



# Local health and social services expenditures: An empirical typology of local government spending



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## ABSTRACT

The conceptual importance of social services to health outcomes is well known and recent empirical evidence has linked social services spending to better population health outcomes. Yet little research has been devoted to what social services spending actually entails as it relates to population health and whether broadly similar spending patterns may exist across communities. The purpose of this study was to identify empirical patterns in spending, and explore health status and outcome correlates with social services spending. Spending data come from the 2012 U.S. Census Bureau's Census of Governments, which includes spending data for 14 social services within 3129 U.S. counties. Additional 2012 demographic, socioeconomic, and population health data were obtained and analyzed at the county-level in 2017. Hierarchical cluster analysis revealed 5 clusters of counties according to local government spending. One group had significantly lower income, social services spending, health indicators, and health outcomes than other counties. Two other groups had relatively high income, high social services spending, and strong health outcomes and indicators. Yet these latter two groups invested differently, with one spreading spending across a larger number of social services and the other concentrating spending in a smaller number of services such as education. Determining the extent to which spending approaches contribute to population health may offer communities guidance for maximizing population health. While it cannot establish causality, this study adds to the literature regarding the ways in which communities invest in both health care and social services to prevent disease and promote population health.

## 1. Introduction

There has been a growing recognition of the importance of social determinants of health in influencing overall population health (Marmot, 2005). For example, approximately 40% of all deaths are at least partially attributable to social circumstances and/or environmental factors (McGinnis and Foege, 1993). Other estimates suggest that only about 10% of premature death is attributable to shortcomings in medical care, with the remaining 90% attributable to genetics, social circumstances, environment, and behaviors (McGinnis et al., 2002; Schroeder, 2007). Yet in spite of the recognized importance of social services and non-medical and social services, comparatively little work has been done to understand whether our social services investments translate into population health outcomes.

Important work from Bradley et al. found that OECD nations that had higher ratios of social services-to-health care expenditures had better health outcomes, including infant mortality and life expectancy (Bradley et al., 2011). Follow-on work by Bradley et al. found a similar relationship in the U.S. at the state-level (Bradley et al., 2016). McCullough and Leider found evidence that increased social services

spending in the U.S. at the county-level was associated with improved health outcomes (McCullough and Leider, 2016; McCullough and Leider, 2017).

Given the observed relationships between social services spending and health outcomes, it is critical for health care providers, researchers, and policymakers to have a complete and accurate accounting of social services expenditures in their communities. Yet to date only limited descriptive statistics are available in the literature. Contrast this paucity of information with the rich data available regarding health care spending in aggregate (Fuchs, 2013), by public sources (Altman and Frist, 2015), future projections (Keehan et al., 2015), geographic variations in spending (Institute of Medicine, 2013), and more. Social services spending remains less well understood. No research has explored correlates and patterns in social services expenditures. This information is particularly important to understand at the local level, given the intra-state variation in populations, needs, resources that social services expenditures might help to address. The purpose of this study was to begin to unpack social services spending to shed light on relative levels of expenditures, identify empirical patterns in expenditures, and explore health status and outcome correlates with

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social services expenditures.

## 2. Methods

We obtained data from multiple sources for this study.

First, we obtained public expenditure data for using the 2012 U.S. Census Bureau's Census of Governments (U. S. Census Bureau, 2012). The Census of Governments collects information on expenditures, revenues, and debts for all jurisdictions in the United States; jurisdictions are compelled to participate by federal statute. This dataset contains annualized estimates of local public spending for all 87,000-plus U.S. governmental entities. We aggregated spending by all governmental entities within each county (or county equivalent) in the U.S., removing outgoing inter-governmental transfers to avoid double-counting. Financial data were aggregated to the county level and analyzed on both per capita basis (dollars spent or received for a given category per person living within a county) and on percentage of total revenues basis (dollars spent or received for a given category as a percentage of total expenditures for a given county). One exception to this was for the 5 boroughs in New York City. The Census of Government spending data are reported in aggregate for all 5 boroughs even though these 5 areas are technically in different counties. Thus, all New York City spending data are included in this analysis, but only in aggregate form and not broken out by borough. Consistent with previously published analyses of social services expenditures, this analysis focuses on 14 social services categories that are conceptually relevant to population health outcomes (Bradley et al., 2011; Bradley et al., 2016; McCullough and Leider, 2016). All spending categories are defined by the U.S. Census Bureau; full definitions of each category are shown in the Appendix.

Second, we obtained data on county-level population, demographics, socioeconomic factors, health outcomes, health behaviors and indicators, and health care resources from several sources. Population, demographic, and socioeconomic data were obtained from the U.S. Census Bureau's Current Population Survey (U. S. Census Bureau, 2014). Health outcomes data were obtained from mortality and natality files at the National Center for Health Statistics and the Centers for Disease Control and Prevention's Behavioral Risk Factor Surveillance System (BRFSS) via the County Health Rankings datasets (County Health Rankings and Roadmaps, 2012). Health behavior and indicators data were obtained from BFRSS (Centers for Disease Control and Prevention, 2012) and the County Health Rankings (County Health Rankings and Roadmaps, 2012) datasets. Health care resources data were obtained from the Area Health Resources File (U.S. Health Resources and Services Administration, 2014) and the Dartmouth Atlas (Atlas, 2017). All measures were obtained for the year 2012 as this is the most recent year for which local spending data are available.

Data regarding health care spending at the county level is limited. The most complete estimates identified were from the Dartmouth Atlas, as mentioned above (Atlas, 2017). While these data may not necessarily be absolutely representative of all health care spending by residents of each county, these price-, age-, sex-, and race-adjusted per capita spending data nevertheless represent the best available proxy for all publicly-financed health care spending.

### 2.1. Statistical analysis

After obtaining, cleaning, and coding all relevant data, data were combined at the county level. Descriptive, univariate, and bivariate statistics were calculated for the sample. We then created maps of county-level per capita health care and social services spending. Next, to examine patterns in social services spending, hierarchical cluster analysis methods were used to group counties according to patterns in social services expenditures (Sugar and James, 2003). The Ward method was used to group counties into clusters. Hierarchical cluster analysis was performed on spending for each social service in terms of dollars per capita and as a proportion of all expenditures, with

similarities assessed using the squared Euclidean distance method (Ward, 1963). A five-cluster solution had the optimal combination of maximized Duda/Hart index and minimized pseudo T-squared and, after confirming via visual inspection of the dendrogram, was determined to provide the optimal combination of data fit and parsimony. This approach is consistent with previous typology developments for studies exploring county-level health outcomes and government agencies (Mays et al., 2010; McCullough and Goodin, 2014). To aid in presentation of findings, cluster groups were numbered and ordered according to total social services spending (Group 1 had the least, group 5 had the most).

Spending data were available for  $n = 3129$  counties and county-equivalents (out of  $N = 3143$ ). Data on spending and health outcomes were available for 2442 counties. All analyses were performed at the county (or county-equivalent) level. Data coding and analyses were performing using Stata 13.1. The Arizona State University Institutional Review Board provided approval for the research protocol.

## 3. Results

In our review of health and social services spending across 3129 counties, we found that local-level per capita social services spending averaged \$3120 (data not shown). In comparison, per capita health care spending (from federal sources) averaged \$9440. The largest social services expenditure category was K-12 education (\$1774), representing 42% of total local government spending. Public hospital spending was the second largest social services category (\$363 per capita; 6.1% of total local government spending), yet the distribution was highly skewed with only 1042 counties reporting any spending towards public hospitals (data not shown).

As shown in Figs. 1 and 2, health care and social services spending tended to be geographically clustered. Health care spending (Fig. 1) tended to be highest in the southeast; social services spending (Fig. 2) tended to be highest in the west. Health care spending and social services spending were modestly negatively correlated ( $-0.19$ ).

Per capita spending for social services was found to correlate significantly for certain services, as shown in Table 1. Correlations for the percentage of total expenditures spent on each social service are shown in the Appendix. Only some social services were significantly correlated with other social services. Significant correlations for per capita spending (\$) were all positive whereas spending as a percentage of total expenditures had significant correlations that were both positive and negative.

The cluster analyses revealed clear patterns in social services spending across services and counties. The map in Fig. 3 shows counties clustered according to social services spending patterns. Table 2 shows median per capita income, health and social services spending in aggregate and for individual social services, and spending for each social service as a percent of total expenditures in a given county. ANOVA tests found that all between-group differences shown in Table 2 were significant after Bonferroni correction ( $p < 0.001$  for all comparisons). In general, while social services spending increased from Group 1 to Group 5, health care spending per capita tended to decrease (with the exception of Group 5) and the ratio of social services to health care spending increased. While income levels varied significantly across groups, no distinct trend was observed from Group 1 to Group 5 (i.e., areas with higher social services spending did not always have higher per capita incomes). Because of the differences in total expenditures across groups, varying patterns can be seen in Table 2 for per capita spending versus spending as a percent of total expenditures.

Relative to the other groups, Group 1 had relatively lower expenditures across nearly all social services with the exception of K-12 education. Group 2 had relatively high expenditures for housing and community development and parks and recreation. Group 3 had relatively high expenditures for public welfare and public health and community health care and relatively low expenditures for public

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