program Effects

Outcomes measured	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
Hospital costs (inpatient)*	1	35456	0.054	0.019	70	n/a	n/a	n/a	0.054	0.005
Prescription drug costs*	1	35456	-0.320	0.026	70	n/a	n/a	n/a	-0.320	0.001

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Chandra, A., Gruber, J., & McKnight, R. (2010). Patient cost-sharing and hospitalization offsets in the elderly. *American Economic Review, 100*(1), 193-213.

Cost sharing: (m) Copays for prescription drugs, general patient population

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

The effects reported below are for moderate increases in prescription drug copays (ranging from $3 to $12) among general patient populations.

Meta-Analysis of Program Effects

Outcomes measured	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
Hospitalization	1	6881	0.000	0.015	31	n/a	n/a	n/a	0.000	1.000
Prescription drug costs**	1	16783	-0.041	0.009	41	n/a	n/a	n/a	-0.041	0.001

**The effect size for this outcome represents an elasticity, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Motheral, B., & Fairman, K.A. (2001). Effect of a three-tier prescription copay on pharmaceutical and other medical utilization. *Medical Care, 39*(12), 1293-304.

Gibson, T.B., McLaughlin, C.G., & Smith, D.G. (2005). A copayment increase for prescription drugs: the long-term and short-term effects on use and expenditures. *Inquiry: a Journal of Medical Care Organization, Provision and Financing, 42*(3), 293-310.

Cost sharing: (h) Copay increases across multiple services, low-income population

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

The effects reported below reflect changes in medical costs resulting from increases in patient copays for multiple services (prescription drugs, office visits, emergency department visits, and outpatient surgery). The effect sizes are price elasticities for expenditures on selected services. Estimates are derived from data for low-income adults (< 300% Federal Poverty Line) in a subsidized health plan.

Meta-Analysis of Program Effects

Outcomes measured	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
Emergency department costs**	1	122456	-0.207	0.152	41	n/a	n/a	n/a	-0.207	0.175
Health care costs**	1	122456	-0.158	0.064	41	n/a	n/a	n/a	-0.158	0.014
Hospital costs (inpatient)**	1	122456	-0.115	0.250	41	n/a	n/a	n/a	-0.115	0.646
Prescription drug costs**	1	122456	-0.131	0.074	41	n/a	n/a	n/a	-0.131	0.076

**The effect size for this outcome represents an elasticity, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Chandra, A., Gruber, J., & McKnight, R. (2014). The impact of patient cost-sharing on low-income populations: evidence from Massachusetts. *Journal of Health Economics, 33,* 57-66.

Cost sharing: (g) Coinsurance (25% rate or higher) versus no cost sharing, general patient population

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

These estimates are from the RAND Health Insurance Experiment. Households were randomly assigned to different levels of cost sharing. The effect sizes reported below measure changes in medical costs, utilization, and health outcomes attributed to having a coinsurance rate of at least 25% versus free care.

Meta-Analysis of Program Effects

Outcomes measured	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
Cholesterol	1	2262	-0.036	0.037	33	n/a	n/a	n/a	-0.036	0.327
Diastolic blood pressure	1	2339	0.079	0.036	33	n/a	n/a	n/a	0.079	0.027
Emergency department visits*	1	2296	-0.210	0.081	33	n/a	n/a	n/a	-0.210	0.010
Emergency department visits (higher-severity)*	1	5392	-0.230	0.059	33	n/a	n/a	n/a	-0.230	0.001
Emergency department vists (lower-severity)*	1	5392	-0.470	0.049	33	n/a	n/a	n/a	-0.470	0.001
Health care costs*	1	1137	-0.189	0.047	33	n/a	n/a	n/a	-0.189	0.001

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Brook, R.H., United States., Rand Corporation., & Rand Health Insurance Experiment. (1984). *The effect of coinsurance on the health of adults: Results from the Rand Health Insurance Experiment.* Santa Monica, Calif: Rand.

Manning, W.G., Rand Corporation., & Rand Health Insurance Study. (1987). *Health insurance and the demand for medical care: Evidence from a randomized experiment.* Santa Monica, CA: Rand.

O'Grady, K.F., Manning, W.G., Newhouse, J.P., & Brook, R.H. (1985). *The impact of cost sharing on emergency department use.* Santa Monica, CA: Rand Corporation.

Cost sharing: (f) High-Deductible Health Plans with higher deductibles (individual > $1000) and HSA accounts, general patient population

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

These results are for High-Deductible Health Plans (HDHPs) versus traditional plans. In this case, the HDHPs have individual deductibles are at least $1000 and health savings accounts (HSA) are offered.

Meta-Analysis of Program Effects

Outcomes measured	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
Health care costs*	2	14364	-0.238	0.057	33	n/a	n/a	n/a	-0.238	0.001

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Charlton, M.E., Levy, B.T., High, R.R., Schneider, J.E., & Brooks, J.M. (2011). Effects of health savings account-eligible plans on utilization and expenditures. *The American Journal of Managed Care, 17*(1), 79-86.

Haviland, A., Sood, N., McDevitt, R., Marquis, M. (2011). How Do Consumer-Directed Health Plans Affect Vulnerable Populations? *Forum for Health Economics & Policy, 14*, 2.

Cost sharing: (e) High-Deductible Health Plans with higher deductibles (individual > $1000) and HRA accounts, general patient population

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

These results are for High-Deductible Health Plans (HDHPs) versus traditional plans. In this case, the HDHPs have individual deductibles of at least $1000 and health reimbursement arrangements (HRA) are provided.

Meta-Analysis of Program Effects

Outcomes measured	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
Health care costs*	4	89701	-0.152	0.028	37	n/a	n/a	n/a	-0.152	0.001

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Borah, B.J., Burns, M.E., & Shah, N.D. (2011). Assessing the impact of high deductible health plans on health-care utilization and cost: a changes-in-changes approach. *Health Economics, 20*(9), 1025-42.

Beeuwkes, B.M., Haviland, A.M., McDevitt, R., & Sood, N. (2011). Healthcare spending and preventive care in high-deductible and consumer-directed health plans. *The American Journal of Managed Care, 17*(3), 222-30.

Haviland, A., Sood, N., McDevitt, R., Marquis, M. (2011). How Do Consumer-Directed Health Plans Affect Vulnerable Populations? *Forum for Health Economics & Policy, 14,* 2.

Cost sharing: (d) High-Deductible Health Plans with higher deductibles (individual > $1000), general patient population

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

These results are for High-Deductible Health Plans (HDHPs) versus traditional plans. In this case, the HDHPs have individual deductibles of at least $1000. These plans may or may not include health reimbursement arrangements (HRA) or a health savings account (HSA).

Meta-Analysis of Program Effects

Outcomes measured	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
Health care costs*	8	142933	-0.178	0.024	37	n/a	n/a	n/a	-0.178	0.001

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Borah, B.J., Burns, M.E., & Shah, N.D. (2011). Assessing the impact of high deductible health plans on health-care utilization and cost: a changes-in-changes approach. *Health Economics, 20*(9), 1025-42.

Beeuwkes, B.M., Haviland, A.M., McDevitt, R., & Sood, N. (2011). Healthcare spending and preventive care in high-deductible and consumer-directed health plans. *The American Journal of Managed Care, 17*(3), 222-30.

Charlton, M.E., Levy, B.T., High, R.R., Schneider, J.E., & Brooks, J.M. (2011). Effects of health savings account-eligible plans on utilization and expenditures. *The American Journal of Managed Care, 17*(1), 79-86.

Haviland, A., Sood, N., McDevitt, R., Marquis, M. (2011). How Do Consumer-Directed Health Plans Affect Vulnerable Populations? *Forum for Health Economics & Policy, 14,* 2.

Cost sharing: (c) High-Deductible Health Plans with moderate deductibles (individual < $1000), general patient population

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

These results are for High-Deductible Health Plans (HDHPs) versus traditional plans. In this case, the HDHPS have moderate deductibles (individual deductibles between $500 and $1000). These plans may or may not include health reimbursement arrangements (HRA) or a health savings account (HSA).

Meta-Analysis of Program Effects

Outcomes measured	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
Health care costs*	3	85731	-0.029	0.014	33	n/a	n/a	n/a	-0.029	0.044

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Beeuwkes, B.M., Haviland, A.M., McDevitt, R., & Sood, N. (2011). Healthcare spending and preventive care in high-deductible and consumer-directed health plans. *The American Journal of Managed Care, 17*(3), 222-30.

Haviland, A., Sood, N., McDevitt, R., Marquis, M. (2011). How do consumer-directed health plans affect vulnerable populations? *Forum for Health Economics & Policy, 14,* 2.

Cost sharing: (o) Copay reductions for prescription drugs used to treat chronic conditions (Value Based Insurance Design), adults with chronic illnesses

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: Evaluations of health care policies and programs often measure two broad types of outcomes: (1) those that reflect the health status of people (e.g., disease incidence) and (2) those that reflect health care system costs and utilization. Cost and utilization measures may or may not be an indication of health status or well-being.

These results are from value-based insurance designs where copays for drugs used to treat chronic conditions are reduced in order to encourage adherence to drug therapies. Conditions include diabetes, pre-diabetes, high blood pressure, and high cholesterol.

Meta-Analysis of Program Effects

Outcomes measured	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
Medication adherence	10	76223	0.045	0.005	52	n/a	n/a	n/a	0.045	0.001

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.

Citations Used in the Meta-Analysis

Farley, J.F., Wansink, D., Lindquist, J.H., Parker, J.C., & Maciejewski, M.L. (2012). Medication adherence changes following value-based insurance design. *The American Journal of Managed Care, 18*(5), 265-74.

Frank, M.B., Fendrick, A.M., He, Y., Zbrozek, A., Holtz, N., Leung, S., & Chernew, M.E. (2012). The effect of a large regional health plan's value-based insurance design program on statin use. *Medical Care Philadelphia, 50*(11), 934-939.

Gibson, T.B., Mahoney, J., Ranghell, K., Cherney, B.J., & McElwee, N. (2011). Value-based insurance plus disease management increased medication use and produced savings. *Health Affairs (project Hope), 30*(1), 100-8.

Maciejewski, M.L., Wansink, D., Lindquist, J.H., Parker, J.C., & Farley, J.F. (2014). Value-based insurance design program in north Carolina increased medication adherence but was not cost neutral. *Health Affairs (project Hope), 33*(2), 300-8.

Zeng, F., An, J.J., Scully, R., Barrington, C., Patel, B.V., & Nichol, M.B. (2010). The impact of value-based benefit design on adherence to diabetes medications: A propensity score-weighted difference in difference evaluation. *Value in Health, 13*(6), 846-852.

Patient-centered medical homes in integrated health systems (high-risk population)

Health Care: Health Care System Efficiency

Literature review updated December 2016.

Program Description: The patient-centered medical home (PCMH) model attempts to make health care more efficient by implementing a set of changes to primary care. Medical homes are designed to provide comprehensive care, treating both acute needs and promoting population health. The medical home model emphasizes care coordination across providers, patient engagement, evidence-based care, use of health information technology, and enhanced patient access.

This category includes only PCMH programs we reviewed that were implemented in integrated health systems. The results are for higher risk, older patients.

Meta-Analysis of Program Effects

Outcomes measured	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
Health care costs*	2	37989	-0.071	0.014	75	n/a	n/a	n/a	-0.071	0.001

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Liss, D.T., Fishman, P.A., Rutter, C.M., Grembowski, D., Ross, T.R., Johnson, E.A., & Reid, R.J. (2013). Outcomes among chronically ill adults in a medical home prototype. *The American Journal of Managed Care, 19*(10), 348-58.

Maeng, D.D., Khan, N., Tomcavage, J., Graf, T.R., Steele, G.D., & Davis, D.E. (2015). Reduced acute inpatient care was largest savings component of geisinger health system's patient-centered medical home. *Health Affairs, 34*(4), 636-644.

Cost sharing: (a) High-Deductible Health Plans (moderate to high deductibles, with and without HRAs or HSAs), general patient population

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: These results are for High-Deductible Health Plans (HDHPs) versus traditional plans. These plans have moderate to high deductibles (at least a $500 individual deductible). They may or may not include health reimbursement arrangements (HRA) or a health savings account (HSA). Preventive services include cancer screening (breast, cervical, colorectal), preventive office visits, and preventive lab tests. The medication adherence effect size is for eight drug classes used to treat diabetes, high blood pressure, high cholesterol and other chronic conditions. The effect is for HDHPs where prescription drug costs are subject to the deductible.

Meta-Analysis of Program Effects

Outcomes measured	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
Emergency department costs*	2	52058	-0.071	0.086	33	n/a	n/a	n/a	-0.071	0.407
Emergency department visits*	1	15847	-0.150	0.032	33	n/a	n/a	n/a	-0.150	0.001
Emergency department visits (higher-severity)*	1	15847	-0.097	0.098	33	n/a	n/a	n/a	-0.097	0.323
Emergency department vists (lower-severity)*	1	15847	-0.196	0.047	33	n/a	n/a	n/a	-0.196	0.001
Health care costs*	10	5052573	-0.116	0.026	33	n/a	n/a	n/a	-0.116	0.001
Hospitalization*	1	15847	-0.118	0.091	33	n/a	n/a	n/a	-0.118	0.196
Medication adherence	8	4865	-0.092	0.038	33	n/a	n/a	n/a	-0.092	0.016
Prescription drug costs*	3	63193	-0.047	0.013	33	n/a	n/a	n/a	-0.047	0.001
Preventive services	11	152096	-0.046	0.010	33	n/a	n/a	n/a	-0.046	0.001
Primary care visits*	1	7953	-0.090	0.015	45	n/a	n/a	n/a	-0.090	0.001

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Borah, B.J., Burns, M.E., & Shah, N.D. (2011). Assessing the impact of high deductible health plans on health-care utilization and cost: a changes-in-changes approach. *Health Economics, 20*(9), 1025-42.

Beeuwkes, B.M., Haviland, A.M., McDevitt, R., & Sood, N. (2011). Healthcare spending and preventive care in high-deductible and consumer-directed health plans. *The American Journal of Managed Care, 17*(3), 222-30.

Charlton, M.E., Levy, B.T., High, R.R., Schneider, J.E., & Brooks, J.M. (2011). Effects of health savings account-eligible plans on utilization and expenditures. *The American Journal of Managed Care, 17*(1), 79-86.

Chen, S., Levin, R.A., & Gartner, J.A. (2010). Medication adherence and enrollment in a consumer-driven health plan. *The American Journal of Managed Care, 16*(2), 43-50.

Haviland, A., Sood, N., McDevitt, R., Marquis, M. (2011). How do consumer-directed health plans affect vulnerable populations? *Forum for Health Economics & Policy, 14,* 2.

Haviland, A., Eisenberg, M., Mehrotra, A., Huckfeldt, P. J., Sood, N., & National Bureau of Economic Research,. (2015). *Do "consumer-directed" health plans bend the cost curve over time?* National Bureau of Economic Research, Cambridge: MA.

Kozhimannil, K.B., Huskamp, H.A., Graves, A.J., Soumerai, S.B., Ross-Degnan, D., & Wharam, J.F. (2011). High-deductible health plans and costs and utilization of maternity care. *The American Journal of Managed Care, 17*(1), 17-25.

Lo, S.A.T., Shah, M., & Frogner, B.K. (2010). Health savings accounts and health care spending. *Health Services Research, 45*(4), 1041-1060.

Reddy, S.R., Ross-Degnan, D., Zaslavsky, A.M., Soumerai, S.B., & Wharam, J.F. (2014). Impact of a high-deductible health plan on outpatient visits and associated diagnostic tests. *Medical Care, 52*(1), 86-92.

Reiss, S.K., Ross-Degnan, D., Zhang, F., Soumerai, S. B., Zaslavsky, A.M., & Wharam, J.F. (2011). Effect of switching to a high-deductible health plan on use of chronic medications. *Health Services Research, 46*(5), 1382-401.

Wharam, J.F., Landon, B.E., Zhang, F., Soumerai, S.B., & Ross-Degnan, D. (2011). High-deductible insurance: two-year emergency department and hospital use. *The American Journal of Managed Care, 17*(10), 410-8.

Wharam, J.F., Graves, A.J., Landon, B.E., Zhang, F., Soumerai, S.B., & Ross-Degnan, D. (2011). Two-year trends in colorectal cancer screening after switch to a high-deductible health plan. *Medical Care, 49*(9), 865-71.

Wharam, J.F., Graves, A.J., Zhang, F., Soumerai, S.B., Ross-Degnan, D., & Landon, B.E. (2012). Two-year trends in cancer screening among low socioeconomic status women in an HMO-based high-deductible health plan. *Journal of General Internal Medicine, 27*(9), 1112-9.

Cost sharing: (b) High-Deductible Health Plans (moderate to high deductible levels, with or without HSAs), low-income patient population

Health Care: Health Care System Efficiency

Literature review updated November 2015.

Program Description: These results are for low-income patients in High-Deductible Health Plans (HDHPs) versus those in traditional plans. In this case, the HDHPs have moderate- to high-deductibles (at least a $500 individual deductible). These plans may or may not include health reimbursement arrangements (HRA) or a health savings account (HSA). Preventive services refer to cancer screening (breast, cervical, colorectal). Low-income status is determined by residence in low-income areas.

Meta-Analysis of Program Effects

Outcomes measured	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
Emergency department visits*	1	5854	-0.046	0.046	33	n/a	n/a	n/a	-0.046	0.319
Emergency department visits (higher-severity)*	1	5854	-0.245	0.103	33	n/a	n/a	n/a	-0.245	0.017
Emergency department vists (lower-severity)*	1	5854	-0.037	0.051	33	n/a	n/a	n/a	-0.037	0.471
Preventive services	6	29449	-0.031	0.012	33	n/a	n/a	n/a	-0.031	0.008

*The effect size for this outcome indicates percentage change, not a standardized mean difference effect size.

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.

Citations Used in the Meta-Analysis

Haviland, A., Sood, N., McDevitt, R., Marquis, M. (2011). How Do Consumer-Directed Health Plans Affect Vulnerable Populations?. *Forum for Health Economics & Policy, 14,* 2.

Wharam, J.F., Graves, A.J., Landon, B.E., Zhang, F., Soumerai, S.B., & Ross-Degnan, D. (2011). Two-year trends in colorectal cancer screening after switch to a high-deductible health plan. *Medical Care, 49*(9), 865-71.

Wharam, J.F., Graves, A.J., Zhang, F., Soumerai, S.B., Ross-Degnan, D., & Landon, B. E. (2012). Two-year trends in cancer screening among low socioeconomic status women in an HMO-based high-deductible health plan. *Journal of General Internal Medicine, 27* (9), 1112-9.

Wharam, J.F., Zhang, F., Landon, B.E., Soumerai, S.B., & Ross-Degnan, D. (2013). Low-socioeconomic-status enrollees in high-deductible plans reduced high-severity emergency care. *Health Affairs, 32*(8), 1398-406.

Transitional care programs to prevent hospital readmissions: Brief phone follow-up only

Health Care: Health Care System Efficiency

Literature review updated December 2014.

Program Description: Transitional care programs focus on preventing future hospital readmissions after discharge. Programs in this specific category include those providing post-discharge patient follow-up by telephone only, with no pre-discharge assistance.

Meta-Analysis of Program Effects

Outcomes measured	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
Hospital readmissions	5	750	-0.140	0.222	57	0.000	0.000	58	-0.143	0.107

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.

Citations Used in the Meta-Analysis

Bostrom, J., Caldwell, J., McGuire, K., & Everson, D. (1996). Telephone follow-up after discharge from the hospital: does it make a difference? *Applied Nursing Research: ANR, 9*(2), 47-52.

Dudas, V., Bookwalter, T., Kerr, K.M., & Pantilat, S.Z. (2001). The impact of follow-up telephone calls to patients after hospitalization. *The American Journal of Medicine, 9*(111), 26-30.

Riegel, B., Carlson, B., Glaser, D., Kopp, Z., & Romero, T.E. (2002). Standardized telephonic case management in a Hispanic heart failure population. *Disease Management and Health Outcomes, 10*(4), 241-249.

Riegel, B., Carlson, B., Glaser, D., & Romero, T. (2006). Randomized Controlled Trial of Telephone Case Management in Hispanics of Mexican Origin With Heart Failure. *Journal of Cardiac Failure, 12*(3), 211-219.

Smoking cessation programs for pregnant women: Postpartum smoking relapse prevention

Health Care: Maternal and Infant Health

Literature review updated December 2016.

Program Description: In this analysis, we reviewed studies of programs that recruited women who quit smoking during pregnancy and provided counseling to prevent relapse. These programs included at least some postpartum counseling.

Meta-Analysis of Program Effects

Outcomes measured	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
Regular smoking	4	405	-0.359	0.117	27	-0.359	0.117	37	-0.359	0.002

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.

Citations Used in the Meta-Analysis

Jiménez-Muro, A., Nerín, I., Samper, P., Marqueta, A., Beamonte, A., Gargallo, P., . . . Rodríguez, G. (2013). A proactive smoking cessation intervention in postpartum women. *Midwifery, 29*(3), 240-245.

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

Reitzel, L.R., Vidrine, J.I., Businelle, M.S., Kendzor, D.E., Costello, T.J., Li, Y., . . . Wetter, D. W. (2010). Preventing postpartum smoking relapse among diverse low-income women: a randomized clinical trial. *Nicotine & Tobacco Research, 12*(4), 326-35.

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.

For further information, contact:
(360) 664-9800, institute@wsipp.wa.gov

Printed on 05-29-2017

Washington State Institute for Public Policy

The Washington State Legislature created the Washington State Insititute for Public Policy in 1983. A Board of Directors-representing the legislature, the governor, and public universities-governs WSIPP and guides the development of all activities. WSIPP's mission is to carry out practical research, at legislative direction, on issues of importance to Washington State.