

Spring 2021

## Identifying Health Bright Spots in the Northeastern Region

Katharine S. F. Knight MPH

Follow this and additional works at: [https://digitalcommons.usm.maine.edu/muskie\\_capstones](https://digitalcommons.usm.maine.edu/muskie_capstones)

---

This Capstone is brought to you for free and open access by the Student Scholarship at USM Digital Commons. It has been accepted for inclusion in Muskie School Capstones and Dissertations by an authorized administrator of USM Digital Commons. For more information, please contact [jessica.c.hovey@maine.edu](mailto:jessica.c.hovey@maine.edu).

# Identifying Health Bright Spots in the Northeastern Region

Katharine S.F. Knight

Spring 2021

## Introduction

Bright Spots are counties that are experiencing better-than-expected health outcomes. There have been a limited number of analyses exploring this concept. There are two research reports that have identified Bright Spots at the county level. The Institute for Healthcare Improvement (IHI) identified 17 counties nationally as Bright Spots. The “Creating a Culture of Health in Appalachia” initiative identified 15 urban counties and 27 rural counties as Bright Spots. In this study we reviewed these findings, and applied the methods used in these reports in an analysis of the Northeast Region of the US.

The IHI published a summary report (Counties of Interest) for a 90-day research and development project in 2011. This summary report identified counties that were experiencing better health outcomes than predicted by social and economic factors in 2010. Counties of interest were identified as Bright Spots if their deleted t residual (the standardized difference between the expected vs. observed health outcome) was statistically significant (at the 90% significance level) based on a linear regression model using all counties in the same state (IHI, 2011, p. 7). The summary report identified 17 counties with better-than-expected health outcomes in the United States. No national comprehensive analysis has been done since the publication of this report.

The research initiative “Creating a Culture of Health in Appalachia” published a statistical analysis executive summary (Identifying Bright Spots in Appalachian Health) in 2018. In this executive summary, Bright Spots were identified as those counties which were experiencing better-than-expected health outcomes given characteristics and resources in 2016. Bright spots were identified if a county’s standardized health outcome was in the top decile (10%) (Holmes et al, 2018, p. 5). The executive summary identified 15 urban counties and 27 rural counties as Bright Spots with better-than-expected health outcomes in the Appalachian region. These results are not comparable between urban and rural areas (Holmes et al, 2018, p. 5). This analysis only explored counties in the Appalachian region.

There has not been an investigation of US counties with “better-than-expected” health outcomes (“Bright Spots”) since 2011. The aim of this Capstone was to update some of the information, by identifying Bright Spot counties as they now exist in the Northeastern region of the United States. Another goal of this Capstone analysis was to identify the top decile of metropolitan (urban) and nonmetropolitan (rural) counties with better-than-expected health

outcomes for the Northeastern region. This Capstone’s analytical methods were developed based on the methods used in the IHI and Appalachian reports. The identification of Bright Spot counties in the Northeast region will allow future research to investigate the factors that drive health outcomes. The Capstone research can also be a resource for researchers who are interested in exploring the reasons or causes behind Bright Spot (i.e. health-outlier) counties.

## Methods

Data were retrieved and downloaded from County Health Rankings, a publicly available data source. This analysis focused on counties located in the Northeastern region<sup>1</sup>. We used the most recent data available: year 2020.

Question 1: Identify Bright Spot counties in the Northeastern region of the United States

Question #1’s analysis was based on the methodology presented in the IHI report. To identify which Northeastern countries are Bright Spots, the IHI report determined a standardized residual (deleted-t residual) cut-off point for each state (based on the number of counties in the state) at the 90% significance-level (Appx Table 1 and Chart 1). If a county’s deleted-t residual value met or exceeded the specified cut-point, then it was considered to be a Bright Spot. In this analysis, social and economic health factors were the predictor variables, and comprised education, employment, income, family and social support, and community safety (Appx Table 2). Health outcomes were the outcome variables, and included premature death (years of potential life lost before age 75), self-reported poor or fair health, self-reported poor physical health days, self-reported poor mental health days, and the percentage of live births with low birthweight (Appx Table 3).

We imported CHR “Outcomes & Factors Rankings” into SAS 9.4 for each Northeastern state. Health factor data (Appx Table 2) within-state z-scores and health outcome data within-state z-scores (Appx Table 3) were used to conduct the analysis. Data were combined into two separate datasets: one for the health outcomes and one for the health factors. These two datasets were then merged into one dataset. This single dataset was used for linear regression models to calculate the predicted value, predicted lower and upper 95% confidence limits, predicted standard error, residual value, standardized residual, and deleted t standardized residual. Additionally, the regression analysis calculated the ANOVA, global p-value, R-square, Spearman p-value for correlation, and created a scatterplot. Counties were identified as Bright Spots if the state’s residual cut-off (Appx Table 1 and Chart 1) was lower than the county’s deleted t residual.

---

<sup>1</sup> Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont

Question 2: Identify the top decile of urban and rural counties with better-than-expected health outcomes for the Northeastern region

Question #2's analysis was based on the method presented in the "Creating a Culture of Health in Appalachia" summary. To determine the top decile of counties, the Appalachian summary identified health factors (Appx Table 4) and outcome measures (Appx Table 5) and determined their relationship through a multivariable regression. Standardized residuals were calculated for each model and were then averaged by county. A county was identified as a Bright Spot if its average standardized residuals fell within the top 10%.

The Capstone project imported 2020 CHR "Ranked Measure Data" into SAS 9.4 to obtain values for health factors (Appx Table 6) and outcomes (Appx Table 3) for each of the Northeastern states, representing 244 counties. These state datasets were then merged into a single dataset. The health outcome variables (Appx Table 3) were renamed to a shorter length and the "water violation" variable was converted from a character variable to a numeric variable.

NCHS Urban-Rural Classification data were also imported. This analysis used the 2013 Urban-Rural Classification scheme. The categories were as follows: large central metro (1); large fringe metro (2); medium metro (3); small metro (4); micropolitan (5); and noncore (6). The data were dichotomized by urban-rural status; urban were levels 1-4, and rural areas were levels 5-6. This NCHS Urban-Rural Classification dataset was merged to the CHR dataset. The analysis differentiated and separated the urban and rural areas in order to run separate regressions for each group.

The urban and rural datasets were used to perform a multivariate regression analysis to determine the relationships between 24 health factors (Appx Table 6), run simultaneously as predictors in the model, and 5 health outcomes (Appx Table 3), run separately as outcomes in the model. The standardized residual values were then averaged for each county in the rural and urban datasets, separately. The top decile "better-than-expected" counties were determined for each dataset and ranked by their averaged standardized residual. A county whose average standardized health outcome residual score was in the top decile was classified as a Bright Spot.

## Results

Using the methods stated above in this Capstone analysis, Question #1 derived six Bright Spot counties (Table 1): Fairfield, CT; Oxford, ME; Dukes, MA; Forest, PA; Providence, RI; and Grand Isle, VT. Of these Bright Spots, three are rural counties and three are urban counties. Table 1 shows the state, county name, deleted t residual, health outcomes z-score, and social and economic factors z-score. Table 2 is a supplementary table which shows the demographic characteristics of each Bright Spot county identified in Question #1 including: population, % Non-Hispanic White, % Black, % Hispanic, % Other, % Population 18 years & Under, and % Population 65 years & Older.

The analysis for Question #2 observed 92 rural counties in the Northeastern Region and identified nine rural Bright Spots (Table 3): Franklin, NY; Coos, NH; Knox, ME; Sullivan, PA; Somerset, PA; Litchfield, CT; Addison, VT; Kennebec, ME; and Wyoming, NY. This analysis

observed 152 urban counties in the Northeastern Region and 15 were identified as urban Bright Spots (Table 4): Fairfield, CT; Allegheny, PA; Orange, NY; Somerset, MD; Kings, NY; Chemung, NY; Bristol, RI; Montour, PA; Middlesex, CT; New London, CT; Rockland, NY; Carroll, MD; Blair, PA; St. Mary's, MD; and Franklin, VT. Tables 3 and 4 show: rank, county, state, average standard residual score, highest individual residual (variable name and residual score), and NCHS Rural-Urban Classification.

Figures 1 and 2 are maps showing the locations of Bright Spots. Figure 1 is a map showing the locations of the six counties of interest as Bright Spots identified in Question #1. Figure 2 is a map showing the location of the 26 counties of interest as Bright Spots identified in Question #2. The “yellow” pins are urban Bright Spots and “blue” pins are rural Bright Spots.

## Discussion

From these results, some findings can be drawn. Question #1 identified six Bright Spots. Most of the identified counties in Question #1 have a primarily Non-Hispanic White population (Table 2). But some of counties have a substantial Black or Hispanic population. For example, Forest, Pennsylvania (20.3%) has a substantial non-Hispanic Black population. Additionally, Fairfield, Connecticut (20.2%) and Providence, Rhode Island (23.4%) have a substantial Hispanic population.

Age-related demographic characteristics in Question #1 were similar from county-to-county (Table 2) excluding Fairfield, CT and Providence, RI. For instance, the percent of the population 18 years and under ranged from 10% to 18% and the percent of the population 65 years and older ranged from 20% to 24% (except in Fairfield, CT and Providence, RI). The counties with a substantial Hispanic population (Fairfield, CT [23%:16%] and Providence, RI [21%:15%]) had higher 18 years and under population and a lower 65 years and older population compared to the other Question #1 Bright Spots.

Question #2 identified nine rural Bright Spots and 15 urban Bright Spots. The rural Bright Spots identified in Question #2 (Table 3) had high residual values for the health outcomes of Average Physical Unhealthy Days (44%) and Average Mental Unhealthy Days (33%). The urban Bright Spots identified in Question #2 (Table 4) had an even spread of high residual values for the health outcomes of Fair or Poor Health (27%), Low Birthweight (20%), Average Physical Unhealthy Days (20%), Average Mental Unhealthy Days (20%), and Premature Death (13%). Further, most of the identified urban Bright Spots are classified as small metro (33%) or large fringe metro (33%).

From viewing the Bright Spot Maps (Figure 1 and 2), it can be seen that most of the urban Bright Spots seem to be near the coast, and rural Bright Spots seem to be closer to the northern country border.

The IHI mentioned the “Hispanic paradox”, selection bias, and salmon bias as attributing factors to Bright Spot counties with a predominate Hispanic population. The Hispanic paradox was “[the] Hispanic population in the U.S. hav[ing] favorable mortality outcomes despite generally unfavorable socioeconomic status” (IHI, 2011, p. 13). However, it is mentioned that

this health outcome phenomenon does not increase as immigrants live further from the U.S.-Mexican border. Selection bias influence who immigrates to the U.S. from Mexico and salmon bias (or the selective return migration) when older immigrants return to Mexico due to illness. The selection bias and salmon bias may explain some of the reasoning between the counties with a substantial Hispanic population and the higher younger population/lower older population.

The rural Bright Spots identified in Question #2 (Table 3) had high residual values for Average Physical Unhealthy Days and Average Mental Unhealthy Days. This could be interpreted as rural populations tending to have healthy physical and mental days. Potential driving factors may be related to environment, lifestyle, and/or behaviors. The urban Bright Spots identified in Question #2 (Table 4) had an even spread of high residual values for the health outcomes. This may be in part due to metropolitan areas tending to have more resources and easier access to health services. Further, most of the identified urban Bright Spots are either small metro or large fringe metro, which might indicate that these area types are more prepared than other urban area types.

Finally, most of the urban Bright Spots seem to be near the coast, and rural Bright Spots seem to be closer to the northern country border. This could be attributed to how numerous each type of county is in proximity to the coast and the northern country border.

## Limitations

There were a few limitations in the performance of this analysis. Question #1 had the challenge of determining the residual cut-off for states. In the previous publication, the report did not describe nor declare the methodology used to determine the residual cut-off for each state. To mitigate this problem, the analysis used estimated residual cut-offs based on a scatterplot with trend lines which included all of the IHI result residual cut-offs (Appx Table 1 and Chart 1).

There were a few limitations in the performance of Question #2. These issues ranged from differences in measures to missing data. This analysis did not use the same health factors (Appx Table 9) and health outcomes (Appx Table 8) as used in the Appalachian report. Instead, this analysis used the measures presented in the CHR dataset to determine health factors (Appx Table 4) and outcomes (Appx Table 3). Second, some health factor data in the CHR datafile were missing, thus excluding observations from the analysis (eight rural counties and three urban counties). To combat this issue this analysis removed the health factor variables of “Violent Crime”, “High School Graduation Rate”, “Dentist Ratio”, and “Primary Care Physician Ratio”. This left the analysis with 26 health factors to conduct the multivariate regression (Appx Table 4). Finally, a couple of the observations were missing from the health outcome data, specifically, “Years Potential Life Lost Rate”. To include all observations this analysis averaged standardized residuals which were available. Finally, through this methodology there will always be Bright Spots identified since Bright Spots are counties in the top decile for health outcomes.

## Implication & Further Research

The counties identified in this Capstone analysis were experiencing better-than-expected health outcomes. With further research, these counties could provide a model or suggest strategies for other counties trying to improve their health outcomes. Of course, it was acknowledged that the Bright Spots identified in this Capstone analysis are subject to change depending on the fluctuation of health factors involved.

Further investigation could take several forms. For instance, further research could use Question #1's methodology to identify counties throughout the United States which are experiencing significantly better-than-expected health outcomes. Further research could additionally use Question #2's methodology to identify the top decile of counties in the United States with the best health outcomes. Further research could look into the various health and confounding (i.e. health initiatives and interventions) factors and their relative impact on health outcomes. Finally, local researcher could follow their county or counties of interest over time to monitor health outcomes and pinpoint any influencing factors.

## Conclusion

There are Bright Spots in the Northeastern region of the United States. Question #1 identified six Bright Spot counties, of which three were rural counties and three were urban counties (Table 1). Question #2 identified 26 Bright Spots, of which 15 were urban counties and nine were rural counties (Table 3 and 4). Some counties identified in Question 1# have a substantial non-Hispanic Black or Hispanic population (Table 2). Rural Bright Spots identified in Question #2 had high residual values for the health outcomes of average physical unhealthy days and average mental unhealthy days (Table 3 and 4). Finally, most of the urban Bright Spots are located near the coast and rural Bright Spots are located closer to the northern country border (Figure 1 and 2).

## References

- Holmes, M.G., Lane, N.M., Holding, W., Randolph, R., Rodgers, J., Silberman, P., Villamil, L., Arcury, T.A., Ivey, K., Goolsby, D., Keyser, A., and J&J Editorial. (2018). *Identifying Bright Spots in Appalachian Health: Statistical Analysis Executive Summary*. Appalachian Regional Commission. <https://www.arc.gov/wp-content/uploads/2018/07/BrightSpotsStatisticalAnalysis-ExecutiveSummaryJuly2018.pdf>.
- Institution for Healthcare Improvement. (2011). *IHI 90-Day R&D Project Final Summary Report: Counties of Interest: Achieving Better- or Worse-Than-Expected Health Outcomes*. Institute for Healthcare Improvement. <http://www.ihl.org/resources/Pages/Publications/CountiesofInterestHealthOutcomesIHI90DayRDProject.aspx>.
- National Center for Health Statistics. (2017, June 1). *NCHS Urban-Rural Classification Scheme for Counties*. Centers for Disease Control and Prevention. [https://www.cdc.gov/nchs/data\\_access/urban\\_rural.htm](https://www.cdc.gov/nchs/data_access/urban_rural.htm).
- Robert Wood Johnson Foundation, University of Wisconsin Population Health Institute. (2021). *Rankings Data & Documentation*. County Health Rankings & Roadmap. <https://www.countyhealthrankings.org/explore-health-rankings/rankings-data-documentation>.



## Figures and Tables

Table 1. Capstone Question #1: Six Counties of Interest as Bright Spots, CHR 2020

<b>State</b>	<b>County</b>	<b>Deleted T Residual</b>	<b>Residual Cut-off for State</b>	<b>Health Outcomes Z-Score</b>	<b>SES Factors Z-Score</b>	<b>NCHS Rural-Urban Classification</b>	
Connecticut	Fairfield	-7.67	-2.72	-1.21	-0.04	Urban	Medium Metro
Maine	Oxford	-2.77	-2.72	0.06	0.3	Rural	Non-core
Massachusetts	Dukes	-3.35	-2.75	-1.07	0.07	Rural	Micropolitan
Pennsylvania	Forest	-4.45	-3.16	-0.33	0.58	Rural	Non-core
Rhode Island	Providence	-2.84	-2.71	1.05	0.62	Urban	Large Central Metro
Vermont	Grand Isle	-2.77	-2.75	-1.23	-0.04	Urban	Small Metro

Table 2. Capstone Question #1: Bright Spot Demographic Characteristics, CHR 2020

<b>County, State</b>	<b>Population</b>	<b>% Non-Hispanic White</b>	<b>% Black</b>	<b>% Hispanic</b>	<b>% Other</b>	<b>% Pop. 18 years &amp; Under</b>	<b>% Pop. 65 years &amp; Older</b>
Fairfield, CT	943,823	61.5	11.0	20.2	6.4	22.5	15.9
Oxford, ME	57,618	95.2	0.6	1.4	1.3	18.4	21.7
Dukes, MA	17,352	87.3	4.1	3.8	2.5	17.5	24.3
Forest, PA	7,279	72.0	20.3	6.6	0.8	10.7	22.6
Providence, RI	636,084	60.9	8.7	23.4	6.2	20.5	15.3
Grand Isle, VT	7,090	92.4	0.7	2.1	2.2	18.0	20.8

Table 3. Capstone Question #2: Nine Rural Counties of Interest as Bright Spots, CHR 2020

Rank	County	State	Avg. Std. Residual Score	Highest Individual Residual	NCHS Rural-Urban Classification
1	Franklin	New York	-1.29	Average Physical Unhealthy Days -2.57	Micropolitan
2	Coos	New Hampshire	-1.02	Average Mental Unhealthy Days -3.09	Micropolitan
3	Knox	Maine	-0.98	Average Physical Unhealthy Days -2.45	Non-core
4	Sullivan	Pennsylvania	-0.96	Premature Death -1.28	Non-core
5	Somerset	Pennsylvania	-0.89	Average Mental Unhealthy Days -1.80	Micropolitan
6	Litchfield	Connecticut	-0.88	Average Physical Unhealthy Days -3.13	Micropolitan
7	Addison	Vermont	-0.74	Average Mental Unhealthy Days -1.47	Non-core
8	Kennebec	Maine	-0.70	Poor or Fair Health -1.52	Micropolitan
9	Wyoming	New York	-0.70	Average Physical Unhealthy Days -1.56	Non-core

Table 4. Capstone Question #2: Fifteen Urban Counties of Interest as Bright Spots, CHR 2020

<b>Rank</b>	<b>County</b>	<b>State</b>	<b>Avg. Std. Residual Score</b>	<b>Highest Individual Residual</b>		<b>NCHS Rural-Urban Classification</b>
1	Fairfield	Connecticut	-1.66	Average Physical Unhealthy Days	-3.06	Medium Metro
2	Allegheny	Pennsylvania	-1.64	Average Physical Unhealthy Days	-2.51	Large Central Metro
3	Orange	New York	-1.45	Average Physical Unhealthy Days	-2.04	Large Fringe Metro
4	Somerset	Maryland	-1.37	Fair or Poor Health	-2.73	Medium Metro
5	Kings	New York	-1.23	Fair or Poor Health	-2.46	Large Central Metro
6	Chemung	New York	-1.18	Average Mental Unhealthy Days	-1.61	Small Metro
7	Bristol	Rhode Island	-1.05	Premature Death	-3.37	Large Fringe Metro
8	Montour	Pennsylvania	-1.04	Premature Death	-2.21	Small Metro
9	Middlesex	Connecticut	-1.01	Low Birthweight	-1.98	Large Fringe Metro
10	New London	Connecticut	-0.93	Average Mental Unhealthy Days	-1.67	Medium Metro
11	Rockland	New York	-0.88	Low Birthweight	-2.27	Large Fringe Metro
12	Carroll	Maryland	-0.87	Low Birthweight	-2.13	Large Fringe Metro
13	Blair	Pennsylvania	-0.83	Fair or Poor Health	-1.40	Small Metro
14	St. Mary's	Maryland	-0.81	Average Mental Unhealthy Days	-1.66	Small Metro
15	Franklin	Vermont	-0.79	Fair or Poor Health	-1.68	Small Metro

Figure 1. Capstone Question #1: Six Counties of Interest as Bright Spots Map

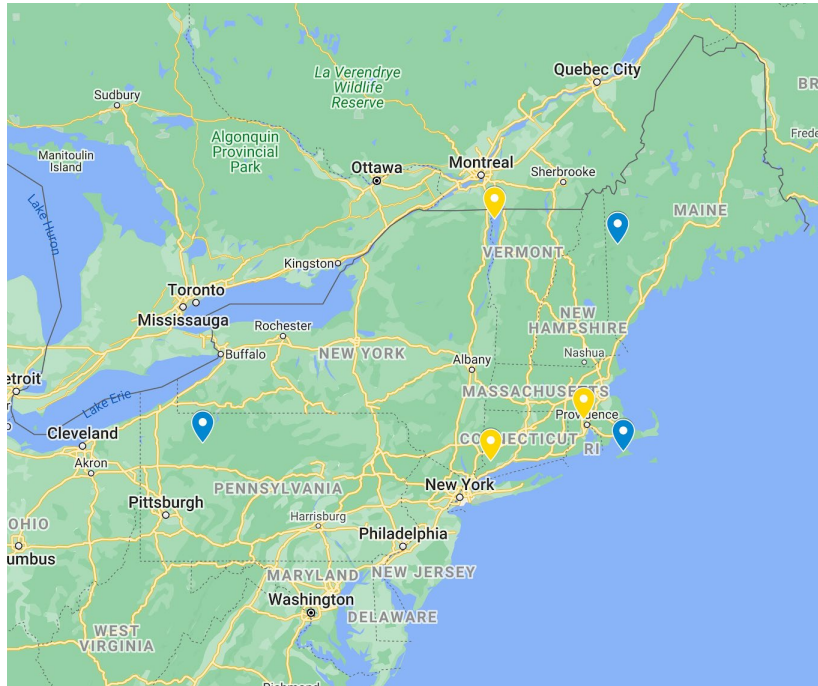
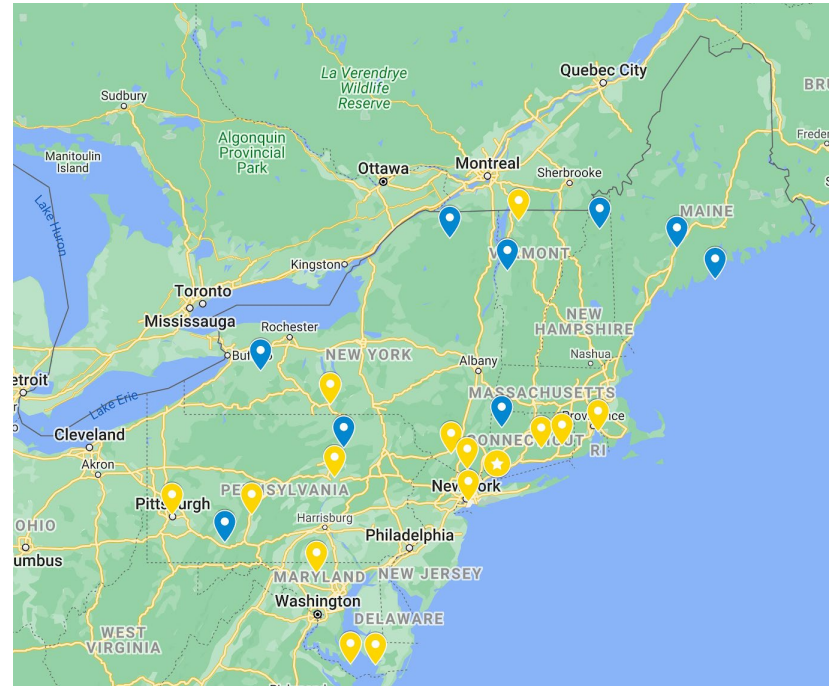


Figure 2. Capstone Question #2: 26 Counties of Interest as Bright Spots Map



## Appendix

Appendix Table 1. State Residual Cut-off

State	Deleted T Residual Cut-off
Alabama	-3.16
Alaska	-2.85
Arizona	-2.62
Arkansas	-3.12
California	-3.08
Colorado	-3.04
Connecticut	-2.72
Delaware	-2.69
District of Columbia	-2.67
Florida	-3.16
Georgia	-
Hawaii	-2.69
Idaho	-2.93
Illinois	-3.28
Indiana	-3.24
Iowa	-3.26
Kansas	-3.30
Kentucky	-3.32
Louisiana	-3.15
Maine	-2.72

Maryland	-2.84
Massachusetts	-2.75
Michigan	-3.17
Minnesota	-3.19
Mississippi	-3.16
Missouri	-3.36
Montana	-3.01
Nebraska	-3.23
Nevada	-2.77
New Hampshire	-2.56
New Jersey	-2.79
New Mexico	-2.92
New York	-3.13
North Carolina	-3.28
North Dakota	-2.99
Ohio	-3.23
Oklahoma	-3.13
Oregon	-2.88
Pennsylvania	-3.16
Rhode Island	-2.71
South Carolina	-3.05
South Dakota	-3.01
Tennessee	-3.24
Texas	-3.36
Utah	-2.85
Vermont	-2.75
Virginia	-3.32
Washington	-2.98
West Virginia	-3.00
Wisconsin	-3.17
Wyoming	-2.80

Appendix Table 2. Capstone Question #1: Social & Economic Health Factors

<b>Focus Area</b>	<b>Measure</b>	<b>Description</b>
Education	High school graduation	Percentage of ninth-grade cohort that graduates in four years.
	Some college	Percentage of adults ages 25-44 with some post-secondary education.
Employment	Unemployment	Percentage of population ages 16 and older unemployed but seeking work.
Income	Children in poverty*	Percentage of people under age 18 in poverty.
	Income inequality	Ratio of household income at the 80th percentile to income at the 20th percentile.
Family and Social Support	Children in single-parent households	Percentage of children that live in a household headed by single parent.
	Social associations	Number of membership associations per 10,000 population.
Community Safety	Violent crime	Number of reported violent crime offenses per 100,000 population.
	Injury deaths*	Number of deaths due to injury per 100,000 population.

Appendix Table 3. Capstone Health Outcomes

<b>Focus Area</b>	<b>Measure</b>	<b>Description</b>
Length of Life	Premature death*	Years of potential life lost before age 75 per 100,000 population (age-adjusted).
Quality of Life	Poor or fair health	Percentage of adults reporting fair or poor health (age-adjusted).
	Poor physical health days	Average number of physically unhealthy days reported in past 30 days (age-adjusted).
	Poor mental health days	Average number of mentally unhealthy days reported in past 30 days (age-adjusted).
	Low birthweight*	Percentage of live births with low birthweight (< 2,500 grams).



Appendix Table 4. Creating a Culture of Health in Appalachia Driver Measures

<b>Category</b>	<b>Measure</b>
Child Health	Teenage births per 1,000
Environment	Full-service restaurants per 1,000 population
	Percentage with access to exercise opportunities
	Air pollution (average daily particulate matter, PM2.5)
	Grocery stores per 1,000 population
	Students per teacher (primary and secondary school)
	Average travel time to work in minutes
Health Behaviors	Percentage of adults currently smoking
	Percentage of adults not physically active
	Chlamydia incidence per 100,000
Health Care System and Utilization	Primary care physicians per 100,000 population
	Dentists per 100,000 population
	Specialty physicians per 100,000 population
	Mental health providers per 100,000 population
	Percentage of physicians that e-prescribe
	Percentage under 65 who are uninsured
Quality	Percentage of Medicare diabetics with HbA1c testing
	Percentage of Medicare women with recent mammogram
Social Determinants	Percentage of total population in paid Social Assistance jobs

Income inequality ratio
Percentage eligible enrolled in SNAP (Food Assistance)
Percentage of households with no car and low access to grocery stores
Percentage of households spending >30% of income on housing
ARC Economic Index
Social association rate per 10,000 population
Percentage receiving disability benefits (OASDI and/or SSI)
Percentage of adults with some college education
Percentage of households with income below poverty line
Median household income

Appendix Table 5. Creating a Culture of Health in Appalachia Outcome Measures

<b>Category</b>	<b>Measure</b>
Mortality	Years of potential life lost per 100,000
	Stroke mortality per 100,000
	All cancer mortality per 100,000
	Unintentional injury mortality per 100,000
	COPD mortality per 100,000
	Heart disease mortality per 100,000
Mental Health	Average mentally unhealthy days per person per month
	Suicide mortality per 100,000
	Percentage Medicare beneficiaries with depression
Child Health	Percentage of live births with low birth weight (<2,500g)
	Infant mortality per 1,000 births
Chronic Disease	Percentage adults with diabetes
	Medicare heart disease hospitalizations per 1,000
	Average Hierarchical Condition Category (HCC) risk score per Medicare beneficiary
	Percentage adults with obesity (BMI>30)
	Average physically unhealthy days per person per month
Substance Abuse	Percentage residents drinking excessively
	Poisoning mortality per 100,000
	Opioid prescriptions as percentage of Part D claims

Appendix Table 6. Capstone Question #2 Health Factors

<b>Focus Area</b>	<b>Measure</b>	<b>Description</b>
Tobacco Use	Adult smoking	Percentage of adults who are current smokers.
Diet and Exercise	Adult obesity	Percentage of the adult population (age 20 and older) that reports a body mass index (BMI) greater than or equal to 30 kg/m <sup>2</sup> .
	Food environment index	Index of factors that contribute to a healthy food environment, from 0 (worst) to 10 (best).
	Physical inactivity	Percentage of adults age 20 and over reporting no leisure-time physical activity.
	Access to exercise opportunities	Percentage of population with adequate access to locations for physical activity.
Alcohol and Drug Use	Excessive drinking	Percentage of adults reporting binge or heavy drinking.
	Alcohol-impaired driving deaths	Percentage of driving deaths with alcohol involvement.
Sexual Activity	Sexually transmitted infections	Number of newly diagnosed chlamydia cases per 100,000 population.
	Teen births*	Number of births per 1,000 female population ages 15-19.
Access to Care	Uninsured	Percentage of population under age 65 without health insurance.
	Mental health providers	Ratio of population to mental health providers.
Quality of Care	Preventable hospital stays*	Rate of hospital stays for ambulatory-care sensitive conditions per 100,000 Medicare enrollees.
	Mammography screening*	Percentage of female Medicare enrollees ages 65-74 that received an annual mammography screening.
	Flu vaccinations*	Percentage of fee-for-service (FFS) Medicare enrollees that had an annual flu

		vaccination.
Education	Some college	Percentage of adults ages 25-44 with some post-secondary education.
Employment	Unemployment	Percentage of population ages 16 and older unemployed but seeking work.
Income	Children in poverty*	Percentage of people under age 18 in poverty.
	Income inequality	Ratio of household income at the 80th percentile to income at the 20th percentile.
Family and Social Support	Children in single-parent households	Percentage of children that live in a household headed by single parent.
	Social associations	Number of membership associations per 10,000 population.
Community Safety	Injury deaths*	Number of deaths due to injury per 100,000 population.
Air and Water Quality	Air pollution - particulate matter <sup>+</sup>	Average daily density of fine particulate matter in micrograms per cubic meter (PM2.5).
	Drinking water violations	Indicator of the presence of health-related drinking water violations. 'Yes' indicates the presence of a violation, 'No' indicates no violation.
Housing and Transit	Severe housing problems	Percentage of households with at least 1 of 4 housing problems: overcrowding, high housing costs, lack of kitchen facilities, or lack of plumbing facilities.
	Driving alone to work*	Percentage of the workforce that drives alone to work.
	Long commute - driving alone	Among workers who commute in their car alone, the percentage that commute more than 30 minutes.

Appendix Table 7. IHI CHR Health Outcomes Metrics and Weighting

<b>Health Outcome</b>	<b>Focus Area</b>	<b>Measure</b>
Mortality (50%)	Premature death	50%: Years of potential life lost before age 75
Morbidity (50%)	Quality of life	10%: Percent of adults reporting poor or fair health
		10%: Mean physically unhealthy days per month for adults
		10%: Mean mentally unhealthy days per month for adults
	Poor birth outcomes	20%: Percent of live births of low birth weight (<2,500 grams)

Appendix Table 8. IHI CHR Social and Economic Factors Metrics and Weighting

<b>Social/Economic Factor</b>	<b>Measure</b>
Education (25%)	12.5%: High school freshman graduation rate
	12.5%: Percent of adults with college degrees
Employment (25%)	25%: Unemployment rate
Income (25%)	18.75%: Percent of children in poverty
	6.25%: Gini Coefficient of Income inequality (based on household)
Family and social support (12.5%)	6.25%: Percent of adults without social/emotional support
	6.25%: Percent of households that are single-parent
Community safety (12.5%)	12.5%: Violent crime rate, or homicide death rate

Chart 1. Scatterplot State Residual Cut-off for Question #1

