Appendix

Appendix Exhibit 1
Number and characteristics of health improvement programs

Name	Organization and Role	Number of Sites	States
Blue Zones	HealthWays (Coordinating)	4	CA, IA, IN, MN
Clinton Health Matters Initiative	Clinton Foundation (Coordinating)	1	CA
Aligning Forces for Quality	Robert Wood Johnson Foundation (Funding, Coordinating)	14	CA, ME, MA, MI, MO, MN, NM, NY, OH, OR, PA, TN, WA, WI
Communities Putting Prevention to Work	Centers for Disease Control and Prevention (Funding)	33	AL, AR, AZ, CA, CO, DC, FL, GA, HI, IA, IL, IN, KY, MA, ME, MN, MO, NC, NE, NV, NM, NY, OH, OK, OR, PA, RI, SC, TN, TX, WA, WV, WI

Notes: Authors' analyses of programs identified through informal networking, expert interviews, and systematic
Internet searches. There may be more than one county (unit of observation) included in each site.

Technical Appendix
Inverse Propensity Score Re-weighting:
Inverse propensity score re-weighting was conducted using a probit model to determine the association between changes in demographic and economic characteristics for all counties and then predict the probability of a non-PHIP county being treated based on these pre-implementation changes in economic and demographic characteristics (Equations 1, 2). Using these predicted probabilities, inverse weights were constructed and applied to control counties in subsequent regressions.

Equation 1:

$$\hat{y}_{it} =$$

$$\frac{1}{1+(\widehat{\beta}_0+X_{1it}\widehat{\beta}_1+X_{2it}\widehat{\beta}_2+X_{3it}\widehat{\beta}_3+X_{4it}\widehat{\beta}_4+X_{5it}\widehat{\beta}_5+X_{6it}\widehat{\beta}_6+(X_{1it})^2\widehat{\beta}_7+(X_{2it})^2\widehat{\beta}_8+(X_{3it})^2\widehat{\beta}_7+(X_{4it})^2\widehat{\beta}_8+(X_{5it})^2\widehat{\beta}_9+(X_{6it})^2\widehat{\beta}_{10}+(X_{1it}*X_{2it})\widehat{\beta}_{11}+\epsilon_{it})}$$

for counties that never implemented a P-HIP during the study period

Equation 2:

$$\hat{y}_{it} =$$

$$\frac{1}{(\widehat{\beta}_0+X_{1it}\widehat{\beta}_1+X_{2it}\widehat{\beta}_2+X_{3it}\widehat{\beta}_3+X_{4it}\widehat{\beta}_4+X_{5it}\widehat{\beta}_5+X_{6it}\widehat{\beta}_6+(X_{1it})^2\widehat{\beta}_7+(X_{2it})^2\widehat{\beta}_8+(X_{3it})^2\widehat{\beta}_7+(X_{4it})^2\widehat{\beta}_8+(X_{5it})^2\widehat{\beta}_9+(X_{6it})^2\widehat{\beta}_{10}+(X_{1it}*X_{2it})\widehat{\beta}_{11}+\epsilon_{it})}$$

for counties that implemented a P-HIP during the study period, where:

i = a given county
t = a given year
X_1 = change in the percent of the population living in poverty from (min, max in 2002-2006)
X_2 = change in the unemployment rate from (min, max in 2002-2006)
X_3 = change in the percent of population ages 5-19 years (min, max in 2002-2006)
X_4 = change in the percent of population ages 20-39 years (min, max in 2002-2006)
X_5 = change in the percent of population ages 40-64 years (min, max in 2002-2006)
X_6 = change in the percent of population ages 65+ years (min, max in 2002-2006)

Appendix Exhibit 3
Balance of pre-implementation covariates based on inverse propensity score treatment weighting

Covariate	Unweighted Standardized Difference	Weighted Standardized Difference
chng_2039	1.352181601	-0.07656569
chng_4064	-2.440963703	-0.021191994
chng_519	0.949003842	0.021506901
chng_65	-0.411497748	0.117204505
chng_pov	-0.143574581	-0.067178955
chng_uer	0.545792396	0.062905454

Notes: Standardized differences are from probability of treatment estimated by inverse propensity score treatment weighting probit regressions conducted in Equations 1. Covariates with standardized differences less than 0.25 are considered to be well-balanced across the treatment and control samples.

Difference-in-Differences:
This technical appendix contains the full specification of each regression model conducted. All variables were entered into the regression model without transformation. For each regression analysis performed below, county and year fixed effects were employed, and standard errors were clustered at the county level.

Appendix Exhibit 4. County-Level Changes in Selected Health Outcomes after P-HIP Implementation, 2002-2012 (Difference-in-Differences: Ordinary Least Squares Analysis)

	Poor or Fair Health (Robust Std. Error)	Any Smoking (Robust Std. Error)	Obese or Overweight (Robust Std. Error)
P-HIP Implementation	-0.00054 (0.002)	0.0004 (0.001)	-0.001 (0.002)
% Living in Poverty	0.0011** (0.005)	0.0003 (0.0002)	0.0005 (0.0005)
Unemployment Rate	-0.0001 (0.005)	0.0006*** (0.0002)	-0.00090 (0.0006)
% 5-19 Years Old	-0.007 (0.333)	-0.331*** (0.154)	-0.489 0.315
% 20-39 Years Old	0.410 (0.367)	-0.556*** (0.179)	-0.550 (0.392)
% 40-64 Years Old	0.058 (0.288)	-0.426*** (0.141)	-0.496 (0.315)
% 65+ Years Old	0.062 (0.328)	-0.584*** (0.160)	-0.467 (0.340)
2003	0.002 (0.002)	0.0008 (0.001)	0.008*** (0.002)
2004	0.013*** (0.002)	0.004*** (0.001)	0.016*** (0.003)
2005	0.020*** (0.003)	0.0005 0.002	0.028*** (0.003)
2006	0.025*** (0.003)	-0.003 (0.002)	0.034*** (0.004)
2007	0.029*** (0.003)	-0.003* (0.002)	(0.045)*** (0.004)
2008	0.031*** (0.003)	-0.004** (0.002)	0.049*** (0.004)
2009	0.029*** (0.004)	-0.007*** (0.002)	0.058*** (0.004)
2010	0.034*** (0.004)	-0.008*** 0.002	0.062*** (0.005)
2011	0.032*** (0.004)	-0.003 (0.002)	0.058*** (0.005)
2012	0.033*** (0.004)	-0.0004 (0.002)	0.064*** (0.005)
Constant	-0.006 (0.29)	0.473*** (0.143)	0.0664** (0.304)
N	2542	2542	2542
R^2	0.11	0.01	0.09
Number of Counties	437	437	437

Notes: Authors' analyses of author's categorization of P-HIPs and BRFSS SMART data from 2002-2012. Number of counties in sample varies from year-to-year based on BRFSS SMART data inclusion criteria. Standard errors are clustered at the county (FIPS) level. *p<0.10; ** p<0.05; ***p<0.01

Appendix Exhibit 5. County-Level Changes in Selected Health Outcomes after P-HIP Implementation, 2002-2012 (Difference-in-Differences: Inverse Propensity Score Treatment Weighted Analysis)

	Poor or Fair Health (Std. Error)	Any Smoking (Std. Error)	Obese or Overweight (Std. Error)
P-HIP Implementation	0.0012 (0.002)	0.0005 (0.001)	-0.0006 (0.002)
% Living in Poverty	0.0008 (0.0006)	0.0002 (0.0003)	0.0002 (0.0006)
Unemployment Rate	0.0009 (0.0006)	0.0006* (0.0003)	-0.0003 (0.0007)
% 5-19 Years Old	0.595 (0.410)	-0.351 (0.219)	0.211 (0.408)
% 20-39 Years Old	0.753 (0.485)	-0.630*** (0.229)	-0.111 (0.427)
% 40-64 Years Old	0.286 (0.404)	-0.510*** (0.175)	-0.201 (0.362)
% 65+ Years Old	0.387 (0.441)	-0.674*** (0.215)	-0.102 (0.410)
2003	0.004 (0.003)	0.0009 (0.002)	0.009*** (0.003)
2004	0.018*** (0.003)	0.005*** (0.002)	0.018*** (0.004)
2005	0.026*** (0.003)	0.001 (0.002)	0.030*** (0.004)
2006	0.032*** (0.004)	-0.002 (0.002)	0.039*** (0.004)
2007	0.033*** (0.004)	-0.002 (0.002)	0.051*** (0.005)
2008	0.035*** (0.004)	-0.003 (0.002)	0.052*** (0.004)
2009	0.031*** (0.005)	-0.005** (0.002)	0.062*** (0.005)
2010	0.036*** (0.005)	-0.007*** (0.003)	0.067*** (0.006)
2011	0.037*** (0.005)	-0.001 (0.003)	0.061*** (0.0060
2012	0.038*** (0.006)	0.002 (0.003)	0.068*** (0.006)
Constant	-0.346 (0.393)	0.539*** (0.187)	0.253 (0.353)
N	2,100	2,100	2,100
R^2	0.14	0.000	0.26
Number of Counties	230	230	230

Notes: Authors' analyses of author's categorization of P-HIPs and BRFSS SMART data from 2002-2012. Number of counties in sample varies from year-to-year based on BRFSS SMART data inclusion criteria. Any smoking includes individuals who report smoking daily and individuals who report smoking some. Overweight/obese includes individuals whose BMI ≥ 25 and ≤ 40. Standard errors are clustered at the county (FIPS) level. *p<0.10; ** p<0.05; ***p<0.01

Appendix Exhibit 6. Annual County-Level Self-Reported Health Outcomes Before and After P-HIP Implementation, 2002-2012 (Event Study: Ordinary Least Squares Analysis)

	Poor or Fair Health (Robust Std. Error)	Any Smoking (Robust Std. Error)	Obese or Overweight (Robust Std. Error)
Period 1	-0.016	-0.020***	-0.029
	(0.012)	(0.006)	(0.021)
Period 2	-0.015	-0.017***	-0.024
	(0.010)	(0.005)	(0.018)
Period 3	-0.014	-0.014***	-0.021
	(0.009)	(0.004)	(0.014)
Period 4	-0.011	-0.009**	-0.020
	(0.008)	(0.004)	(0.013)
Period 5	-0.013**	-0.10***	-0.017
	(0.006)	(0.003)	(0.011)
Period 6	-0.005	-0.008***	-0.012
	(0.005)	(0.003)	(0.008)
Period 7	-0.006	-0.004	-0.012*
	(0.005)	(0.003)	(0.007)
Period 8	-0.011**	-0.003	-0.016***
	(0.005)	(0.003)	(0.005)
Period 9	--	--	--
Period 10	-0.005	0.001	-0.004
	(0.005)	(0.003)	(0.005)
Period 11	0.002	0.003	-0.005
	(0.004)	(0.003)	(0.007)
Period 12	0.002	0.010***	0.011
	(0.005)	(0.003)	(0.009)
Period 13	0.0003	0.010**	0.008
	(0.007)	(0.004)	(0.011)
Period 14	0.012	0.010**	0.012
	(0.0007)	(0.004)	(0.014)
% in Poverty	0.001*	0.0004	0.00004
	(0.0007)	(0.0003)	(0.0007)
% Unemployed	0.003***	0.0008*	0.0009
	(0.0009)	(0.0005)	(0.0010)
% 5-19 Years Old	0.914	-0.353	0.205
	(0.552)	(0.292)	(0.566)
% 20-39 Years Old	1.06	-0.692**	-0.585
	(0.699)	(0.328)	(0.589)
% 40-64 Years Old	0.496	-0.499*	-0.611
	(0.617)	(0.266)	(0.568)
% 65+ Years Old	0.673	-0.751**	-0.727
	(0.640)	(0.311)	(0.559)
Constant	-0.606	0.575**	0.619
	(0.570)	(0.267)	(0.499)
N	813	813	550
R^2	0.17	0.0000	0.016
Number of Counties	112	112	72

Notes: Authors' analyses of author's categorization of P-HIPs and BRFSS SMART data from 2002-2012. Number of counties in sample varies from year-to-year based on BRFSS SMART data inclusion criteria. Any smoking includes individuals who report smoking daily and individuals who report smoking some. Overweight/obese includes individuals whose BMI $\geq$ 25 and $\leq$ 40.
*p<0.10; ** p<0.05; ***p<0.01

Appendix Exhibit 7. Annual County-Level Self-Reported Health Outcomes Before and After P-HIP Implementation, 2002-2012 (Event Study: Inverse Propensity Score Treatment Weighted Analysis)

	Poor or Fair Health (Std. Error)	Any Smoking (Std. Error)	Obese or Overweight (Std. Error)
Period 1	-0.019	-0.022***	-0.036
	(0.012)	(0.007)	(0.022)
Period 2	-0.014	-0.019***	-0.026
	(0.009)	(0.005)	(0.019)
Period 3	-0.014	-0.015***	-0.025
	(0.009)	(0.005)	(0.015)
Period 4	-0.011	-0.011**	-0.024*
	(0.007)	(0.004)	(0.013)
Period 5	-0.014**	-0.012***	-0.019*
	(0.006)	(0.003)	(0.011)
Period 6	-0.006	-0.010***	-0.015*
	(0.005)	(0.003)	(0.008)
Period 7	-0.004	-0.005	-0.014**
	(0.005)	(0.003)	(0.007)
Period 8	-0.011**	-0.004	-0.016***
	(0.005)	(0.003)	(0.005)
Period 9	--	--	--
Period 10	0.003	0.001	-0.003
	(0.006)	(0.003)	(0.006)
Period 11	0.001	0.002	-0.002
	(0.004)	(0.003)	(0.007)
Period 12	0.002	0.011***	0.013
	(0.006)	(0.003)	(0.009)
Period 13	0.006	0.010**	0.011
	(0.007)	(0.004)	(0.012)
Period 14	0.012	0.010**	0.017
	(0.008)	(0.004)	(0.015)
% in Poverty	0.001	0.0005	0.0003
	(0.0007)	(0.003)	(0.0007)
% Unemployed	0.003***	0.0008	0.0009
	(0.001)	(0.0005)	(0.001)
% 5-19 Years Old	1.133*	-0.325	0.291
	(0.590)	(0.316)	(0.580)
% 20-39 Years Old	1.275*	-0.666*	-0.503
	(0.751)	(0.355)	(0.624)
% 40-64 Years Old	0.660	-0.495*	-0.551
	(0.659)	(0.284)	(0.594)
% 65+ Years Old	0.789	-0.739**	-0.649
	(0.678)	(0.331)	(0.573)
Constant	-0.779	0.560*	0.549
	(0.611)	(0.287)	(0.522)
N	746	746	746
R²	0.161	0.0001	0.261
Number of Counties	80	80	80

Notes: Authors' analyses of author's categorization of P-HIPs and BRFSS SMART data from 2002-2012. Number of counties in sample varies from year-to-year based on BRFSS SMART data inclusion criteria. Any smoking includes individuals who report smoking daily and individuals who report smoking some. Overweight/obese includes individuals whose BMI ≥ 25 and ≤ 40.
*p<0.10; ** p<0.05; ***p<0.01