

The Impact of the Economy, Demographics and Social Services Spending on Metropolitan Area Health Outcomes

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Executive Summary

Previous international studies and a recent study of the states have found that jurisdictions with higher rates of social services spending have significantly better health outcomes. These social services include public health spending, spending on parks and recreation and public welfare among others. Healthier communities also have lower rates of air pollution and healthier behaviors such as lower rates of smoking and higher rates of exercise. This paper examines the role that several determinants of health play in affecting key health outcomes at the community level.

Six general categories of these determinants of health were examined to estimate their impact on nine different community-based health outcome measures. These determinants included health behaviors, demographics and income, transportation and commuting time, state of the local economy, education, the environment and social services spending.

Several of these determinants had a substantial association with better health outcomes. Health behaviors such as smoking and physical activity were **important** predictors of virtually all nine health outcome measures. Longer commute times were also generally associated with better health outcomes. Higher levels of per student educational spending was associated with a reduction in the number of mental health days and age adjusted mortality rates. Increased community levels of fine particulates and ozone were also predictive of community based reductions in health outcomes. Finally, higher levels of social service spending on parks and recreation and public welfare improved health outcomes in all but one category.

As the health policy debate pivots toward improved efficiency and better health outcomes, these results suggest the need to broaden our focus on not just the health sector but to include these important underlying determinants of health. Estimates from the Institute of Medicine and others show that 70 percent of potentially avoidable mortality is linked to health behaviors, environmental and other social issues. Community level approaches for leveraging both health and social service spending represent an important approach for improving health outcomes.

Overview

Previous international studies and a recent study of the states have found that jurisdictions with higher rates of social services spending have significantly better health outcomes.

<http://content.healthaffairs.org/content/35/5/760.full.pdf+html>. This previous work posited that states (or countries) with higher ratios of social services to health care spending produced better health outcomes. This line of work follows earlier work on the underlying determinants of health from Marmot and colleagues. The social determinants of health body of work have explored the impact that health behaviors, physical/chemical and environmental factors, transportation, socioeconomic position and spending on health care services. Data from this body of work showed large disparities in health outcomes by socio-economic status, work hierarchy and race. <http://www.annualreviews.org/doi/pdf/10.1146/annurev-publhealth-031210-101218>.

A challenge for communities is to encourage cities and counties to focus on improvements in five key areas; healthy behaviors, community safety, built environment, social/economic factors and environmental exposures. A key aim of this paper is to provide statistical estimates of the impact that these key areas have on the health profile of cities nationally. This paper extends the previous line of research by examining the impact of social service spending and other social determinants of health on health outcomes at the metropolitan/city level. As a result, this project will examine the impact of health insurance and several social determinants of health on several measures of health care outcomes.

Data and Analysis

Metropolitan statistical area (MSA) data were collected for the years 2008 to 2012. Complete variable information was collected for 477 MSAs during the 5 year period, or approximately 95 MSAs per year. The smallest MSA population included was about 140,000 with the largest at almost 20 million. A number of data sources were used to compile the data. Information on obesity, physical and mental health, general health status, chronic conditions, smoking status, race/ethnicity, education, any exercise, and health insurance was derived from The Behavioral Risk Factor Surveillance System (BRFSS) Selected Metropolitan/Micropolitan Area Risk Trends (SMART) data. SMART is a subset of the BRFSS created to provide estimates at the MSA level.¹ Poverty level measures were obtained from the Current Population Survey, Annual Social and Economic (ASEC) Supplement for the years 2009 to 2013. ASEC survey is conducted annually in March with the poverty related information pertaining to the prior calendar year.²

Weighted MSA means were calculated using Stata (V14) survey commands to account for the complex survey designs of both SMART and ASEC surveys. Cancer mortality and overall mortality, both age-adjusted using the 2000 US population, were downloaded from CDC WONDER.³ While the cancer mortality data were available at the MSA level, overall mortality data originated from the Compressed Mortality File at the county-level. To obtain a MSA mortality rate, the population weighted average of all counties in the MSA was calculated. Unemployment rates, seasonally adjusted, by MSA were obtained from the Bureau of Labor Statistics. The weighted annual mean concentration ($\mu\text{g}/\text{m}^3$) of fine particulate matter and fourth highest daily maximum 8-hour concentration (ppm) of ozone came from the Environmental Protection Agency air quality trends by city.⁴ Information on commuting times came from the American Community Survey 1-year summary files.⁵ Per pupil total spending in the MSA⁵ and total local government expenditures in the state on public welfare, health and hospitals, police and fire, parks and recreation, and sewerage and solid waste⁶ were obtained from the Census Bureau. Per capita real GDP (chained 2009 dollars) and per capita personal health care consumption were from the Bureau of Economic Analysis. The cigarette taxes per 20-pack were from taxfoundation.org. All variables are measured at the MSA level, except for state level variables total local government expenditures, per capita personal health care consumption and cigarette taxes.

The analysis will be at the metropolitan statistical area (MSA) (city) level for 2011 and 2012. The analysis will examine the impact of traditional access to health care on health outcomes as well as a variety of social determinants of health including:

- Health behaviors
- Demographics
- Transportation
- Economics/income
- Education
- Environmental quality
- Social services spending per capita on education, parks and recreation and public welfare

We completed a series of regression analyses using the following dependent (health outcome variables) and independent variables. Most of the outcome variables were skewed so we used log transformations of the dependent variables (except obesity which was not highly skewed). The variables used are outlined below, with a full list of variables are presented in Figure 1 in the appendix.

Dependent Variables

Health Outcomes at the Metropolitan Statistical Market Area

- Percent obese
- Average number of days last month with restricted activities due to poor physical or mental health
- Average number of days last month not in good physical health
- Average number of days last month not in good mental health
- Age adjusted mortality rate
- Age adjusted cancer mortality rate
- Asthma prevalence
- Diabetes prevalence
- Cardiovascular disease prevalence

For these nine health outcome variables, we ran log linear (and log log) regressions using the following independent (covariates) variables. I have categorized these variables into seven different categories.

Independent Variables (covariates)

1. Health Behaviors

- a. Percent participating in physical activities
- b. Smoking prevalence
- c. State cigarette tax

2. Demographics and Income

- a. Indicator variables for level of college education
- b. Indicator variables for race and ethnicity
- c. Income as a percent of poverty
- d. % uninsured

3. Transportation

- a. Indicator variables for commuting time in minutes

4. Economics

- a. Real per capita metropolitan area gross domestic product

5. Education

- a. Education spending per student

6. Environment

- a. Fine particulate matter (PM2.5). Weighted Annual Mean - Weighted annual mean concentration ($\mu\text{g}/\text{m}^3$)
- b. Ozone (O3) 4th Max - Fourth highest daily maximum 8-hour concentration (ppm)

7. Social Services Spending

- a. Per capita local spending on health and hospitals
- b. Per capita local spending on parks and recreation
- c. Per capita local spending on police and fire
- d. Per capita local spending on public welfare
- e. Per capita local spending on sewer and waste

Health Behaviors

Health behaviors were almost uniformly important in predicting health outcomes and are summarized below.

➤ Increased percent participating in physical activities

For each 10 percentage point increase in the share of metropolitan area residents participating in physical activities was associated with an 8 percent reduction in obesity, an 8 percent reduction in the average number of restricted activity days per month, a 6 percent reduction in the number of days not in good physical health, a 6 percent reduction in age adjusted mortality, a 4 percent reduction in age adjusted cancer mortality, a 17 percent reduction in diabetes prevalence and a 19 percent reduction in cardiovascular disease.

➤ Smoking

Each 10 percentage point reduction in smokers is associated with an 8 percent reduction in the number of restricted days of physical activity, a 12 percent reduction in the number of mental health days, a 7 percent reduction in physical health days, a 6 percent reduction in age adjusted mortality, a 9 percent reduction in cancer mortality, a 13 percent reduction asthma prevalence, a 7 percent reduction in diabetes, a 3 percent reduction in obesity and a 16 percent reduction in cardiovascular disease.

➤ Tobacco Tax

A 1 cent increase in the state tobacco tax is associated with a 4.6 percent reduction in the number of days of restricted physical activity, a 3.5 percent reduction in the number of days not in good physical health, a 1 percent reduction in cancer mortality, a 4.1 percent reduction in diabetes prevalence, and a 7 percent reduction in cardiovascular disease prevalence. A 10 percent increase in the tobacco tax was associated with a 4.3 percent reduction in obesity.

Demographics and Labor Markets

Increases in the local unemployment rate were also associated with increased rates of poor health outcomes. For instance, each 10 percent increase in the unemployment rate was associated with a 4.3 percent increase in obesity, a 5.1 percent increase in number of poor health days per month, an 8.2 percent increase in the number of mental health days per month, a 3.8 percent increase in the number of days not in good physical health. The impacts on chronic disease prevalence were mixed with rising unemployment associated with a 9.7 percent increase in diabetes prevalence and a 6.2 percent reduction in cardiovascular disease prevalence.

Transportation

Longer commuting times were also generally associated with slightly better health outcomes. Relative to communities with an average commute time of less than 30 minutes, those with commutes averaging over an hour have a very small negative impact on obesity rates (less than one half of one percent), 0.5 percent lower adjusted mortality rates and a 1 percent lower rate of diabetes.

Local Economy

Communities with higher rates of per capita gross domestic income were associated with better health outcomes. For instance, each 10 percent increase in per capita income was associated with a 6.6 percent reduction in obesity and a 3 percent reduction in age adjusted mortality

Education

Communities that spent more per study on education also had improved health outcomes for some categories. For instance, each 10 percent increase in education spending per student was associated with a 9 percent reduction in monthly mental health days, a 5.5 percent reduction in age adjusted mortality and a 25 percent reduction in cardiovascular disease prevalence.

The Environment

Increased community levels of fine particulates and ozone were associated with some reductions in health outcomes. Each one unit increase in the mean annual fine particulate concentration was associated with 1.1 percent reduction in poor health days. At the same time a one unit increase in mean fine particulate concentration was associated with a 0.5 percent increase in age adjusted mortality, nearly a 9 percent increase in cancer mortality, and an 8 percent increase in diabetes prevalence. Similarly, a 1 unit (pound per meter) increase in ozone concentration was associated with an 11 percent increase in age adjusted mortality.

Social Services Spending

Higher levels of social services spending on parks and recreation and public welfare were associated with improved health outcomes though with one outlier result. Each 10 percent increase in per capita spending on parks and recreation was associated with an 11 percent reduction in the number of restricted activity days per month, a 7 percent reduction in the monthly number of days not in good mental health, a 1.5 percent reduction in days not in good physical health, and a 3.5 percent reduction in asthma prevalence.

Additional spending on public welfare was also associated with improved health outcomes. Each 10 percent increase in public welfare spending was associated with 2 percent reduction in obesity, a 1.3 percent reduction in the number of restricted activity days per month, a 1 percent reduction in the number of days per month not in good physical health, a 1 percent reduction in mortality, a 1.3 percent reduction in diabetes prevalence and finally a 2 percent reduction in cardiovascular disease prevalence.

Higher rates of local public health and hospital spending also improved several health outcomes. For instance higher health spending was associated with fewer lost days per month due to physical or mental health problems, and lower rates of asthma.

Higher spending on police and fire functions were usually linked to worse health outcomes. This could simply reflect the fact that a higher police presence and spending are found in less affluent and healthy areas so the direction of the relationship here is unclear. Worse health outcomes could drive higher police and fire spending.

Conclusions

The analysis presented above highlights the key importance of higher rates of physical activity, lower smoking rates, high rates of employment, and spending on parks, recreation, public health and public welfare can play in improving the health of communities. The results make a strong argument for additional community based investments in these activities. Overall, we spend substantially more on health care than we invest in social services, controlling pollution and implementing evidence based behavior change programs.

As the healthy policy debate pivots toward improved efficiency and better health outcomes, these results suggest the need to broaden our focus on not just the health sector but to include these important underlying determinants of health. Estimates from the Institute of Medicine and others show that 70 percent of potentially avoidable mortality is linked to health behaviors, environmental and other social issues. Community level approaches for leveraging both health and social service spending represent an important approach for improving health outcomes.

Notes

1. http://www.cdc.gov/brfss/smart/smart_data.htm
2. <http://www2.census.gov/programs-surveys/cps/techdocs/>
3. <http://wonder.cdc.gov>
4. <https://www.epa.gov/air-trends/air-quality-cities-and-counties>
5. http://www2.census.gov/programs-surveys/acs/summary_file/2012/documentation/1_year/ACS_2012_SF_Tech_Doc.pdf
6. <http://www.census.gov/govs/school/index.html>
7. <https://www2.census.gov/govs/local>