Heterogenous Effects of Local Government Spending on Mortality Across Racial Groups Among Working-Age Adults in the U.S.

Courtnee E. Melton-Fant, PhD

Introduction: Mortality among working-age adults has been rising, but the underlying reasons are not fully known. Given the relationship between higher levels of public spending and better health outcomes, it is possible that differences in public spending may explain some of this trend. This study examined the association between county government spending and overall and race-specific mortality among working-age adults over time.

Methods: Hybrid random effects models, which specified separate within- and between-county effects, were used to assess the relationship between per capita county spending and overall and race-specific mortality rates from 1980 to 2019. All models controlled for median age, percentage of the population with at least a bachelor's degree, unemployment rate, and poverty rate.

Results: In the overall population, counties with higher k-12 education, library, and police spending were significantly associated with higher mortality rates. Among Black adults, counties with lower corrections spending, lower waste management spending, and higher highway spending had significantly higher Black mortality. Among White adults, counties with lower natural resource spending and higher police spending had higher White mortality.

Conclusions: This study showed that differences in public spending may explain the geographic and racial differences in mortality among working-age adults. Local governments should consider public spending as a tool to improve overall population health and address racial health inequalities in their jurisdictions.

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INTRODUCTION

Mortality among working-age adults, adults aged 25−64 years, is higher in the U.S. than in other high-income countries. Between 1990 and 2017, the U.S. experienced increases in mortality among working-age adults, and the gap between the U.S. and other high-income countries widened.[1] The patterns of increasing mortality among working-age adults vary by race, ethnicity, and geography. Although the Black−White gap in mortality has narrowed, Black working-age adults have consistently higher mortality rates than their White peers. There are also large disparities in mortality across different levels of geography, including states,[2-4]

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counties,[5,6] and metropolitan areas.[7] The increase in mortality among working-age adults has been attributed to a variety of social, economic, and cultural factors such as structural racism, worsening economic conditions, community resources, and access to health care, but research is needed to better understand the factors underlying this troubling trend.[1] This study explored government spending as a potential contributor to geographic and racial disparities in mortality among working-age adults.

Government spending must be understood in the context of fiscal federalism: the division of finances between federal, state, and local governments. States and localities provide their residents with various public goods and services and have different abilities to fund those services owing to variations in tax systems and the number of taxable resources available. Governments with more resources are able to provide more robust public goods and services, and the quality and availability of these resources are important for the health and well-being of residents.[8] People report a higher quality of life if they live in a state that spends more on libraries, parks and recreation, natural resources, highways, and police protection.[9] In addition to generating revenue through taxes, state and local governments receive revenue from the federal government. Federal funds flow to state and local government primarily through grants. Some federal dollars go directly to local governments, whereas other federal funds are given to states and states allocate those funds to localities (i.e., pass-through grants). The amount of direct and indirect federal funding to state and local governments varies by spending category. For example, in 2015, over 60% of state and local public welfare spending was federally financed, but <20% of health and hospital funding was federally financed.[10] Along with receiving direct and indirect funds from federal governments, local governments also receive intergovernmental transfers from state governments. In 2017, intergovernmental transfers accounted for 36% of local government revenue.[11]

Both attitudes toward public spending and actual spending are racialized. Goren[12] found that there is less support for social spending among politically and economically advantaged White people when the spending is perceived to primarily help Black people. An et al.[13] found that racial inequality is associated with decreased city investments in hospitals, police protection, and parks and recreation but not in other spending categories. Among metropolitan governments, health and police budgets decrease as racial inequality increases. Alesina, Baqir, and Easterly[14] concluded that more racially diverse jurisdictions have less per capita spending on public goods and roads. Similarly, Leon-Moreta, Totaro, and Dixon[15] found that municipal parks and recreation spending decreased as racial heterogeneity and income inequality increased, but the impacts of racial heterogeneity were stronger. Public policy decisions and their effects are racialized in the U.S.[16] The health effects of government spending should be explored in this context.

Government spending in both health and nonhealth sectors is important for population health because health is largely shaped by nonmedical factors known as the social determinants of health. The WHO defines the *social determinants of health* as "...conditions in which people are born, grow, work, live, and age, and... economic policies and systems, development agendas, social norms, social policies and political systems."[17] Improving population health requires investing and engaging with these nonmedical factors, and adequate public financing across the social determinants of health is necessary for health equity.[18] The Robert Wood Johnson Foundation's Culture of Health Action Framework lays out 4 action areas to improve population health and equity, including creating healthier, more equitable communities and fostering cross-sector partnerships. They highlight the need for resource investments across both health and nonhealth sectors to create a Culture of Health.[19] Investments in nonhealth sectors in particular can address the social determinants of health to create community conditions that promote health and health equity. The U.S. continues to have higher healthcare spending than other high-income countries, but these larger investments have not translated into better health outcomes.[20] Countries, states, and counties with higher government public health and social service spending have comparatively better health outcomes.[21−23]

Although all levels of government implement programs and policies that shape health through the social determinants of health, local governments are of particular interest. State and local governments arguably exert more power and influence over the things that matter the most in people's daily lives such as education, environment, land use planning and zoning, public health, democracy, and public safety than the federal government.[24] Counties are an important unit of analysis because they are the fastest growing general purpose government[25] and raise money for and provide redistributive services.[26] In addition, there is considerable heterogeneity in county-level mortality across age, race, SES, geography, and sex.[1,27−30]

Increased county-level spending in both health and nonhealth sectors is associated with modest improvements in national County Health Rankings, and long-

term increases in per capita public health spending reduce all-cause mortality among adults.[31] Although most studies have concluded that public spending is positively associated with a population's health, some studies have found negative or mixed effects. Higher per capita police spending was associated with higher premature mortality rates in cities.[32] In Georgia, increased public health spending was associated with increases in heart disease−related morbidity and mortality at the county level.[33] A few studies have examined the health effects of local government spending within and between populations. Cardona and colleagues[34] measured the association between county spending and health among rural and urban counties. In urban U.S. counties, increased building infrastructure spending was associated with increases in life expectancy at birth, whereas increased social spending, such as education and public health, was associated with increased life expectancy in rural counties. Increased law enforcement spending was associated with decreased life expectancy in both rural and urban counties.[34] In Tennessee, increased county government library and k-12 education spending were associated with lower mortality rates, but the impacts of other types of spending varied by gender. Increased public health spending was associated with lower mortality rates among women but not among men.[35] Overall, this body of work suggests that government spending is important for population health, but the strength and direction of this relationship vary on the basis of the spending category and the population studied.

Increases in mortality among working-age adults and the accompanying widening of geographic and racial disparities are harmful to the health and well-being of individuals, communities, and the nation as a whole. Moving toward racial health equity will require a broad understanding of whether and how policies and the budgets used to enact those policies shape the health of the overall population as well as the health of different racial and ethnic groups within the population. This study examined 2 questions: (1) Is county government spending associated with mortality among working-age adults and (2) Is the association between county government spending and mortality among working-age adults heterogeneous across racial groups? On the basis of previous research on local government spending and health, I expect that both health and nonhealth-related spending will be associated with mortality among working-age adults. Given the racialized nature of public spending and attitudes toward public spending, I expect that the relationship between local government spending and mortality will vary across racial groups.

METHODS

Study Sample
The study utilizes county-level panel data from 1980 to 2019. A total of 87,508 county government observations were included in the study. The number of county governments varied each year owing to data collection methods used by the Census Bureau. In years that end in 2 or 7, data were collected in the "Census of Government Finance and Employment Data." In other years, when the census was not conducted, data from a sample of governments are collected in the "Annual Survey of State & Local Government Finances."[36] In the study sample, there was an average of 3,036 counties in years ending in 2 and 7. For all other years, there was an average of 1,975 counties per year.

Measures
Annual county government spending data were from the Government Finance Database. The Government Finance Database is a comprehensive database containing all the Census Bureau's Annual Survey of State and Local Government Finances since 1967.[36] Spending categories included corrections, k-12 education, fire protection, juridical and legal, health, hospitals, highway, library, natural resources, parks and recreation, police, public welfare, and waste management. All government spending data were converted into 2019 dollars using the Consumer Price Index, and then per capita spending was calculated. Definitions of spending categories are in Appendix Table 1 (available online). Covariates include median age, the proportion of the population with at least a college degree, unemployment rate and the poverty rate, the percentage of the population that is non-Hispanic Black, and the percentage of the population that is non-Hispanic White. These variables were chosen because they have strong associations with population health outcomes[37−39]; are also related to county government fiscal health, fiscal capacity, and spending patterns[40,41]; and were available for the entire study period. Covariate data were from the 1980, 1990, 2000, and 2010 U.S. Decennial Census and the 2014 and 2019 American Community Survey 5-year estimates. Decennial Census data were harmonized to 2010 boundaries to account for changes in boundaries over time. All data were accessed through Social Explorer. Overall and race-specific all-cause crude mortality rates for adults aged between 25 and 64 years were obtained from the Centers for Disease Control and Prevention's Compressed Mortality File for years 1980−2016[42,43] and from the Multiple Cause of Death Files for 2017−2019 data.[44]

Statistical Analysis
Panel data are typically modeled using fixed effects, random effects, or a complete pooling approach. Pooled

estimation approaches assume no correlations between measures once all the covariates are accounted for. Fixed effects models absorb all between variation and estimate within effects only. Random effects models assume that within and between effects are equal. However, all time-varying variables have both a between and a within effect that makes up the total effect. The assumption that within and between effects are equal may introduce cluster confounding and a less substantive interpretation of the data.[45−47] I assume that the within- and between-county effects of government spending are unequal and use random effects models that distinguish between-county and within-county effects.[45,46] The clustergen function in STATAStata[46] was used to generate a county mean (the between effects) for every variable. The within-county effects are deviations in the units of measurement from the county means. After generating the within and between transformations of the variables, multivariate random effects models were run using the xtreg function in Stata to examine the relationship between per capita county government spending and overall and race-specific mortality rates. The between coefficient estimates represent the effects of per capita spending on mortality across counties. The within estimates represent the effects of deviations from the means in a variable within a county over time. All models controlled for median age, percentage of the population with at least a bachelor's degree, unemployment rate, and poverty rate. The per capita spending variables were lagged by 4 years because within-county spending is not independent over time. County budgets are often based on the estimated and actual spending from previous years, and the error terms for different years were likely correlated. Spending variables were also lagged because the process of change is slow, and the effects of social spending are not immediate. Four-year lags were chosen on the basis of previous research that found that the majority of the benefits of additional public health spending on mortality were realized within the first 4 years of spending.[48] Separate models were run for the overall and race-specific mortality rates, and SEs were clustered by state to account for the nesting of counties within states. All analyses were completed using Stata, Version 16.1. All data used in this study were public and deidentified and did not require IRB approval.

RESULTS

Descriptive statistics are shown in Table 1. Over the study period, K-12 education was the largest expenditure

Table 1. Descriptive Statistics From 1980 to 2019

Variables	Mean	SD overall	SD between	SD within
Total spending[a]	1,353.6	1,813.3	1,672.3	797.5
Corrections[a]	48.6	108.4	72.5	82.1
K-12 education[a]	193.3	584.7	564.0	154.8
Fire protection[a]	13.5	53.5	41.8	33.0
Judicial/legal[a]	40.7	52.5	43.1	34.6
Health[a]	71.7	142.4	107.4	100.5
Hospitals[a]	170.4	522.0	395.3	305.1
Highway[a]	175.5	286.9	237.5	169.7
Library[a]	9.2	20.1	14.9	13.3
Natural resources[a]	15.3	41.1	27.6	30.7
Parks and Recreation[a]	16.6	50.7	39.2	35.2
Police[a]	79.0	109.5	94.4	65.8
Public welfare[a]	95.2	171.4	150.7	75.2
Waste management[a]	32.6	128.8	110.0	68.2
Median age[b,c]	35.2	5.9	3.9	4.5
Percentage with least a bachelor's degree[b,c]	20.5	9.5	7.7	5.1
Unemployment rate[b,c]	6.7	3.2	2.7	1.9
Poverty rate[b,c]	15.3	6.9	6.6	2.6
Overall all-cause mortality rate[d]	441.8	142.5	117.0	85.4
Black all-cause mortality rate[d]	830.8	2,547.6	9,845.8	355.7
White all-cause mortality rate[d]	247.2	130.8	169.4	51.3

[a]Government Finance Database.
[b]Decennial Census 1980, 1990, 2000, and 2010.
[c]American Community Survey 5-year estimates (2011−2014) and American Community Survey (2015−2019) 5-year estimates.
[d]CDC Compressed Mortality Files and CDC Multiple Cause of Death Files.
CDC, Centers for Disease Control and Prevention.

Table 2. Association Between Per Capita County Government Spending and All-Cause Mortality Among All Working-Age Adults, 1980−2019, N=3,025 Counties

Variables	Between counties (95% CI)	Within counties (95% CI)
Corrections	**−0.066*** (−0.12, −0.01)	−0.019 (−0.04, 0.001)
K-12 education	0.008 (−0.003, 0.02)	−0.025 (−0.06, 0.007)
Fire protection	−0.049 (−0.17, 0.07)	−0.050 (−0.16, 0.06)
Judicial/legal	−0.017 (−0.27, 0.24)	−0.113 (−0.22, −0.003)
Health	−0.029 (−0.09, 0.03)	−0.021 (−0.05, 0.01)
Hospitals	−0.002 (−0.01, 0.01)	**0.011**** (0.004, 0.02)
Highway	−0.007 (−0.04, 0.02)	**0.034**** (0.01, 0.05)
Library	0.179 (−0.07, 0.43)	−0.113 (−0.30, 0.07)
Natural resources	−0.228 (−0.50, 0.04)	−0.228 (−0.50, 0.04)
Parks and recreation	0.011 (−0.13, 0.15)	−0.017 (−0.05, 0.01)
Police	0.099 (−0.01, 0.21)	0.049 (−0.02, 0.12)
Public welfare	**−0.057*** (−0.10, −0.01)	**−0.041*** (−0.08, −0.003)
Waste management	−0.025 (−0.09, 0.04)	**−0.033*** (−0.06, −0.01)
Median age	**9.828**** (8.07,11.59)	**4.497**** (3.03, 5.96)
College or more	**−4.563**** (−5.10,−4.03)	**1.308**** (0.73, 1.89)
Unemployment	**5.049**** (1.54, 8.56)	**2.388**** (0.76, 4.01)
Poverty	**7.526**** (5.36, 9.70)	0.233 (−1.11, 1.58)
Percent White	**−1.816**** (−3.15,−0.49)	2.171 (−0.13, 4.47)
Percent Black	0.336 (−1.07, 1.74)	2.328 (−0.83, 5.49)

Note: Boldface indicates statistical significance (*$p<0.05$, **$p<0.01$, ***$p<0.001$).

category with $193 per capita, followed by highway ($176 per capita) and hospital ($170 per capita) spending. Libraries were the lowest expenditure category with $9 per capita spent. There is variation in spending both within and between counties. Consistent with previous literature, all-cause mortality among working-age adults was higher among Black adults (831 per 100,000) than among White (247 per 100,000) adults. The all-cause mortality rate for the overall population was 442 per 100,000.

Table 2 displays the model results for the overall population. Across counties, lower per capita corrections ($p<0.05$) and public welfare spending ($p<0.05$) were associated with significantly higher overall mortality rates. Within counties, mortality significantly increased as per capita public welfare ($p<0.01$) and waste management spending ($p<0.05$) decreased and as per capita hospital ($p<0.01$) and highway ($p<0.01$) spending increased. Tests for cluster confounding were significant for hospital and highway spending, indicating that there were separate between- and within-county effects. The results for tests of cluster confounding are available in Appendix Table 2 (available online).

Table 3 displays the model results for the Black population. Across counties, lower per capita corrections spending ($p<0.05$) and lower per capita waste management spending ($p<0.01$) were associated with significantly higher Black mortality. Counties with higher per capita highway spending ($p<0.05$) had significantly higher Black mortality rates. Within counties, Black mortality significantly increased as waste management spending ($p<0.05$) decreased. Tests for cluster confounding were significant for highway, corrections, and waste management spending, confirming separate within and between effects (Appendix Table 2, available online).

Table 4 displays the model results for White adults. Across counties, lower per capita natural resource spending ($p<0.01$) and higher per capita police spending ($p<0.01$) were associated with significantly higher White mortality. Within counties, decreased per capita natural resources spending ($p<0.001$), decreased per capita parks and recreation spending ($p<0.001$), decreased per capita public welfare spending ($p<0.001$), and decreased per capita waste management spending ($p<0.05$) were associated with higher White mortality. Increased per capita corrections ($p<0.01$), police ($p<0.001$), and hospital spending ($p<0.05$) were significantly associated with higher White mortality. Tests for cluster confounding were only significant for natural resource spending (Appendix Table 2, available online).

To check the robustness of these findings, additional models without lagged spending variables and shorter 2-year lags were run. Testing the models without lags and with multiple lag lengths is consistent with previous research in this area[21,31,48,49] and because spending may

Table 3. Association Between Per Capita County Government Expenditures and All-Cause Mortality in Black Working-Age Adults, 1980−2019, N=1,929 Counties

Variables	Between counties (95% CI)	Within counties (95% CI)
Corrections	**−3.346*** (−6.05, −0.64)	−0.009 (−0.07, 0.05)
K-12 education	0.522 (−0.83, 1.87)	−0.027 (−0.08, 0.03)
Fire protection	3.768 (−19.99, 27.53)	−0.198 (−0.45, 0.05)
Judicial/legal	0.067 (−17.54, 17.67)	−0.101 (−0.32, 0.11)
Health	0.751 (−4.79, 6.30)	−0.021 (−0.04, 0.001)
Hospitals	0.089 (−0.77, 0.95)	0.004 (−0.01, 0.02)
Highway	**10.993*** (2.26, 19.73)	0.016 (−0.03, 0.06)
Library	8.092 (−21.14, 37.32)	−0.353 (−0.73, 0.02)
Natural resources	5.261 (−14.76, 25.28)	−0.052 (−0.17, 0.07)
Parks and recreation	−4.746 (−22.66, 13.17)	−0.045 (−0.11, 0.02)
Police	5.844 (−2.40, 14.09)	−0.097 (−0.29, 0.10)
Public welfare	−1.664 (−4.56, 1.23)	−0.021 (−0.10, 0.05)
Waste management	**−9.793**** (−15.39, −4.20)	**−0.100*** (−0.19, −0.01)
Median age	105.332 (−84.86, 295.52)	−0.655 (−2.62, 1.31)
College or more	14.075 (−49.17, 77.32)	**−1.753***** (−2.69, −0.82)
Unemployment	180.236 (−182.74, 543.21)	**−5.878***** (−8.23, −3.52)
Poverty	**118.142*** (3.66, 232.63)	2.766 (−0.38, 5.91)
Percent White	11.051 (−79.28, 101.38)	2.167 (−1.21, 5.54)
Percent Black	**−78.766*** (−147.68, −9.86)	2.341 (−1.96, 6.65)

Note: Boldface indicates statistical significance (*p<0.05, **p<0.01, ***p<0.001).

have both immediate and/or longer lagging effects on health, and there is no consensus on how soon or for how long public spending impacts population health outcomes. The results were consistent across all models among Black adults. For White adults, the models with 2-year lags were consistent with the main findings, but results differed in the model without lagged spending. The models among the overall population were not as robust to the changes in lags. Model results are found in Appendix Tables 3−5 (available online).

Table 4. Association Between Per Capita County Government Spending and All-Cause Mortality in White Working-Age Adults, 1980−2019, N=3,019

Variables	Between counties (95% CI)	Within counties (95% CI)
Corrections	0.008 (−0.05, 0.07)	**0.036**** (0.01, 0.06)
K-12 education	−0.002 (−0.01, 0.01)	−0.024 (−0.06, 0.01)
Fire protection	0.076 (−0.07, 0.23)	0.030 (−0.05, 0.11)
Judicial/legal	0.153 (−0.10, 0.41)	−0.046 (−0.16, 0.07)
Health	−0.026 (−0.10, 0.05)	−0.013 (−0.04, 0.01)
Hospitals	−0.001 (−0.01, 0.01)	**0.098*** (0.001, 0.02)
Highway	−0.025 (−0.06, 0.01)	0.003 (−0.01, 0.02)
Library	0.100 (−0.24, 0.44)	−0.104 (−0.29, 0.08)
Natural resources	**−0.444**** (−0.76, −0.13)	**−0.081***** (−0.13, −0.04)
Parks and recreation	0.077 (−0.11, 0.26)	**−0.042**** (−0.07, −0.02)
Police	**0.159**** (0.04, 0.28)	**0.122***** (0.06, 0.18)
Public welfare	−0.052 (−0.11, 0.01)	**−0.073***** (−0.12, −0.03)
Waste management	−0.074 (−0.18, 0.03)	**−0.034*** (−0.06, −0.004)
Median age	**9.519***** (7.82, 11.22)	**6.965***** (5.35, 8.58)
College or more	**−4.764***** (−5.36, −4.17)	**2.320***** (1.74, 2.90)
Unemployment	**4.070**** (1.07, 7.07)	**1.945**** (0.63, 3.26)
Poverty	**7.325***** (5.26, 9.39)	0.872 (−0.65, 2.39)
Percent White	−0.265 (−1.85, 1.32)	−0.322 (−2.56, 1.92)
Percent Black	0.232 (−1.36, 1.82)	2.075 (−0.99, 5.14)

Note: Boldface indicates statistical significance (*p<0.05, **p<0.01, ***p<0.001).

DISCUSSION

This study examined the relationship between county government spending and overall and race-specific mortality among working-age adults. The goal of the models was to assess the heterogeneity of correlations between all-cause mortality and county government spending for the overall population and across racial groups. Consistent with previous literature,[21,22,31] nonhealth-related public spending was significantly associated with population health outcomes. However, this study did not find an association between health-related spending and population health outcomes. Research on the effects of public health spending on health outcomes is mixed, with some studies finding positive, negative, or null effects on health. Singh[50] notes that the association between public health spending and population health outcomes depends on the outcome studied. For example, Mays and Smith[51] found that increases in public health spending were associated with reductions in infant mortality and mortality because of heart disease, diabetes, and cancer but not with all-cause mortality or deaths because of influenza. In addition, many of the studies that found significant and positive relationships between public health spending and population health outcomes examined public health spending in isolation. The literature examining both health and nonhealth-related spending on health is relatively small. Studies by McCullough and Leider[31,49] examined both health and nonhealth county-level spending and found that spending in public health, public hospitals, and nonhealth sectors was associated with improvements in County Health Rankings. Cardona et al.[34] examined the association between public spending and life expectancy at birth and found that nonhealth spending was associated with improved population health. Public health spending was included in the study, but it was grouped within a larger category of social spending that included spending on other things such as education, natural resources, libraries, and public welfare. Singh and McCullough[52] explored the association between per capita spending on the social determinants of health and per member healthcare costs among privately insured adults. They found that per capita health spending was not associated with healthcare costs among privately insured adults aged 18−54 years. The lack of association between health spending and population health outcomes in this study could be attributed to the outcome being studied, the focus on working-age adults, and differences in data and analytical methods across studies. The majority of the literature has used different time periods, estimation methods, and lag lengths. These findings support previous assessments that the relationship between public spending and population health varies by the outcome and the population studied and also point to the need for additional research in this area.

This study builds on the previous literature in 2 ways: showing the racialized health effects of public spending and the importance of analyzing within-county and between-county effects of public spending on health. Counties with higher per capita highway spending and lower per capita waste management and corrections expenditures had higher Black mortality rates. Whereas higher White mortality was associated with lower per capita natural resource spending and higher per capita police spending. Black and White mortality rates were sensitive to different categories of public spending. Bernet and colleagues[53] similarly found that Black infant mortality rates were more sensitive to county-level public health spending than White infant mortality rates in Florida. These findings may be due to place-based inequalities and racialized public spending patterns. Black people are more likely to live in high-poverty neighborhoods and are also overrepresented in the South, the poorest region of the U.S.[54] In addition, there is an inverse relationship between racial heterogeneity and public spending.[14,15] Cities with high poverty rates also have reduced public spending owing to having a smaller revenue base.[55] The combination of these factors results in Black people disproportionately living in places with less robust public infrastructure but a higher demand for public services and goods. Future research should examine the interplay between place, public spending, and public infrastructure on the health of Black populations. This research would also benefit from grounding public spending patterns and decisions as manifestations of structural racism.[56]

Another important finding is that the within- and between-county effects of government spending are different. For example, per capita highway expenditures were significant when explaining differences in Black mortality across counties. However, changes in per capita highways expenditures within counties over time were not associated with Black mortality. By contrast, higher per capita police spending was associated with higher White mortality within and between counties. Future research on the health impacts of public spending should account for this. Within-county estimates provide insight into the potential of reallocating funding to improve health, whereas the between-county effects help to explain health differences across counties. Just because higher spending in a given category explains some of the differences in health between counties does not necessarily mean that changing within that same category county will result in improved population health.

This nuance would have been lost if only within effects, between effects, or the combined total effects of spending were modeled.

Limitations

This study has several limitations. First, the analysis is only examining spending, but spending does not provide any information on details on what programs and services the spending went toward, the quality of those programs and services, or the utilization of those services. Secondly, the study examined longitudinal associations and cannot provide evidence for a direct or causal relationship between local government spending and mortality. The study also used the same lag lengths across all spending types. However, it is possible that the effects of spending on health vary across types of spending. For example, the return on investment in k-12 education spending may be different from that of spending on parks and recreation. The study also only examined 1 health outcome. However, the relationship between spending and health outcomes likely varies by the health outcome studied. For example, public health spending may have an impact on childhood immunization rates unique from the impact on other health outcomes. Another limitation is the exclusion of other racial and ethnic groups. The study time period and the use of county-level data did not allow for the inclusion of other racial and ethnic groups, but public spending shapes the health of all populations. Mixed-methods, qualitative, single county, or other statistical approaches should be used to assess the impacts of public spending on other racial and ethnic groups. Finally, spending patterns reflect local needs and priorities, which are constantly changing. The study design is unable to account for need-based and political factors that shape public spending.

CONCLUSIONS

Local governments directly and indirectly influence the social determinants of health and health outcomes through public spending. The study does not provide causal evidence that county government spending causes aggregate changes in mortality rates. However, it does make the case that public spending has varied implications on population health across racial groups. The study cannot explain why these patterns exist, but it does lay the foundation for future research into understanding why and how public spending matters for racial health inequality. In addition, public spending is an understudied and potentially important public policy tool for addressing racial health inequalities.

CREDIT AUTHOR STATEMENT

Courtnee E. Melton-Fant: Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Writing — original draft, Writing — review & editing.

SUPPLEMENTARY MATERIALS

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