A Geography of Risk: Structural Racism and COVID-19 Mortality in the United States

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Running Head: Structural Racism and COVID-19 Mortality in the US

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ABSTRACT

Coronavirus disease 2019 (COVID-19) is disproportionately burdening racial and ethnic minority groups in the US. Higher risks of infection and mortality among racialized minorities are a consequence of structural racism, reflected in specific policies that date back centuries and persist today. Yet, our surveillance activities do not reflect what we know about how racism structures risk. When measuring racial and ethnic disparities in deaths due to COVID-19, the CDC statistically accounts for the geographic distribution of deaths throughout the US to reflect the fact that deaths are concentrated in areas with different racial and ethnic distributions than that of the larger US. In this commentary, we argue that such an approach misses an important driver of disparities in COVID-19 mortality, namely the historical forces that determine where individuals live, work, and play, and consequently determine their risk of dying from COVID-19. We explain why controlling for geography downplays the disproportionate burden of COVID-19 on racialized minority groups in the US. Finally, we offer recommendations for the analysis of surveillance data to estimate racial disparities, including shifting from distribution-based to risk-based measures, to help inform a more effective and equitable public health response to the pandemic.

Keywords: COVID-19, mortality, health status disparities, structural racism, residential segregation, public health surveillance

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In recent months, it has become clear that coronavirus disease 2019 (COVID-19) is disproportionately burdening racial and ethnic minority groups in the US. The COVID Tracking Project, a volunteer organization launched from *The Atlantic*, has analyzed data reported by state health departments and found evidence of a racial or ethnic disparity in the burden of confirmed cases or deaths due to COVID-19 – defined as the percentage of cases or deaths in a given racial or ethnic group exceeding the group's share of the population by at least 33% – in 48 states as of September 30th (1). For example, 14% of the population of Illinois identifies as Black or African American, but this group accounts for an estimated 19% of confirmed cases and 27% of deaths from COVID-19. In North Carolina, 9% of the population is of Hispanic origin, but this group represents an estimated 35% of confirmed cases and 10% of deaths due to COVID-19. In New Mexico, 9% of the population identifies as Indigenous, but this group has suffered an estimated 33% of confirmed cases and 54% of deaths from COVID-19. These percentages are estimates because not all local health departments collect and report data on race and ethnicity. We currently have data on race and ethnicity for 74% of confirmed cases and 96% of deaths in Illinois, for 79% of cases and 95% of deaths in North Carolina, and for 94% of cases and 86% of deaths in New Mexico.

Lawmakers, researchers, reporters, and health professionals began calling attention to emerging racial disparities early in the pandemic, and they highlighted the need for adequate data on the differential burden of the pandemic by race and ethnicity (2–8). Yet, the fact that the pandemic has had vastly different impacts on different parts of the country begs the question: what methodological approach should we use to estimate the magnitude of racial and ethnic disparities at the national level? The approach used by the Centers for Disease Control (CDC) is to statistically account for the geographic distribution of COVID-19 deaths throughout the US, to

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reflect the fact that COVID-19 is concentrated in areas with different racial and ethnic distributions than that of the larger US (9). As Tori Cowger and colleagues recently pointed out, this approach underestimates the magnitude of racial inequities in the risk of dying from COVID-19 (10). When controlling for place, one can only estimate the average differences in mortality that exist between racial and ethnic groups *living in the same places*. Such differences do not fully capture the disproportionate burden of disease on racialized minorities, because part of that disproportionate burden operates through differences in geography. The places where people live, which are in large part determined by their race and ethnicity, are strongly predictive of their risk of contracting and dying from COVID-19. Therefore, controlling for place downplays racial and ethnic disparities in the burden of COVID-19 deaths in the US. In this commentary, we explain *why* and *how* controlling for geography downplays the disproportionate burden of COVID-19 on communities of color in the US. We recommend an alternative approach that focuses on comparing risks across groups rather than comparing the racial distribution of deaths to the racial distribution of the population. Finally, we consider the broader implications of our argument against controlling for population characteristics such as geography for future analyses of racial health disparities.

COVID-19 is the latest in a long line of infectious diseases that have disproportionately burdened racialized minority communities in the US (11–15). The heightened susceptibility of racialized minorities to these diseases is neither biological nor coincidental; rather, it is evidence of *structural racism*. As defined by Dr. Zinzi Bailey et al. (2017), structural racism describes the collective ways in which racial discrimination is cultivated in societies through "mutually reinforcing inequitable systems" that are interconnected, historically rooted, and culturally bolstered (16). Many inequitable systems have worked together to produce infectious disease

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disparities by determining where individuals can live, work, and play, engineering communities of color that are at higher risk of exposure to pathogens, higher risk of infection once exposed, and higher risk of death once infected. We can trace the mechanisms producing such disparities to specific federal, state and local policies enacted throughout the history of the US. Some of those policies, such as land dispossession and forced relocation to reservations of Indigenous Americans and the kidnapping and enslavement of Africans, date back centuries and have effects that persist today (17–20). Others are more recent, such as redlining, which created segregated neighborhoods and diverted public resources away from minority communities (21).

The effects of redlining include reduced access to quality education, employment, and healthcare, (22). Despite being formally abolished by the Civil Rights Act of 1968, redlining continues through predatory lending and disinvestment in the neighborhoods where racialized minorities live and work, practices that maintain poor housing and working conditions and are thus associated with greater risk of infectious disease transmission (23). For example, employment opportunities for Black and Latinx people have historically been concentrated in the service and agricultural industries, where they hold lower-paying jobs, are less likely to have health insurance, and are more likely to be exposed to infectious diseases like COVID-19 (24,25). Redlining also continues to be enacted through unequal policing and punitive practices that put racialized minorities at higher risk of incarceration, and thus at higher risk of exposure to COVID-19 (26,27).

Other policies that have shaped racial health inequities include the differential application of environmental regulations, resulting in poorer air quality in minority communities with implications for both community transmission and individual susceptibility to COVID-19 (28,29). The lack of safe recreational spaces, proliferation of food deserts, and disruption of

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traditional diets through the promotion of commodity foods have all led to higher rates of chronic diseases like hypertension and cardiovascular disease, which are associated with worse outcomes from COVID-19 (30). Indigenous and other racialized minority communities are more likely to lack running water due to the discriminatory practices embedded in federal infrastructure development initiatives, making handwashing to limit disease spread challenging (31). Residents of minority communities are more likely to rely on public transportation to travel to work and to meet their basic needs, such as food and water, during a pandemic (32,33). They are also less likely to live near a SARS-CoV-2 testing site (34,35) and more likely to experience a lower standard of medical care should they require treatment for COVID-19 (36).

Through such policies and practices, we have institutionalized a double standard of health, implicitly affirming that some lives matter less than others. In light of this history, the disproportionate impact of COVID-19 on racialized minority communities in the US can be properly understood as a direct consequence of racism, which Dr. Camara Jones, Past President of the American Public Health Association, describes as "a system of assigning value based on the social interpretation of how one looks" that "unfairly disadvantages some individuals and communities, unfairly advantages other individuals and communities, and saps the strength of the whole society through the waste of human resources" (37). One of the most powerful mechanisms through which racism operates is the structuring of physical space. Policies that instituted reservations and sanctioned redlining, that concentrated the agricultural industry in certain towns and not others, that funded water and sanitation projects in some counties and not others, that "revitalized" some neighborhoods and not others, have created a *geography of risk*, effectively drawing the map for the spread of COVID-19.

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Accordingly, our national public health response to the ongoing pandemic requires data on racial and ethnic disparities that properly incorporate the effects of geography on the burden of COVID-19. While estimating racial and ethnic differences in COVID-19 *infections* is currently difficult due to differential testing rates and gaps in the reporting of test results by race and ethnicity, we do know the race and ethnicity of approximately 95% of US residents who have died from COVID-19 (38). As of September 30th, the health departments of all 50 states and the District of Columbia report COVID-19 deaths by race and ethnicity; 36 states and the District of Columbia have reported race and ethnicity for at least 85% of deaths due to COVID-19 (1). Race and ethnicity are also routinely recorded on death certificates, which are reported to the National Vital Statistics System at the National Center for Health Statistics (NCHS), a division of the Centers for Disease Control (CDC).

Using these death certificate data, the NCHS reports the percent of total COVID-19 deaths that occurred in each major racial and ethnic group in the US (Table 1). For comparison, they present the percent of the total US population represented by each racial and ethnic group. For example, 51.3% of COVID-19 deaths occurred among non-Hispanic Whites, who represent 60.1% of the total population of the US. However, the NCHS advises against comparing these two percentages to determine whether certain racial and ethnic groups are experiencing a disproportionately high or low burden of deaths due to COVID-19. Their rationale is that such a comparison does not adequately account for the fact that the racial and ethnic distribution of the places hardest hit by COVID-19 is different from that of the entire US. To address this issue, they encourage comparison to a *weighted* population distribution that better reflects the racial and ethnic composition of the places reporting the most deaths due to COVID-19. To construct the weighted population, each individual living in the US is multiplied by the total number of

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COVID-19 deaths that have occurred in his or her county. That is, someone living in a county with zero COVID-19 deaths, like Yancey County, NC would not appear in the weighted population, and someone living in a county with multiple COVID-19 deaths would appear in the weighted population multiple times – thousands of times in the case of counties like Los Angeles County, CA, Cook County, IL and Kings County, NY. Thus, the racial and ethnic distribution of the weighted population is skewed to look more like the racial and ethnic makeup of areas that have suffered many more deaths from COVID-19, like LA, Chicago, and New York (10). As a result, while Blacks and Latinxs represent a combined 31.0% of the *actual* US population, they make up 47.6% of the weighted population (Table 1). Conversely, while non-Hispanic Whites represent 60.1% of the actual US population, they represent only 40.2% of the weighted population due to their under-representation in the areas hardest hit by COVID-19.

Controlling for geography may seem appealing because geography is both associated with race and strongly predictive of mortality. However, to do so is to assert that the geographic distribution of racial and ethnic minority populations throughout our country is not an important component of racial disparities in COVID-19. Such an assumption is problematic and harmful because it discounts the ways in which structural racism, vis-a-vis policies of residential segregation, etc., determines where individuals live and work, and thus determines their risk of death due to COVID-19. We know that racialized minority communities were largely established in certain places and not others as a matter of discriminatory policies and practices, not purely preference or chance. Therefore, controlling for geography through methods such as weighting, standardization or regression adjustment dangerously understates the total racial disparity in deaths due to COVID-19.

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A parallel argument can be made against reporting age-standardized estimates of racial disparities in mortality. It may seem natural to control for age, a characteristic that is both associated with race and strongly predictive of mortality. However, racial and ethnic differences in the distribution of age, similar to differences in the distributions of geography, socio-economic status, and countless other population characteristics, are shaped by structural racism. When we control for such differences through standardization or weighting, we maintain that they are not important components of racial disparities in COVID-19. If we instead acknowledge that the age distributions of different racial and ethnic groups are not random, but rather have been shaped by historical and contemporary social processes such as discriminatory immigration policies and repeated exposure to environmental stressors (39), then we must consider age differences as an important component of racial disparities in COVID-19. In other words, if we want to learn about the racial disparities that exist in our current population, rather than in a hypothetical population where all racial groups have the same age distribution, then we should not control for age.

While controlling for geography through weighting is not common in the health disparities literature, some researchers have adjusted for geography when studying racial disparities in health outcomes such as diabetes and hospital stays (40,41). Davis et al. make the case that estimates adjusted for geography, when compared to unadjusted estimates, can help us disentangle the factors that contribute to racial disparities in a given health outcome. However, these authors acknowledge that "it may be inappropriate to control for geographic confounding when estimating disparities, as this would remove part of the disparity effect" (40, p.15).

If the goal of adjusting for geography is not to assess national-level racial disparities in mortality, but rather to assess racial disparities in mortality among people *exposed* to COVID-19,

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weighting by total county-level deaths remains problematic because it imposes the assumption that exposure is determined by county-level factors shared by all racial and ethnic groups, and additionally that risk of death once exposed does not vary by race or ethnicity. We know that many of the underlying factors that affect exposure to COVID-19, such as living conditions, occupation, workplace policies, household composition, and incarceration vary systematically by race and ethnicity even within counties. We also know that the risk of developing serious illness or dying after exposure to COVID-19 likely varies by race and ethnicity due to differences in testing rates, access to healthcare, quality of medical treatment, and underlying health conditions (42). Thus, whether the intent of controlling for geography is to measure racial disparities in the population burden of mortality or to isolate racial disparities in mortality among people exposed to COVID-19, doing so hides the history of structural racism that puts racial and ethnic minoritites at higher risk of health threats like COVID-19.

To more comprehensively measure disparities in COVID-19 mortality, we propose that the racial and ethnic distribution of COVID-19 deaths instead be compared to the actual racial and ethnic distribution of the US. For example, while Black Americans make up 12.5% of the US, they have suffered 20.8% of deaths due to COVID-19. The fact that Black individuals tend to live in the cities hardest hit by COVID-19 is an important reason for that disparity, one that we should draw attention to rather than adjust away. The proportion of deaths among Latinx people also exceeds their share of the population, at 21.3% vs.18.5%. Indigenous people represent 0.7% of the population, but 1.0% of deaths due to COVID-19. Conversely, the proportion of deaths among Whites is lower than their share of the population by 8.8%.

Comparing the racial and ethnic distribution of deaths to the racial and ethnic distribution of the population is one approach to estimating racial disparities in mortality. Such an approach

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is simple and effective at communicating the direction and magnitude of disparities, when disparities are defined as differences in the risk of mortality between a given racial or ethnic group and the total population. However, an approach based on comparing distributions hides the underlying risks of mortality in each racial and ethnic group. An alternative to a distribution-based approach is a risk-based approach that directly estimates and compares risks of death across racial and ethnic groups. For example, the risk of dying from COVID-19 in the first 9 months of 2020 was 9.8 deaths per 10,000 people among non-Hispanic Blacks, and 5.0 deaths per 10,000 people among non-Hispanic Whites (Table 2). That is 1 in 1,020 Black people and 1 in 2,000 White people died of COVID-19 in the first 9 months of 2020. The 9-month risk of death was also higher among Latinx (6.8 per 10,000) and Indigenous (7.9 per 10,000) people compared to Whites; the risk was slightly lower among Asians (4.2 per 10,000). Both a distribution-based approach and a risk-based approach to estimating racial disparities require the same data on deaths and population size that are already being collected and reported by the NCHS. A risk-based approach has the added benefit of communicating the magnitude of the burden of disease in the population, in addition to the direction and magnitude of the disparities themselves.This approach can easily be extended to estimate place- or age-specific risks, which are arguably more useful as guides for resource allocation than the place- and age-specific distributions of deaths by race and ethnicity that are currently reported by the NCHS (9).

Finally, while the focus of this commentary has been on national-level racial disparities, analyses of national-level disparities should not preclude us from identifying and remedying disparities at the state and local levels. In fact, national-level analyses may conceal stark local disparities. We also know from prior studies of racial disparities in mortality that geography matters differently for different racial and ethnic groups (43). The NCHS currently provides data

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on COVID-19 deaths by race and ethnicity for 47 states and the District of Columbia. Based on these data, both the overall risk of death from COVID-19 and racial disparities in the risk of death vary substantially from state to state (Table 2). For example, in New York as of September 30th, the overall 9-month risk of death was 16.6 deaths per 10,000, and Blacks experienced the highest risk of death with a 9-month risk of 26.3 deaths per 10,000. In Iowa, the overall 9-month risk of death was 4.1 per 10,000, and Indigenous Americans experienced the greatest 9-month risk of death at 15.5 deaths per 10,000. Moreover, risk does not always color inside administrative boundary lines. For example, 1 in 313 residents of the Navajo Nation, which spans parts of New Mexico, Arizona and Utah, died from COVID-19 in the first 9 months of 2020 – a risk of 32.0 deaths per 10,000 (44). One approach to reducing racial disparities in the burden of COVID-19 is to identify and concentrate resources in geographic areas that have higher concentrations of minority populations and have been historically underfunded, like the Navajo Nation. Monitoring progress toward reducing the burden of COVID-19 in those areas requires local surveillance data, the collection and analysis of which should be done carefully and in consultation with stakeholders from racialized minority communities in order to avoid unintended consequences, such as stigma and discrimination against specific racial and ethnic groups in response to their (perceived) greater vulnerability to COVID-19 (45).

While surveillance data are an important tool for identifying and monitoring racial disparities, such data are subject to limitations. A central concern when analyzing death certificate data is the potential for misclassification bias. One aspect of misclassification bias is systematic error in the measurement of race and ethnicity on death certificates, which may be differential by race, ethnicity, and geography, and is particularly pronounced for Indigenous Americans (46,47). Another aspect of misclassification bias is the differential classification of

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causes of death by race and ethnicity, which likely varies by geography and over time, especially in the case of an emerging disease like COVID-19 (48). In addition to misclassification, there may also be differential lag times in the reporting of death certificate data to the NCHS. The quality of the data we collect, like the methods we use to analyze them, is of fundamental importance to public health efforts to reduce health disparities. Accordingly, we hope these limitations will soon be addressed through improved data collection and management as our response to the pandemic continues to evolve.

As public health professionals, we have an ethical obligation to pursue health justice and equity and to ensure that our activities do not exacerbate health inequities (49). In light of this obligation, we must consider how our research methods themselves are value-laden, how the methodological choices and assumptions we make can either serve to *unveil* or *reproduce* health inequities (50). We must recognize that how we choose to collect and analyze surveillance data involves technical choices that have profound implications for both the questions that we are able to answer and the actions taken as a result of those answers (51). When estimating racial disparities in deaths due to COVID-19, controlling for geography may jeopardize the public health response by underestimating disparities and (mis)directing funding away from the vulnerable communities most affected by COVID-19.

Looking forward, analyses of racial and ethnic disparities in COVID-19 mortality should be grounded in an understanding of *how* racial health inequities are produced in the US. Important methodological choices should be guided by conceptual frameworks that reflect how health risks and health-promoting resources are distributed in our population (52). With a focus on identifying and acknowledging the social forces that shape population health, we can learn about the current racial and ethnic distribution of COVID-19 mortality in the US, not as an

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accident, nor as the result of differences in biological susceptibility to COVID-19, but rather as a result of entrenched racist policies and practices. Without this context, the field of public health risks becoming complicit in the perpetuation of systems that reinforce structural racism.

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Table 1. Population Burden of COVID-19 Mortality in the United States by Race/Ethnicity as of September 30, 2020[a]

Indicator	Non-Hispanic White (N=99,494)	Non-Hispanic Black or African American (N=40,334)	Hispanic or Latino (N=41,332)	Non-Hispanic Asian (N=8,019)	Non-Hispanic American Indian or Alaska Native (N=1,924)	Total[b] (N=191,103)
Distribution of COVID-19 Deaths (%)	51.3	20.8	21.3	4.1	1.0	98.5
Unweighted Distribution of Population (%)	60.1	12.5	18.5	5.8	0.7	97.6
Weighted Distribution of Population (%)[c]	40.2	15.3	32.3	9.9	0.3	98.0

COVID-19: Coronavirus Disease 2019

[a]Data from the National Center for Health Statistics (9).

[b]This table does not include deaths among individuals identified as Native Hawaiian/Other Pacific Islander or of Multiple Races. Because the National Center for Health Statistics reported deaths among those individuals together with deaths among individuals of unknown race or ethnicity as of September 30, 2020, the corresponding proportion of deaths could not be compared to the proportion of the population that is Native Hawaiian/Other Pacific Islander or of Multiple Races.

[c]The racial/ethnic distribution of each county was weighted by the total number of COVID-19 deaths in that county. Counties with no COVID-19 deaths received a weight of 0.

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Table 2. 9-Month Risk of Death from COVID-19 per 10,000 Population by Race/Ethnicity for the Period January 1 - September 30, 2020[a,b,c]

Jurisdiction	Non-Hispanic White	Non-Hispanic Black or African American	Hispanic or Latino	Non-Hispanic Asian	Non-Hispanic American Indian or Alaska Native
Alabama	6.1	9.3	3.9	2.8	
Alaska					
Arizona	5.6	5.3	7.5	3.5	23.3
Arkansas	3.6	4.9	3.8	3.5	
California	3.1	5.0	4.7	3.0	3.4
Colorado	3.1	6.2	4.0	3.8	5.4
Connecticut	13.7	18.5	7.0	3.3	
Delaware	6.5	6.4	3.3		
DC	3.3	17.2	13.7	4.3	
Florida	6.2	8.8	7.2	3.3	3.5
Georgia	5.2	7.4	3.9	2.3	
Hawaii	0.3			1.6	
Idaho	2.7		2.7		
Illinois	4.8	11.2	7.5	5.0	5.7
Indiana	5.1	10.0	3.3	2.0	
Iowa	4.1	5.2	4.0	3.8	15.5
Kansas	2.1	5.9	3.1	1.4	4.3
Kentucky	2.6	4.1	2.5	2.4	
Louisiana	8.6	14.9	5.4	4.0	5.6
Maine	1.2			0.0	0.0
Maryland	5.9	9.7	7.6	4.1	
Massachusetts	13.2	13.9	6.4	4.9	
Michigan	4.5	18.1	3.3	2.0	
Minnesota	3.5	4.9	2.7	3.2	4.8
Mississippi	7.9	11.7	3.5	3.1	52.4
Missouri	2.8	7.4	2.3	2.1	
Montana	1.1				5.7
Nebraska	2.3	3.4	4.1	2.3	
Nevada	4.1	6.5	4.9	7.2	4.6
New Hampshire	3.2		2.0		0.0
New Jersey	16.0	22.6	16.2	10.0	7.8
New Mexico	2.4		1.5		23.8
New York	11.7	26.3	21.9	13.8	
North Carolina	2.1	3.3	2.3	1.3	2.6
North Dakota	2.7				6.4
Ohio	3.6	5.4	1.8	1.8	
Oklahoma	2.8	2.7	2.0	2.2	3.4
Oregon	1.2	1.2	1.4	1.1	3.0

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Pennsylvania	6.1	12.3	4.9	4.0	
Rhode Island	11.6	9.2	5.2	5.3	
South Carolina	5.3	9.3	3.2	2.2	
South Dakota	2.3				6.3
Tennessee	2.8	5.4	3.4	1.7	
Texas	4.2	5.2	7.6	2.1	3.4
Utah	1.1		2.3	2.4	12.2
Vermont					
Virginia	3.3	5.3	3.8	2.5	
Washington	2.5	2.2	2.9	2.0	5.6
West Virginia	1.5	1.6	0.0		0.0
Wisconsin	1.8	6.2	3.5	2.2	1.9
Wyoming					
United States	**5.0**	**9.8**	**6.8**	**4.2**	**7.9**

COVID-19: Coronavirus Disease 2019; DC: District of Columbia

[a]Number of deaths based on death certificates received and coded by the National Center for Health Statistics (NCHS) as of September 30, 2020. Risks are calculated as (deaths÷population)×10,000 using Vintage 2019 US Census Population Estimates.

[b]No data were available for jurisdictions with fewer than 100 deaths received and processed by the NCHS as of September 30, 2020, including Alaska, Vermont, and Wyoming.

[c]Blank cells in jurisdictions other than Alaska, Vermont, and Wyoming represent suppressed data due to death counts between 1-9. Note that the risk among Indigenous Americans in New York is unavailable because deaths are reported separately for New York City, where the number of deaths is between 1-9.

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