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Political Economy of the COVID-19 Pandemic: How State Policies Shape County-Level Disparities in COVID-19 Deaths

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Abstract
The authors examine how two state-level coronavirus disease 2019 (COVID-19) policy indices (one capturing economic support and one capturing stringency measures such as stay-at-home orders) were associated with county-level COVID-19 mortality from April through December 2020 and whether the policies were more beneficial for certain counties. Using multilevel negative binominal regression models, the authors found that high scores on both policy indices were associated with lower county-level COVID-19 mortality. However, the policies appeared to be most beneficial for counties with fewer physicians and larger shares of older adults, low-educated residents, and Trump voters. They appeared to be less effective in counties with larger shares of non-Hispanic Black and Hispanic residents. These findings underscore the importance of examining how state and local factors jointly shape COVID-19 mortality and indicate that the unequal benefits of pandemic policies may have contributed to county-level disparities in COVID-19 mortality.

Keywords
COVID-19 mortality, state policy, geographic disparities, population health

Coronavirus disease 2019 (COVID-19) mortality rates have varied markedly across geographic areas of the United States throughout the pandemic (Ahmed et al. 2020; Cuadros et al. 2021; Khan et al. 2022). For example, COVID-19 mortality rates are higher in rural than in urban counties (Albrecht 2022; Sun, Cheng, and Monnat 2022). Among rural counties, COVID-19 mortality rates are higher in farming-dependent counties than in counties dependent on other economic structures (Sun et al. 2022). Explanations for these county-level disparities have focused largely on county-level characteristics. Studies have shown that counties with lower social capital and larger shares of Black and Hispanic persons, older adults, residents with low educational attainment, uninsured residents, and Trump voters have higher county-level COVID-19 mortality rates (Bhowmik et al. 2021; Borgonovi, Andrieu, and Subramanian 2021; Dalsania et al. 2022; Fielding-Miller, Sundaram, and Brouwer 2020; Hawkins, Charles, and Mehaffey 2020; Pan et al. 2020).

Less understood is the potential role that U.S. states' pandemic-related policies may have played in shaping county-level COVID-19 mortality rates. Policies to contain the spread of the virus (e.g., stay-at-home orders, business closures) and to mitigate the economic consequences (e.g., eviction moratoria) may have been disproportionately beneficial for lowering the risk of death from COVID-19 within certain types of counties. Examining how state and local contexts have jointly affected COVID-19 mortality can shed light on the independent or synergistic role of these contexts on COVID-19 mortality rates and geographic disparities in those rates.

This study expands knowledge about the factors driving county-level disparities in COVID-19 deaths in two ways. First, it includes both state-level policies and county-level characteristics to examine how they may have independently or synergistically shaped county-level COVID-19 mortality. Second, it includes two major dimensions of state-level

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COVID-19 policies—containment and closure policies and economic support policies—taken from the Oxford COVID-19 Government Response Tracker.

Background

County-Level Characteristics Associated with COVID-19 Deaths

County-level disparities in COVID-19 deaths have been associated with several local factors such as county-level demographic compositions, socioeconomic conditions, health care resources, and political ideology. It is well established that county-level racial/ethnic and age composition are associated with COVID-19 deaths at the county level. Counties with larger shares of Black and Hispanic residents have higher COVID-19 mortality rates (Albrecht 2022; Cheng, Sun, and Monnat 2020; Hawkins et al. 2020). This might be due to structural racism and residential segregations (Khanijahani and Tomassoni 2022; Tan, deSouza, and Raifman 2022). Additionally, because older adults are more vulnerable to COVID-19, counties with larger shares of older adults have a higher burden of COVID-19 deaths (Fielding-Miller et al. 2020; Hawkins et al. 2020; Zhang and Schwartz 2020).

Socioeconomic conditions also shape county-level COVID-19 mortality. Counties with larger shares of lower educated residents have higher COVID-19 mortality rates (Albrecht 2022; Fielding-Miller et al. 2020; Hawkins et al. 2020; Zhang and Schwartz 2020). This is consistent with fundamental cause theory, which asserts that socioeconomic resources (e.g., education) are important for health outcomes, including risk of death from new diseases such as COVID-19 (Link and Phelan 1995; Phelan, Link, and Tehranifar 2010). In addition, social capital is associated with fewer COVID-19 cases and deaths (Borgonovi et al. 2021; Fraser, Aldrich, and Page-Tan 2021; Fraser, Page-Tan, and Aldrich 2022). Social capital reflects the resources and connectivity of communities, which is achieved through organizations and civic participation that share norms and values among members (Kawachi, Subramanian, and Kim 2008; Putnam 2000). Those shared norms and values might promote the adoption of physical distancing and face-masking behaviors.

Health care resources are associated with COVID-19 deaths. Former studies found that larger shares of uninsured residents is associated with more COVID-19 deaths across counties (Dalsania et al. 2022; Pan et al. 2020). At the early period of the COVID-19 pandemic, the number of physicians per capita was associated with fewer increases in COVID-19 deaths (Cheng et al. 2020). However, physician rates might be positively associated with mortality later, because patients might seek resources in counties with better health infrastructures.

Political ideology is also related to COVID-19 deaths. Before December 2020, Democratic counties had higher COVID-19 mortality than Republican counties; but this relationship was reversed after the COVID-19 vaccine became publicly available (Sehgal et al. 2022). This is because political ideology has become important in determining whether people will engage in preventive behaviors such as physical distancing, face masking, and vaccine uptake (Grossman et al. 2020; Hartwell et al. 2020; Sun and Monnat 2022).

The Role of State Policies during COVID-19

A political economy approach to explaining geographic disparities in population health focuses on the structural determinants of health, such as macro political and economic factors (Bambra, Smith, and Pearce 2019; Schrecker and Bambra 2015). This includes welfare forms, regulation laws, or state policies. For example, U.S. states with more liberal policies have longer life expectancies than those with more conservative policies (Montez and Farina 2021; Montez et al. 2020). Moreover, because federal devolution and state preemption laws have given states more authority to make and change their own policies and laws (Montez 2017, 2020; Montez, Hayward, and Zajacova 2021), where people live has become more important in determining how well and how long they will live.

During the COVID-19 pandemic, the importance of state policies on population health has increased. With few to no COVID-19 related mandates at the federal level (Cui et al. 2021), the federal government defaulted to delegating COVID-19 policy decisions to the states. Some state governors (e.g., governors in Georgia and Texas) prevented counties from implementing social distancing or masking requirements in schools and other public places, which further exacerbated the impacts of state governments' responses. Many counties that experienced spikes of COVID-19 cases and deaths were in states where state governors did not implement preventive policies.

States, and their ability to enact policies to protect the health and well-being of their residents, played a critical role in preventing the spread and deaths from COVID-19. For instance, stringency policies (e.g., stay-at-home orders, nonessential business closures, gathering restrictions, and face masking) helped reduce COVID-19 deaths (Amuedo-Dorantes, Kaushal, and Muchow 2021; Jiang et al. 2022; Page-Tan and Corbin 2021). Lyu and Wehby (2020) found that stay-at-home orders reduced the increases of COVID-19 mortality rates by 6.1 percent. Meanwhile, economic support policies such as eviction moratoria and water shutoff moratoria are also associated with lower COVID-19 mortality rates (Leifheit et al. 2021; Zhang, Warner, and Grant 2022). These moratoriums were put in place to protect residents who could not afford to pay their rent or utility bills because of COVID-19-related job losses. Water shutoff moratorium reduced the increases of COVID-19 deaths by 0.135 percent (Zhang et al. 2022). The expirations of eviction moratoriums created a fivefold increase in COVID-19 mortality (Leifheit et al. 2021). These studies have demonstrated the important role that specific state policies have played in affecting COVID-19 mortality. Building on these informative studies of single policies, the present study includes two policy indices that capture the major domains of states' pandemic policy response—stringency policies and economic support policies—for a more comprehensive assessment of how states' pandemic responses shaped COVID-19 mortality rates.

State policies also interact with local contexts to shape COVID-19 mortality because the application of state policies is based on local resources and attitudes. Local areas also carry their own set of risks and resources for health such as shares of the population that are college educated or uninsured. In fact, some research has shown that certain stringency policies enacted at the state level had differential effects across local characteristics. For instance, from January to June 2020, the effects of stay-at-home orders were better at curbing COVID-19 deaths in urban compared with rural areas because of greater mobility and less order enforcement in rural counties (Jiang et al. 2022). Gathering restrictions and stay-at-home orders were more effective in counties with lower socioeconomic status and larger shares of older adults and racial/ethnic minorities (Page-Tan and Corbin 2021). Those policies might also be more effective at curbing COVID-19 deaths in counties with higher social capital because social capital is associated with higher likelihoods of adopting physical distancing behaviors (Borgonovi and Andrieu 2020; Gibbons, Yang, and Oren 2022). Also important, the effects of states' pandemic policies on COVID-19 mortality may vary by political ideology. COVID-19 policies have been less effective in counties with larger shares of Trump votes (Albrecht 2022), because Trump voters are less likely to comply with stay-at-home orders and adopt preventive behaviors (Grossman et al. 2020; Hartwell et al. 2020; Sun and Monnat 2022).

Aims

In this study we examine how two dimensions of states' pandemic policies are associated with county-level COVID-19 deaths. This study addresses two main research questions. First, how are states' containment and closure policies and economic support policies associated with county-level COVID-19 mortality? We examine containment and closure policies and economic support policies together to produce a more comprehensive view of how state's pandemic policies may have shaped COVID-19 mortality. Second, how do county-level contexts moderate the associations between state policies and COVID-19 mortality? On the basis of the research reviewed earlier, we include five contextual characteristics: urban-rural status, demographic composition, socioeconomic conditions, health care resources, and political ideology.

Data and Methods

We retrieved the two state-level COVID-19 policy indices from the Oxford COVID-19 Government Response Tracker (Hallas et al. 2020). The stringency index summarizes eight policies: closures of schools, closures of workplaces, cancellations of public events, restrictions on gatherings, closures of public transport, stay-at-home orders, restrictions on domestic movement, and restrictions on international travel. The economic support index summarizes two policies: income supports to people who are unemployed or cannot work and household debt and contract relief. The indices were created by first assigning a daily score for each policy in each state. The daily score ranged from 0 to 4 depending on the strictness of the policy in a state (e.g., no measures or some measures, recommended closures or required closures, closing some or closing all). The stringency index for each state-day observation was created by averaging the scores for the eight containment and closure policies. Likewise, the economic index for each state-day observation was created by averaging the scores for the two economic policies.

We calculated weekly averages of these two policy indices for each week from March 15 to December 13, 2020 (39 weeks in total). We included policy indices beginning March 15, 2020 because not all states had COVID-19 cases before mid-March of 2020. We included policy indices before December 13, 2020—before the COVID-19 vaccine was publicly available—to avoid any potential confounding effects of vaccine availability. Because state policies might have lagged effects on mortality, we created three time lags (one-week lag, two-week lag, and three-week lag) for both policy indices. Because the correlation coefficient between the stringency index and the economic support index is only 0.36 (not present in the results), we can examine these two policy indices together.

We merged the two state policy indices with county-level data from multiple sources. COVID-19 death data were from USA Facts (2020), which are reported for each day at the county level. Because daily death counts can be affected by clusters of reported deaths on Mondays (because most health departments do not operate during weekends), we smooth these artificial fluctuations by calculating weekly county-level COVID-19 deaths.

As for covariates, we used rural-urban continuum codes (RUCCs) from the U.S. Department of Agriculture Economic Research Service to classify counties as urban (RUCCs 1–3) or rural (RUCCs 4–9) (USDA ERS 2020). Sociodemographic data (percentage non-Hispanic [NH] Black, percentage Hispanic, percentage residents aged ≥65 years, percentage residents aged ≥25 years with a bachelor's degree or higher, and percentage without health insurance) were taken from the 2016–2020 American Community Survey (U.S. Census Bureau 2022). We used the social capital index from the Penn State University (Rupasingha, Goetz, and Freshwater 2006). This index was constructed

Table 1. Descriptive Statistics of All Variables.

Variable	Mean	*SD*	Minimum	Maximum
Weekly COVID-19 deaths	2.60	17.51	.00	1608.00
Stringency index	50.07	13.98	7.41	87.96
Stringency index (t-1)	50.62	14.17	7.41	87.96
Stringency index (t-2)	50.91	14.14	7.41	87.96
Stringency index (t-3)	50.69	14.24	7.41	87.96
Economic support index	39.99	22.69	.00	100.00
Economic support index (t-1)	40.17	22.57	.00	100.00
Economic support index (t-2)	40.16	22.45	.00	100.00
Economic support index (t-3)	39.79	22.43	.00	100.00
% non-Hispanic Black	8.95	14.43	.00	87.79
% Hispanic	9.62	13.96	.00	98.90
% residents aged ≥65 years	19.28	4.75	3.03	57.78
% residents aged ≥25 years with bachelor's degree or higher	22.61	9.72	.00	79.14
Social capital	.00	1.26	−3.18	21.81
% without health insurance	9.46	5.03	.51	42.55
Physicians per 100,000 population	51.51	36.33	.00	561.12
% Trump vote, 2020	64.97	16.13	5.40	96.18

Note: $n = 111,996$ (3,111 counties × 36 weeks). SD = standard deviation; COVID-19 = coronavirus disease 2019.

using a variety of organizations and associations, voter turnout, and census response rate. Physician rates (per 100,000 population) came from the Area Health Resources Files (HRSA 2020). The 2020 presidential election data (percentage Trump vote) were from GitHub (McGovern 2021). Percentage NH Black, percent Hispanic, and physician rate were coded as quartiles because of skewed distributions. All policy indices, percentage residents aged ≥65 years, percentage residents aged ≥25 years with a bachelor's degree or higher, social capital index, percentage without health insurance, and percentage Trump vote were z-score standardized. Accounting for missing data (all Alaska counties, one Hawaii county, and one Texas county), all analyses include 3,111 counties from 49 states and the District of Columbia.

Because the distribution of COVID-19 deaths is overdispersed (see Table 1), we used multilevel mixed-effects negative binomial regression models with random intercepts to account for repeated observations of counties. We estimated both immediate and lagged associations between the state policy indices and COVID-19 mortality. To ensure all models include the same mortality data and are comparable, we examined only COVID-19 deaths from the 4th week (April 5–12, 2020) to the 39th week because the 4th week's deaths correspond to the 1st week's state policies in the 3-week lag models. All models include an offset with the log-transformed population sizes. The α parameter was used for estimating overdispersion. An α parameter greater than zero means that data are overdispersed and justifies the use of negative binomial models. The Akaike information criterion and Bayesian information criterion were used to compare the fit of the models. All analyses were conducted in Stata 17.

Results

Table 1 presents descriptive statistics for all variables. The average COVID-19 deaths per week are 2.60 but range from 0 to 1,608. The stringency index ranges from 7.41 to 87.96, with a mean value of 50.07. The economic support index ranges from 0 to 100, with a mean value of 39.99. The mean and standard deviation of lagged measures are very similar to immediate measures of policy indices.

Figure 1 presents the changes in COVID-19 policy indices over time for each state. The trends in policy indices varied greatly across states. For example, after week 30 (October 4–10, 2020), the stringency index was declining in Maine but increasing in Minnesota. Meanwhile, this index was fluctuating in some states, such as Pennsylvania and Hawaii. After week 10 (May 17–23, 2020), the economic support index was high in New York but low in Utah.

Table 2 presents the results of multilevel negative binomial regression models for predicting weekly county-level COVID-19 deaths from the two policy indices. Both indices are consistently associated with fewer COVID-19 deaths across immediate and lagged effects models. Using the immediate effect model as an example, each standard deviation increase in the stringency index is associated with a 19 percent reduction ($p < .001$) in weekly COVID-19 deaths, net of the economic support index and county-level characteristics. Each standard deviation increase in the economic support index is associated with a 10 percent reduction ($p < .001$) in weekly COVID-19 deaths, net of the stringency index and county-level characteristics. The findings from the lagged models were similar. Consistent with former studies, counties with larger shares of NH Black and Hispanic,

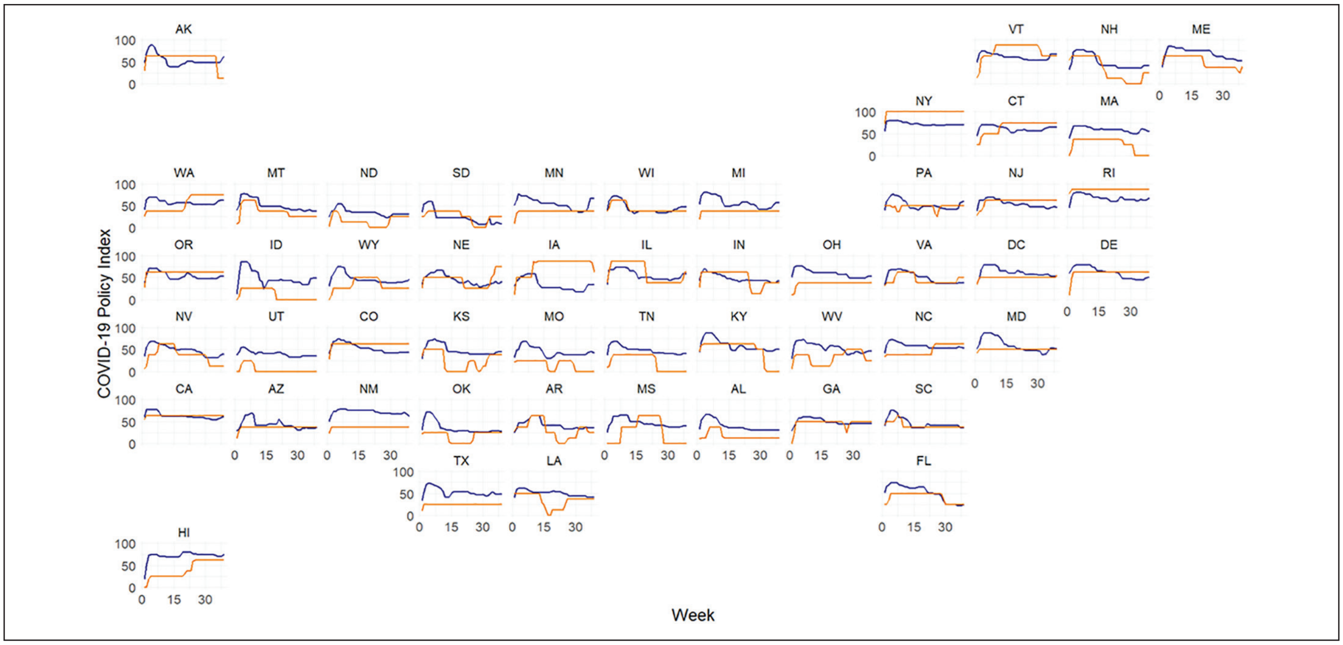

Figure 1. Coronavirus disease 2019 (COVID-19) policy indices by states from week 1 (March 15–22, 2020) to week 39 (December 6–13, 2020).
Note: Blue represents stringency index. Orange represents economic support index.

low-educated, and uninsured residents have more deaths from COVID-19. However, rural status and shares of older adults are not significant. Lower social capital and larger shares of Trump voters are associated with fewer COVID-19 deaths.

We also examine three counterfactual scenarios for the time period of April 5 to December 13, 2020. First, if only the stringency index in all states was set to the maximum value (87.96), the average COVID-19 deaths would have been 7.31 percent lower than the actual average deaths (2.41 vs. 2.60). Among the 3,111 counties, this reduction in the actual deaths would have resulted in about 21,784 fewer deaths. Second, if only the economic support index in all states was set to the maximum value (100), it would have resulted in an estimated 2,143 fewer deaths. Third, if both policy indices in all states were set to the maximum values, it would have resulted in an estimated 29,055 fewer deaths.

Because the models with and without lag in Table 2 all provided similar results, we continue the analyses using the "no lag" model. Table 3 presents the results of multilevel negative binominal regression models for predicting weekly COVID-19 deaths from the two policy indices, county-level characteristics, and the interactions between these state and county variables.

In Table 3, the rural status model incorporates interactions between counties' rural-urban status and their states' COVID-19 policy indices. The model results indicate that the association between COVID-19 policy indices and COVID-19 deaths varies across rural and urban areas. The incidence rate ratios for rural counties are 0.66 and 1.06 times that of urban counties for the stringency and economic indices respectively. A higher stringency index is associated with a greater decrease of deaths in rural counties compared with urban counties, net of the economic support index and other county-level characteristics (see Figure 2A). Figure 3A shows that, net of the stringency index and county-level characteristics, the economic support index is negatively associated with deaths in both urban and rural counties, but the decrease is slightly stronger in urban areas.

In Table 3, the demographic compositions model incorporates interactions between counties' percentage NH Black, percentage Hispanic, and percentage residents aged ≥65 years and their states' COVID-19 policy indices. The model results indicate that the association between COVID-19 policy indices and COVID-19 deaths varies by county-level demographic compositions. The incidence rate ratio of the stringency index is larger for counties with larger shares of racial/ethnic minorities and smaller for counties with larger shares of older adults. These interactions can be seen more clearly in Figures 2B to 2D. Figures 2B and 2C reveal that the stringency index is negatively associated with deaths across all quartiles of percentage NH Black and percentage Hispanic, but the decrease is stronger in counties with smaller shares of NH Black and Hispanic residents, net of the economic support index and other county-level characteristics. In summary, the stringency policies are less beneficial in counties with larger shares of racial/ethnic minorities. Figure 2D shows that the stringency policies are more effective in counties with larger shares of older adults.

Table 2. Multilevel Negative Binominal Regression Models Predicting Weekly Coronavirus Disease 2019 Deaths from Two State-Level Pandemic Policy Indices.

	Immediate Effect		Lagged Effect (t-1)		Lagged Effect (t-2)		Lagged Effect (t-3)	
	IRR	95% CI	IRR	95% CI	IRR	95% CI	IRR	95% CI
Stringency index	.81***	.80–.82	.77***	.76–.78	.72***	.71–.74	.70***	.69–.71
Economic support index	.90***	.88–.91	.90***	.89–.92	.90***	.88–.91	.91***	.90–.93
Rural (reference: urban)	.99	.92–1.05	.98	.92–1.05	.98	.92–1.04	.98	.92–1.04
% non-Hispanic Black (reference: Q1)								
Q2	.98	.91–1.06	.98	.91–1.06	.99	.92–1.07	1.00	.92–1.08
Q3	1.17***	1.08–1.26	1.18***	1.09–1.28	1.20***	1.10–1.30	1.21***	1.12–1.31
Q4	1.52***	1.40–1.65	1.53***	1.41–1.67	1.56***	1.44–1.70	1.59***	1.46–1.73
% Hispanic (reference: Q1)								
Q2	1.01	.94–1.09	1.01	.93–1.08	1.00	.93–1.08	.99	.92–1.07
Q3	.96	.89–1.04	.96	.89–1.04	.97	.89–1.04	.96	.89–1.04
Q4	1.19***	1.10–1.29	1.21***	1.11–1.31	1.24***	1.14–1.34	1.25***	1.14–1.35
% residents aged ≥65 years	.99	.96–1.02	1.00	.97–1.03	1.01	.97–1.04	1.01	.98–1.04
% residents aged ≥25 years with bachelor's degree or higher	.78***	.75–.82	.79***	.76–.82	.79***	.76–.82	.79***	.76–.82
Social capital	1.11***	1.08–1.15	1.10***	1.06–1.14	1.09***	1.05–1.12	1.07***	1.04–1.11
% without health insurance	1.05**	1.02–1.08	1.04**	1.01–1.08	1.03*	1.00–1.07	1.04*	1.00–1.07
Physicians per 100,000 population (reference: Q1)								
Q2	1.04	.97–1.13	1.05	.97–1.13	1.05	.97–1.13	1.05	.97–1.13
Q3	1.10*	1.02–1.19	1.10*	1.02–1.19	1.10*	1.02–1.19	1.10*	1.01–1.18
Q4	1.10*	1.00–1.20	1.10*	1.00–1.20	1.10*	1.00–1.20	1.10*	1.00–1.20
% Trump vote, 2020	.93***	.90–.96	.92***	.89–.96	.91***	.88–.95	.92***	.89–.95
Constant	.00***	.00–.00	.00***	.00–.00	.00***	.00–.00	.00***	.00–.00
α	1.40***	1.37–1.43	1.39***	1.36–1.42	1.37***	1.35–1.40	1.35***	1.33–1.38
AIC	292,132.8		291,571.2		290,751.8		290,107.5	
BIC	292,325.3		291,763.7		290,944.3		290,300.0	

Note: All models include random intercepts for counties and offset for the counties' log-transformed population sizes. $n = 111,996$; group = 3,111. AIC = Akaike information criterion; BIC = Bayesian information criterion; CI = confidence interval; IRR = incident rate ratio; Q = quartile.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

The incidence rate ratio of the economic support index is 1.15 times that for the fourth quartile of percentage NH Black than the first quartile of percentage NH Black. Compared to counties with the first quartile of percentage Hispanic, the incidence rate ratio of the economic support index is 0.95 times that for the second quartile of percentage Hispanic but 1.14 times that for the fourth quartile. These interactions can be seen more clearly in Figures 3B and 3C. Figure 3B reveals that the economic support index is negatively associated with deaths in counties with the first to third quartiles of percentage NH Black but predicts more deaths in counties with the fourth quartile of percentage NH Black, net of the stringency index and other county-level characteristics. The pattern is similar for percentage Hispanic (see Figure 3C). The interactions between the economic support index and shares of older adults are not statistically significant (see Figure 3D).

In Table 3, the socioeconomic conditions model incorporates interactions between counties' percentage residents with a bachelor's degree or higher as well as social capital index and their states' COVID-19 policy indices. The model results indicate that the association between COVID-19 policy indices and COVID-19 deaths varies by local socioeconomic conditions. The incidence rate ratio of the stringency index is larger for counties with larger shares of residents with a bachelor's degree or higher but smaller for counties with higher social capital. These interactions can be seen more clearly in Figures 2E and 2F. A higher stringency index is associated with a greater decrease of deaths in counties with smaller shares of residents with bachelor's degree or higher and higher social capital, net of the economic support index and other county-level characteristics. Meanwhile, the incidence rate ratio of economic support index is larger for counties with higher social capital. A higher economic support index is associated with a greater decrease of deaths in counties with lower social capital, net of the stringency index and other county-level characteristics (see Figure 3F). The interactions between the economic support index and shares of residents with a bachelor's degree or higher are not statistically significant (see Figure 3E).

In Table 3, the health care resources model incorporates interactions between counties' percentage without health insurance and physician rates and their states' COVID-19

Table 3. Multilevel Negative Binominal Regression Models Predicting Weekly COVID-19 Deaths from the Interactions between State-Level Pandemic Policy Indices and County-Level Contexts.

	Rural Status		Demographic Compositions		Socioeconomic Conditions		Health Care Resources		Political Ideology	
	IRR	95% CI	IRR	95% CI	IRR	95% CI	IRR	95% CI	IRR	95% CI
SI	.99	.97–1.01	.60***	.58–.63	.76***	.74–.77	.70***	.68–.73	.74***	.73–.75
ESI	.87***	.85–.89	.84***	.80–.88	.91***	.89–.92	.88***	.85–.91	.91***	.90–.93
Rural (reference: urban)	.96	.90–1.02	1.01	.94–1.07	.98	.92–1.05	.98	.91–1.04	.98	.91–1.04
% non-Hispanic Black (reference: Q1)										
Q2	1.01	.93–1.09	1.08*	1.00–1.17	1.01	.94–1.09	1.00	.92–1.08	1.01	.94–1.10
Q3	1.19***	1.10–1.29	1.28***	1.19–1.39	1.19***	1.10–1.29	1.18***	1.08–1.28	1.22***	1.12–1.33
Q4	1.55***	1.43–1.69	1.65***	1.51–1.79	1.54***	1.42–1.67	1.54***	1.41–1.68	1.56***	1.43–1.70
% Hispanic (reference: Q1)										
Q2	1.01	.93–1.08	.99	.92–1.06	1.01	.94–1.09	1.02	.94–1.10	.99	.92–1.07
Q3	.96	.89–1.04	.96	.89–1.04	.98	.91–1.06	.96	.89–1.04	.92*	.85–.99
Q4	1.19***	1.10–1.30	1.17***	1.07–1.27	1.18***	1.09–1.29	1.27***	1.16–1.38	1.08	.99–1.18
% residents aged ≥65 years	1.00	.97–1.03	.99	.96–1.02	.98	.95–1.01	.99	.95–1.02	.97	.94–1.00
% residents aged ≥25 years with bachelor's degree or higher	.78***	.75–.81	.77***	.74–.80	.76***	.73–.79	.77***	.74–.80	.75***	.72–.78
Social capital	1.10***	1.06–1.13	1.09***	1.05–1.13	1.08***	1.04–1.12	1.13***	1.09–1.17	1.11***	1.07–1.15
% without health insurance	1.05**	1.02–1.08	1.05**	1.02–1.09	1.05**	1.02–1.08	1.03	1.00–1.07	1.08***	1.05–1.12
Physicians per 100,000 population (reference: Q1)										
Q2	1.05	.97–1.13	1.06	.99–1.14	1.06	.99–1.14	1.09*	1.01–1.18	1.08	1.00–1.16
Q3	1.10*	1.02–1.19	1.12**	1.04–1.21	1.14***	1.06–1.23	1.16***	1.07–1.25	1.14**	1.05–1.24
Q4	1.10*	1.00–1.20	1.12*	1.02–1.22	1.12**	1.03–1.23	1.15**	1.05–1.26	1.11*	1.01–1.22
% Trump vote, 2020	.93***	.90–.97	.93***	.90–.96	.95**	.92–.98	.96*	.92–.99	.91***	.88–.94
Interaction effects with COVID-19 policies										
Rural × SI	.66***	.64–.68								
Rural × ESI	1.06**	1.02–1.10								
% non-Hispanic Black (reference: Q1 × SI)										
Q2 × SI			1.13***	1.07–1.18						
Q3 × SI			1.35***	1.29–1.42						
Q4 × SI			1.41***	1.34–1.48						
% Hispanic (reference: Q1 × SI)										
Q2 × SI			1.02	.98–1.07						
Q3 × SI			1.08**	1.03–1.13						
Q4 × SI			1.16***	1.11–1.21						
% residents aged ≥65 years X SI			.95***	.94–.97						
% non-Hispanic Black (reference: Q1 × ESI)										
Q2 × ESI			1.01	.95–1.06						
Q3 × ESI			1.00	.95–1.06						
Q4 × ESI			1.15***	1.09–1.21						
% Hispanic (reference: Q1 × ESI)										
Q2 × ESI			.95*	.91–1.00						
Q3 × ESI			1.04	.99–1.09						
Q4 × ESI			1.14***	1.09–1.21						
% residents aged ≥65 years × ESI			.99	.97–1.02						
% residents aged ≥25 years with bachelor's degree or higher × SI					1.26***	1.24–1.27				

(continued)

Table 3. (continued)

	Rural Status		Demographic Compositions		Socioeconomic Conditions		Health Care Resources		Political Ideology	
	IRR	95% CI	IRR	95% CI	IRR	95% CI	IRR	95% CI	IRR	95% CI
Social capital × SI					.89***	.88–.91				
% residents aged ≥25 years with bachelor's degree or higher × ESI					1.01	.99–1.03				
Social capital × ESI					1.05***	1.02–1.07				
% without health insurance × SI							.86***	.85–.87		
Physicians per 100,000 population (reference: Q1 × SI)										
Q2 × SI							1.06*	1.01–1.11		
Q3 × SI							1.08**	1.03–1.13		
Q4 × SI							1.28***	1.22–1.35		
% without health insurance × ESI							1.12***	1.09–1.14		
Physicians per 100,000 population (reference: Q1 × ESI)										
Q2 × ESI							1.05	1.00–1.11		
Q3 × ESI							1.05*	1.00–1.11		
Q4 × ESI							1.08**	1.02–1.13		
% Trump vote, 2020 × SI									.75***	.73–.76
% Trump vote, 2020 × ESI									.99	.97–1.01
Constant	.00***	.00–.00	.00***	.00–.00	.00***	.00–.00	.00***	.00–.00	.00***	.00–.00
α	1.37***	1.35–1.40	1.37***	1.35–1.40	1.35***	1.32–1.37	1.36***	1.34–1.39	1.33***	1.31–1.36
AIC	291,390.4		291,357.1		290,851.1		291,503.2		290,513.0	
BIC	291,602.2		291,684.4		291,082.1		291,772.7		290,724.8	

Note: All models include random intercepts for counties and offset for the counties' log-transformed population sizes. $n = 111{,}996$; group = 3,111. AIC = Akaike information criterion; BIC = Bayesian information criterion; CI = confidence interval; COVID-19 = coronavirus disease 2019; ESI = economic support index; IRR = incident rate ratios; Q = quartile; SI = stringency index.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

policy indices. The model results indicate that the association between COVID-19 policy indices and COVID-19 deaths varies by local health care resources. The incidence rate ratio of the stringency index is larger for counties with smaller shares of uninsured residents and higher physician rates. These interactions can be seen more clearly in Figures 2G and 2H. A higher stringency index is associated with a greater decrease of deaths in counties with larger shares of uninsured residents and lower physician rates, net of the economic support index and other county-level characteristics. Meanwhile, the incidence rate ratio of the economic support index is larger for counties with larger shares of uninsured residents and higher physician rates. Figures 3G and 3H reveal that a higher economic support index is associated with a greater decrease of deaths in counties with smaller shares of uninsured residents and lower physician rates, net of the stringency index and other county-level characteristics.

In Table 3, the political ideology model incorporates interactions between counties' percentage Trump vote and their states' COVID-19 policy indices. The model results indicate that the association between the stringency index and COVID-19 deaths varies by political ideology. The incidence rate ratio of the stringency index is smaller for counties with larger shares of Trump voters. This interaction can be seen more clearly in Figure 2I. Stringency policies are more beneficial in counties with larger shares of Trump voters. The interactions between the economic support index and shares of Trump voters are not statistically significant (see Figure 3I).

We also tested the interactions between local characteristics and lagged measures of COVID-19 policy indices. The findings are basically consistent, despite the slight changes in effect sizes and statistical significance (see Appendix Tables 1–3).

Discussion

Using policy data from the Oxford COVID-19 Government Response Tracker and multilevel mixed-effects negative binomial regression models, we examined how two key dimensions of states' pandemic policies were associated with county-level COVID-19 mortality and how those associations varied by county-level contexts. We found that both

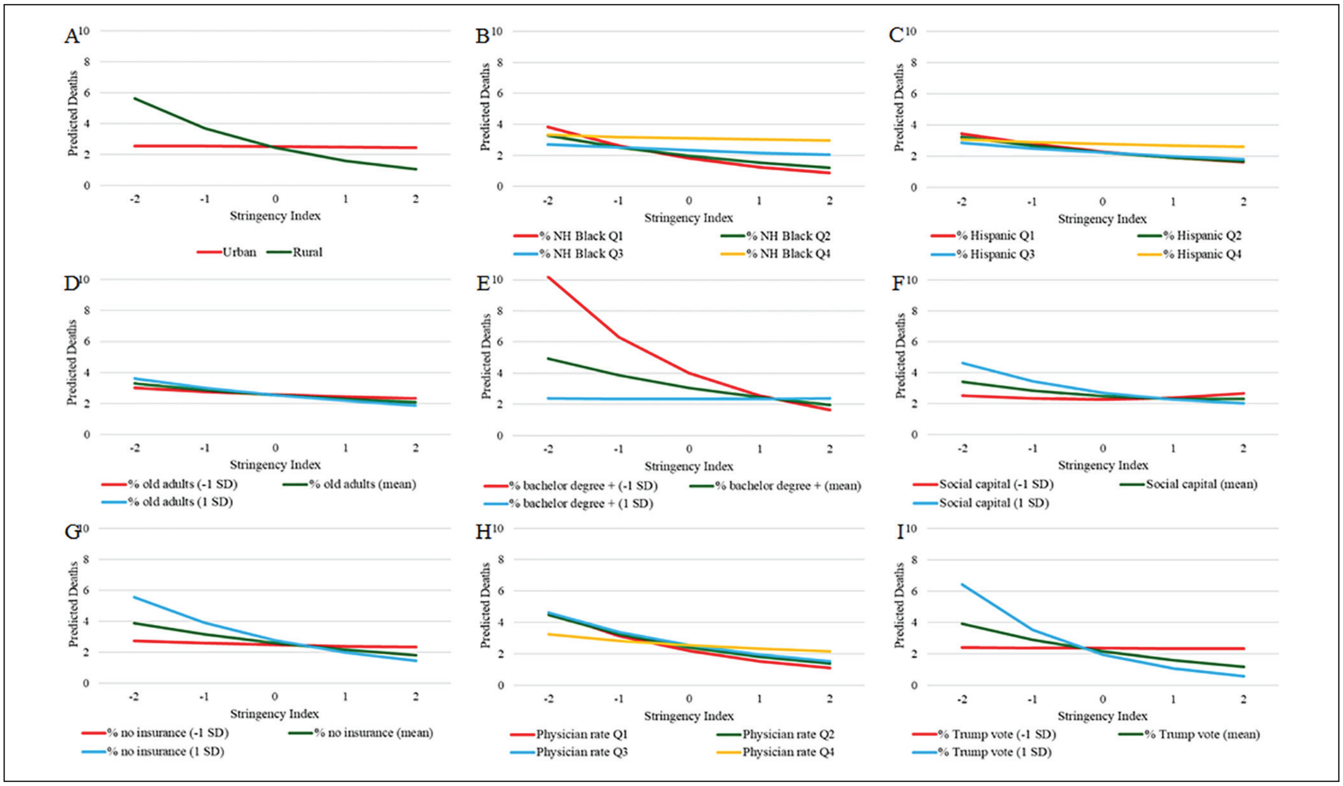

Figure 2. Predicted weekly deaths by the interactions between stringency index and local contexts.
Note: Stringency index is z-score standardized. Q = quartile; SD = standard deviation..

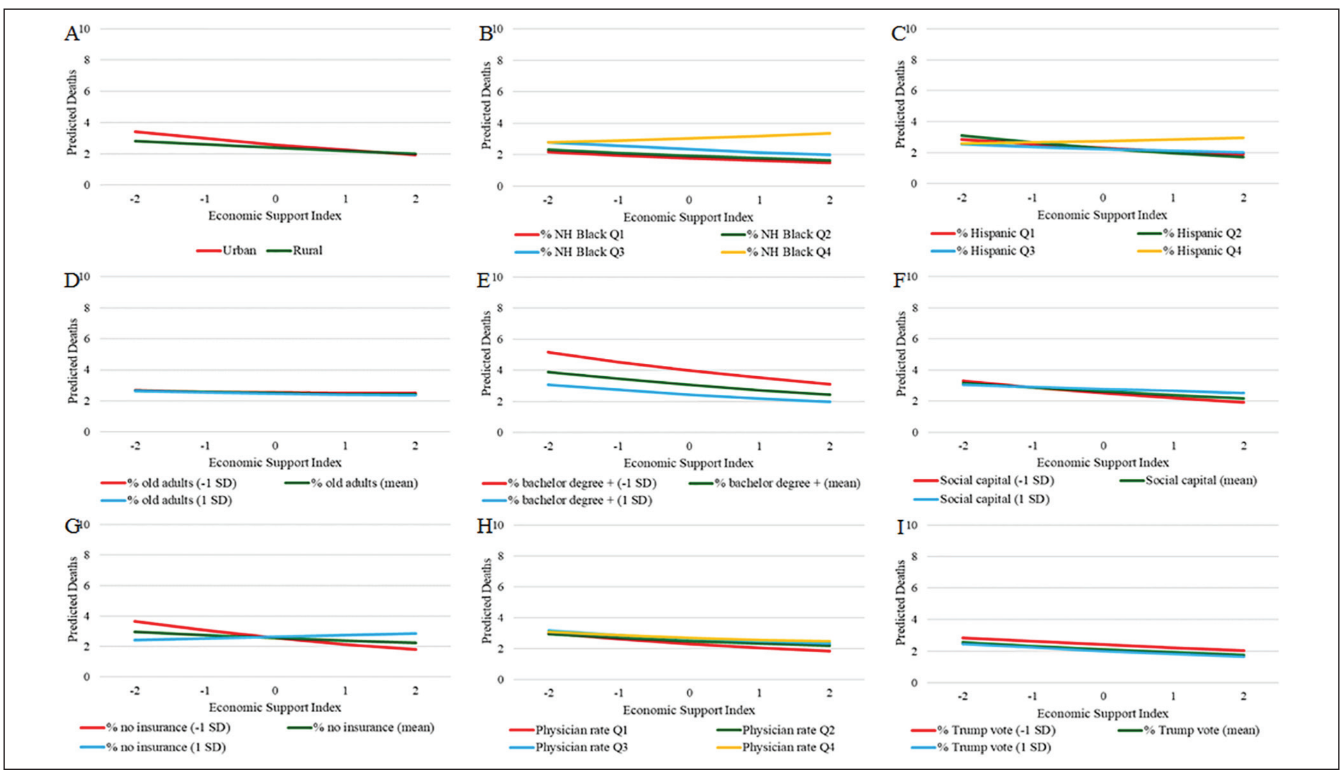

Figure 3. Predicted weekly deaths by the interactions between economic support index and local contexts.
Note: Economic support index is *z*-score standardized. Q = quartile; SD = standard deviation.

stringency policies and economic support policies are associated with fewer increases in COVID-19 deaths. These associations were consistent across immediate and lagged measures of the policy indices. Moreover, the associations between COVID-19 policy indices and weekly deaths varied by local contexts. Those policies appeared to be more effective at reducing COVID-19 deaths in counties with fewer physicians and larger shares of older adults, low-educated residents, and Trump voters. However, both stringency policies and economic support policies appeared to be less effective in counties with larger shares of NH Black and Hispanic residents. In addition, those policies had different effects in certain counties. Stringency policies were more beneficial in rural areas and counties with higher social capital and larger shares of uninsured residents, while economic support policies were less beneficial in those counties.

This study highlights the important roles of state policies in contributing to geographic variations in COVID-19 mortality. This is consistent with former studies using political economy of health theory (Bambra et al. 2019; Montez, Hayward, and Zajacova 2019; Montez et al. 2020). As structural determinants, state policies affect the spread and deaths of COVID-19 within a state. Stringency policies directly affect the exposures to COVID-19. Stay-at-home orders, closing schools and workplaces, canceling public events and public transportation, and restricting gatherings, domestic movement, and international travel can significantly slow the spread of COVID-19 and reduce exposures to the virus. Meanwhile, economic support policies, including income supports to people who are unemployed or cannot work and household debt/contract relief, can help state residents cope with the economic adversity of COVID-19 and thus can afford sick leave and preventive measures, such as face masks and at-home test. Thus, residents of states applying stringency policies and economic support policies are less likely to contract COVID-19. If both stringency policies and economic support policies in all states were set to the maximum levels, 29,055 lives could be saved from COVID-19 during April 5 to December 13, 2020.

This study also revealed that the associations between the two state policy indices and COVID-19 mortality varied by county-level contexts. Those policies were more strongly associated with lower COVID-19 deaths in counties with fewer physicians and larger shares of older adults, low-educated residents, and Trump voters. This suggests that state policies were most consequential in places with vulnerable populations, fewer socioeconomic and health care resources, and more politically conservative populations. In many ways, these populations are the most vulnerable to COVID-19. People with low socioeconomic status and Trump voters are less likely to take preventive action, such as face masking and physical distancing, and are more likely to be exposed to COVID-19 (Kim and Crimmins 2020; Porteny et al. 2022). The insufficient number of physicians means infected residents might not get medical treatments on time. States that implemented policies that restricted contact with others or provided economic support lowered the risk of death in the counties with greater proportions of populations that may have been most likely to contract COVID-19.

At the same time, we found that COVID-19 policies were less effective in counties with larger shares of NH Black and Hispanic residents. The smaller benefits of these policies among racial/ethnic minorities stems from various factors such as the insidious effects of structural racism. Structural racism has been the root cause of racial/ethnic health disparities for decades and has continued to do so throughout the COVID-19 pandemic (Garcia et al. 2021). Higher levels of structural racism are associated with higher COVID-19 mortality, especially for NH Black individuals (Tan et al. 2022). One potential mechanism through which structural racism exerts its force is through institutional barriers. For instance, although providing economic relief may be individually beneficial, economic support policies may be less effective among racial/ethnic minorities if they face institutional barriers to accessing and using those supports within their counties.

In addition, those policies had different effects in certain counties. Stringency policies were more beneficial in rural areas and counties with higher social capital and larger shares of uninsured residents, while economic support policies were less beneficial in those counties. This is due to the different mechanisms of state policies. Stringency policies benefit rural and uninsured residents by reducing their exposure to COVID-19. Rural and uninsured residents are at higher risk for COVID-19 death, because rural residents are less likely to take preventive measures (Callaghan et al. 2021), and uninsured residents might not get medical treatments once they are ill. Stringency policies were better implemented in counties with higher social capital, because social capital reflects shared norms and values (Borgonovi and Andrieu 2020; Gibbons et al. 2022). Meanwhile, economic support policies were less beneficial in those counties. Because of institutional barriers, rural and uninsured residents might be not capable of accessing and using those economic supports. Those economic supports might be less important in counties with higher social capital, because social capital represents the resources of one community and also supports local residents.

Our findings have important policy implications. First, both stringency policies and economic support policies are important for curbing COVID-19 deaths. Applying these policies in a timely manner can not only save lives and protect psychological well-being but also accelerate economic recovery. Second, local contexts are important for the effectiveness of state policies. When state governments make health-protecting decisions with regard to COVID-19 policies, county governments must remove institutional barriers for marginalized populations and mobilize community organizations to aide in applying those policies.

Limitations

This study has several limitations. First, this is an ecological study that uses county-level data. Thus, we cannot infer how state policies affect individual-level mortality or how state policies affect subgroups differently. Second, state policy indices included combinations of policies related to containment, closure, and economy. Although these indices are robust and strongly associated with COVID-19 deaths, specific state policies might have different effects on COVID-19 mortality if examined separately. However, because the correlations among COVID-19 policies are complicated, this study cannot examine the separate effects of each of these policies on mortality rates. Third, although we do not have data on this topic, the application of state COVID-19 policies might vary by local governance abilities because some measures (e.g., testing) require financial supports and the mobilization of social capital.

Future studies should examine whether each policy within our indices has different effects on COVID-19 mortality. For instance, the stringency index includes school, work, and transportation closures as well as limitations on gatherings and limitations on domestic and foreign travel. Although these policies collectively influence COVID-19 mortality, some may exert a stronger influence than others. In addition, future research should empirically test the role of structural racism in explaining why COVID-19 policies are less effective in counties with higher proportions of NH Black and Hispanic residents.

Conclusion

Geographic disparities in COVID-19 deaths are shaped by state policies. Moreover, those policies appeared to be more effective in counties with fewer physicians and larger shares of older adults, low-educated residents, and Trump voters. COVID-19 policies were less effective in counties with larger shares of NH Black and Hispanic residents. Local contexts influence how state policies shape geographic disparities in COVID-19 deaths. Multilevel factors and their interactions must be simultaneously considered when examining geographic disparities in health. Our findings underscore the importance of examining how state and local factors jointly shape COVID-19 mortality and indicate that the unequal benefits of pandemic policies may have contributed to county-level disparities in COVID-19 mortality.

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Supplemental Material

Supplemental material for this article is available online.

References

Ahmed, Rashid, Mark Williamson, Muhammad Akhter Hamid, and Naila Ashraf. 2020. "United States County-Level COVID-19 Death Rates and Case Fatality Rates Vary by Region and Urban Status." *Healthcare* 8(3):330.

Albrecht, Don E. 2022. "COVID-19 in Rural America: Impacts of Politics and Disadvantage." *Rural Sociology* 87(1):94–118. doi:10.1111/ruso.12404.

Amuedo-Dorantes, Catalina, Neeraj Kaushal, and Ashley N. Muchow. 2021. "Timing of Social Distancing Policies and COVID-19 Mortality: County-Level Evidence from the U.S." *Journal of Population Economics* 34(4):1445–72.

Bambra, Clare, Katherine E. Smith, and Jamie Pearce. 2019. "Scaling Up: The Politics of Health and Place." *Social Science & Medicine* 232:36–42.

Bhowmik, Tanmoy, Sudipta Dey Tirtha, Naveen Chandra Iraganaboina, and Naveen Eluru. 2021. "A Comprehensive Analysis of COVID-19 Transmission and Mortality Rates at the County Level in the United States Considering Socio-demographics, Health Indicators, Mobility Trends and Health Care Infrastructure Attributes." *PLoS ONE* 16(4):e0249133.

Borgonovi, Francesca, and Elodie Andrieu. 2020. "Bowling Together by Bowling Alone: Social Capital and COVID-19." *Social Science & Medicine* 265:113501.

Borgonovi, Francesca, Elodie Andrieu, and S. V. Subramanian. 2021. "The Evolution of the Association between Community Level Social Capital and COVID-19 Deaths and Hospitalizations in the United States." *Social Science & Medicine* 278:113948.

Callaghan, Timothy, Jennifer A. Lueck, Kristin Lunz Trujillo, and Alva O. Ferdinand. 2021. "Rural and Urban Differences in COVID-19 Prevention Behaviors." *Journal of Rural Health* 37(2):287–95.

Cheng, Kent Jason G., Yue Sun, and Shannon M. Monnat. 2020. "COVID-19 Death Rates Are Higher in Rural Counties with Larger Shares of Blacks and Hispanics." *Journal of Rural Health* 36(4):602–608.

Cuadros, Diego F., Adam J. Branscum, Zindoga Mukandavire, F. DeWolfe Miller, and Neil MacKinnon. 2021. "Dynamics of the COVID-19 Epidemic in Urban and Rural Areas in the United States." *Annals of Epidemiology* 59:16–20.

Cui, Zhihan, Geoffrey Heal, Howard Kunreuther, and Lu Liu. 2021. "The Political Economy of Responses to COVID-19 in the U.S.A." NBER Working Paper No. 28578. Cambridge, MA: National Bureau of Economic Research.

Dalsania, Ankur K., Matthew J. Fastiggi, Aaron Kahlam, Rajvi Shah, Krishan Patel, Stephanie Shiau, Slawa Rokicki, et al. 2022. "The Relationship between Social Determinants of Health and Racial Disparities in COVID-19 Mortality." *Journal of Racial and Ethnic Health Disparities* 9(1):288–95.

Fielding-Miller, Rebecca K., Maria E. Sundaram, and Kimberly Brouwer. 2020. "Social Determinants of COVID-19 Mortality at the County Level." *PLoS ONE* 15(10):e0240151.

Fraser, Timothy, Daniel P. Aldrich, and Courtney Page-Tan. 2021. "Bowling Alone or Distancing Together? The Role of Social Capital in Excess Death Rates from COVID19." *Social Science & Medicine* 284:114241.

Fraser, Timothy, Courtney Page-Tan, and Daniel P. Aldrich. 2022. "Social Capital's Impact on COVID-19 Outcomes at Local Levels." *Scientific Reports* 12:6566.

Garcia, Marc A., Patricia A. Homan, Catherine García, and Tyson H. Brown. 2021. "The Color of COVID-19: Structural Racism and the Disproportionate Impact of the Pandemic on Older Black and Latinx Adults." *Journals of Gerontology: Series B* 76(3):e75–80.

Gibbons, Joseph, Tse-Chuan Yang, and Eyal Oren. 2022. "Community Boosts Immunity? Exploring the Relationship between Social Capital and COVID-19 Social Distancing." *Spatial Demography* 10:75–105.

Grossman, Guy, Soojong Kim, Jonah M. Rexer, and Harsha Thirumurthy. 2020. "Political Partisanship Influences Behavioral Responses to Governors' Recommendations for COVID-19 Prevention in the United States." *Proceedings of the National Academy of Sciences* 117(39):24144–53.

Hallas, Laura, Ariq Hatibie, Saptarshi Majumdar, Monika Pyarali, Rachelle Koch, Andrew Wood, and Thomas Hale. 2020. "Variation in US States' Responses to COVID-19_3.0." Retrieved May 9, 2022. https://www.bsg.ox.ac.uk/research/publications/variation-us-states-responses-covid-19.

Hartwell, Micah, Benjamin Greiner, Zach Kilburn, and Ryan Ottwell. 2020. "Association of Public Interest in Preventive Measures and Increased COVID-19 Cases after the Expiration of Stay-at-Home Orders: A Cross-Sectional Study." *Disaster Medicine and Public Health Preparedness* 16(1):55–59.

Hawkins, Robert B., Eric J. Charles, and J. Hunter Mehaffey. 2020. "Socio-economic Status and COVID-19–Related Cases and Fatalities." *Public Health* 189:129–34.

HRSA (Health Resources and Services Administration). 2020. "Area Health Resources Files." Retrieved October 29, 2020. https://data.hrsa.gov/data/download.

Jiang, David H., Darius J. Roy, Benjamin D. Pollock, Nilay D. Shah, and Rozalina G. McCoy. 2022. "Association of Stay-at-Home Orders and COVID-19 Incidence and Mortality in Rural and Urban United States: A Population-Based Study." *BMJ Open* 12:e055791.

Kawachi, Ichiro, S. V. Subramanian, and Daniel Kim. 2008. "*Social Capital and Health*." Pp. 1–26 in *Social Capital and Health*, edited by I. Kawachi, S. V. Subramanian, and D. Kim. New York: Springer.

Khan, Sadiya S., Amy E. Krefman, Megan E. McCabe, Lucia C. Petito, Xiaoyun Yang, Kiarri N. Kershaw, Lindsay R. Pool, et al. 2022. "Association between County-Level Risk Groups and COVID-19 Outcomes in the United States: A Socioecological Study." *BMC Public Health* 22:81.

Khanijahani, Ahmad, and Larisa Tomassoni. 2022. "Socioeconomic and Racial Segregation and COVID-19: Concentrated Disadvantage and Black Concentration in Association with COVID-19 Deaths in the USA." *Journal of Racial and Ethnic Health Disparities* 9(1):367–75.

Kim, Jung Ki, and Eileen M. Crimmins. 2020. "How Does Age Affect Personal and Social Reactions to COVID-19: Results from the National Understanding America Study." *PLoS ONE* 15(11):e0241950.

Leifheit, Kathryn M., Sabriya L. Linton, Julia Raifman, Gabriel L. Schwartz, Emily A. Benfer, Frederick J. Zimmerman, and Craig Evan Pollack. 2021. "Expiring Eviction Moratoriums and COVID-19 Incidence and Mortality." *American Journal of Epidemiology* 190(12):2503–10. doi:10.1093/aje/kwab196.

Link, Bruce G., and Jo Phelan. 1995. "Social Conditions as Fundamental Causes of Disease." *Journal of Health and Social Behavior* (Extra Issue):80–94.

Lyu, Wei, and George L. Wehby. 2020. "Shelter-in-Place Orders Reduced COVID-19 Mortality and Reduced the Rate of Growth in Hospitalizations." *Health Affairs* 39(9):1615–23.

McGovern, Tony. 2021. "United States General Election Presidential Results by County from 2008 to 2020." GitHub. Retrieved October 30, 2021. https://github.com/tonmcg/US_County_Level_Election_Results_08-20.

Montez, Jennifer Karas. 2017. "Deregulation, Devolution, and State Preemption Laws' Impact on US Mortality Trends." *American Journal of Public Health* 107(11):1749–50.

Montez, Jennifer Karas. 2020. "US State Polarization, Policymaking Power, and Population Health." *Milbank Quarterly* 98(4):1033–52.

Montez, Jennifer Karas, Jason Beckfield, Julene Kemp Cooney, Jacob M. Grumbach, Mark D. Hayward, Huseyin Zeyd Koytak, Steven H. Woolf, et al. 2020. "US State Policies, Politics, and Life Expectancy." *Milbank Quarterly* 98(3):668–99.

Montez, Jennifer Karas, and Mateo P. Farina. 2021. "Do Liberal U.S. State Policies Maximize Life Expectancy?" *Public Policy & Aging Report* 31(1):7–13.

Montez, Jennifer Karas, Mark D. Hayward, and Anna Zajacova. 2019. "Educational Disparities in Adult Health: U.S. States as Institutional Actors on the Association." *Socius* 5. doi:10.1177/2378023119835345.

Montez, Jennifer Karas, Mark D. Hayward, and Anna Zajacova. 2021. "Trends in U.S. Population Health: The Central Role of Policies, Politics, and Profits." *Journal of Health and Social Behavior* 62(3):286–301.

Page-Tan, Courtney, and Tanya Buhler Corbin. 2021. "Protective Policies for All? An Analysis of COVID-19 Deaths and Protective Policies among Low-, Medium-, and High-Vulnerability Groups." *Disasters* 45(S1):S119–45.

Pan, Wei, Yasuo Miyazaki, Hideyo Tsumura, Emi Miyazaki, and Wei Yang. 2020. "Identification of County-Level Health Factors Associated with COVID-19 Mortality in the United States." *Journal of Biomedical Research* 34(6):437–45.

Phelan, Jo C., Bruce G. Link, and Parisa Tehranifar. 2010. "Social Conditions as Fundamental Causes of Health Inequalities: Theory, Evidence, and Policy Implications." *Journal of Health and Social Behavior* 51(1_Suppl.):S28–40.

Porteny, Thalia, Laura Corlin, Jennifer D. Allen, Kyle Monahan, Andrea Acevedo, Thomas J. Stopka, Peter Levine, et al. 2022.

"Associations among Political Voting Preference, High-Risk Health Status, and Preventative Behaviors for COVID-19." *BMC Public Health* 22:225.

Putnam, Robert D. 2000. *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon & Schuster.

Rupasingha, Anil, Stephan J. Goetz, and David Freshwater. 2006. "The Production of Social Capital in US Counties." *Journal of Socio-economics* 35(1):83–101.

Schrecker, Ted, and Clare Bambra. 2015. *How Politics Makes Us Sick: Neoliberal Epidemics*. New York: Palgrave Macmillan.

Sehgal, Neil Jay, Dahai Yue, Elle Pope, Ren Hao Wang, and Dylan H. Roby. 2022. "The Association between COVID-19 Mortality and the County-Level Partisan Divide in the United States." *Health Affairs* 41(6):853–63.

Sun, Yue, Kent Jason G. Cheng, and Shannon M. Monnat. 2022. "Rural-Urban and Within-Rural Differences in COVID-19 Mortality Rates." *Journal of Rural Social Sciences* 37(2):Article 3.

Sun, Yue, and Shannon M. Monnat. 2022. "Rural-Urban and Within-Rural Differences in COVID-19 Vaccination Rates." *Journal of Rural Health* 38(4):916–22.

Tan, Shin Bin, Priyanka deSouza, and Matthew Raifman. 2022. "Structural Racism and COVID-19 in the USA: A County-Level Empirical Analysis." *Journal of Racial and Ethnic Health Disparities* 9(1):236–46.

U.S. Census Bureau. 2022. "American Community Survey (ACS)." Retrieved May 5, 2022. https://www.census.gov/programs-surveys/acs.

USA Facts. 2020. "US COVID-19 Cases and Deaths by State." Retrieved May 5, 2022. https://usafacts.org/visualizations/coronavirus-covid-19-spread-map/.

USDA ERS (U.S. Department of Agriculture Economic Research Service). 2020. "Rural-Urban Continuum Codes." Retrieved May 5, 2021. https://www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx.

Zhang, Charlie H., and Gary G. Schwartz. 2020. "Spatial Disparities in Coronavirus Incidence and Mortality in the United States: An Ecological Analysis as of May 2020." *Journal of Rural Health* 36(3):433–45.

Zhang, Xue, Mildred E. Warner, and Mary Grant. 2022. "Water Shutoff Moratoria Lowered COVID-19 Infection and Death across U.S. States." *American Journal of Preventive Medicine* 62(2):149–56.

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