Allentown's COVID-19 Case Variation by Ward: Racial and Ethnic Disparities in Early Neighborhood Caseloads.

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ABSTRACT

COVID-19 has had a disparate impact on different racial and ethnic groups throughout the United States. No local racial or ethnic data exists for Allentown, Pennsylvania, the state's third largest city. In the absence of this information, this study overlaps American Community Survey data with the only publicly released COVID-19 statistics from the Allentown Health Bureau. This study finds that only the proportion of the population identifying as Non-Hispanic Black or Latinx is significantly associated with an increase in COVID-19 cases within city wards. Economic indicators, the prevalence of health insurance, and the median age all prove insignificant. Maps are provided to show the strong overlap in cases with neighborhoods that are predominantly Black and Latinx.

Keywords: COVID-19, Racial Disparities, Allentown

INTRODUCTION

Although all people are biologically susceptible to infection by SARS-CoV-2, the virus that causes COVID-19 (Centers for Disease Control 2020), the virus has spread unevenly due to disparate conditions like healthcare capacity, government policy response, access to diagnostics, density, and adherence to public health directives, among many other factors (Roser, et. al 2020). Within the United States, the uneven impact of COVID-19 mirrors some of the preexisting inequalities in healthcare outcomes throughout the country. Data compiled by the COVID Racial Data Tracker reveals an over-representation of cases and deaths by racially and ethnically marginalized groups in virtually every US state and territory (COVID Tracking Project and the Antiracist Research and Policy Center 2020). Racial and ethnic data related to COVID-19 relies on proper gathering and reporting by local hospitals, health agencies, and governments. At this moment, it remains a patchwork, particularly relating to the reporting of Hispanic ethnicity.

Allentown, Pennsylvania's third largest city, has one of the highest case rates per capita in the commonwealth at 1 case per 59 residents (Allentown Health Bureau 2020). At the time of this writing, Allentown's cases per capita was 3.5 times greater than the state's, and larger than both the cases per capita in Philadelphia and Pittsburgh (Pennsylvania Department of Health 2020). There is no local reporting of cases or deaths by race or ethnicity. This paper looks to fill gaps in that knowledge by assessing the only public data for the City of Allentown, cases by city ward, according to racial and ethnic composition of those wards.

I use social and economic data through the American Community Survey (ACS) to explore why some wards in Allentown are hit particularly hard. According to data published by the American Communities Project through Brown University, Allentown has moderate levels of residential segregation as assessed by the Index of Dissimilarity and Isolation Index (American Communities Project 2014). This is borne out in racial and ethnic data through the ACS where many center city neighborhoods are composed of predominantly Latinx and non-Hispanic Black residents while the city's wealthier west end is composed of predominantly non-Hispanic Whites.

I employ a multiple linear regression using covariates informed by the social determinants of health (SDOH) to assess what factors of neighborhood composition are most important for predicting the case rates in each ward. The percentages of the population identifying as Non-Hispanic Black or Latinx in each ward are the only variables that are statistically connected to an increase in cases per 1,000 residents. The percentage of the

population without health insurance, the median income, the poverty rate, educational attainment, housing tenure, and median age were all assessed and proved insignificant contributors.

RACIAL INEQUALITY IN COVID-19

Structural racism in America's healthcare system, and in overall health outcomes, is well documented (Penner, et. al. 2010, 436–40; Lukachko, et. al. 2014, 42–50; Feagin and Bennefield 2014, 7–14). Racially and ethnically marginalized people suffer from major chronic disease at rates 1.5 to 2.0 times higher than Whites in America (Price, et. al. 2013, 1–12). Black Americans have higher rates of mortality than do Non-Hispanic Whites, though mortality is lower for Latinx and Asian Americans (National Academies of Science 2017, 57-98). Disturbingly, racial and ethnic disparities in mortality have been increasing across multiple age groups in recent years (Gennuso, et. al. 2019, 585–91). These disparities are thought to be driven by some interaction of discrimination, social and economic access to resources and healthcare, and cultural practices and trust in institutions (Egede 2006, 667–9).

These intersecting social and economic conditions have already proved to be substantial determinants of outcomes in localities where more demographic data has been announced. Laster Pirtle (2020) argues that racial capitalism is the fundamental cause of the overrepresentation of Black death reported in Detroit, Michigan. She contends that preexisting inequalities from racial capitalism render Black Detroiters uniquely vulnerable to underlying health conditions that are compounded by COVID-19, the social situations that precipitate its transmission like homelessness and residential segregation, and to a lack of access to resources that could ameliorate spread.

Yancy (2020, 1891–92) argues that the SDOH are a complex equation that explain racial disparities in COVD-19 mortality as seen in Chicago, Louisiana, Michigan and New York. He contends that these social and economic factors must be considered for a just response. An analysis conducted by the Washington Post found that majority-Black counties have infection rates three times higher, and mortality rates six times higher, than majority-White counties (Thebault, et. al. 2020). The analysis reports the disparities within political subdivisions as well, with places like Milwaukee, Washington D.C., Illinois, North Carolina, Florida, and Connecticut all reporting an overrepresentation of Black mortality. This is seen in other racially and ethnically marginalized communities throughout the country such as native Navajo Nation, which now suffers from a higher COVID-19 infection rate than anywhere in the United States (Silverman et. al. 2020).

SOCIAL DETERMINANTS OF HEALTH

The World Health Organization formed the Commission on the Social Determinants of Health (CSDH) in 2005 to support countries and NGOs in addressing health inequities caused by social and economic conditions throughout the world (World Health Organization 2008). One of the commission's primary

findings was that inequitable distribution of power, money, and resources was responsible for a large gap in global health outcomes. The commission spurred a widespread emphasis on addressing health outcomes through civil society and social improvements for researchers and practitioners alike (Braveman and Gottlieb 2014, 19–31; Niederdeppe, et. al. 2008, 481–513; Kennedy 2013, 155–162). In 2010, amidst increased focus on the SDOH, the United States Office of Disease Prevention and Health Promotion laid out "a new focus on societal determinants of health" for the Health People 2020 initiative through the Department of Health and Human Services (Secretary's Advisory Committee on National Health Promotion and Disease Prevention 2010). Healthy People 2020's framework for the SDOH includes five key areas: economic stability, education, social and community context, health and health care, and neighborhood and built environment (Healthy People 2020).

This study uses the SDOH to explore why COVID-19 case rates vary so dramatically across different neighborhoods within Allentown. I test variables from each of these five areas to see their predictive value on the wards' cases. Poverty and median income are the variables for economic stability. Residents of lower income and higher poverty neighborhoods are at increased risk of chronic disease (Braveman, et. al. 2010) and lowered life expectancy (Singh and Siahpush 2006, 969–79). The percentage of the population with at least a high school degree is the variable for the education key area. Higher educational attainment is associated with better physical health independent of access to and use of healthcare (Kaplan et. al. 2017, 598–608). The variable chosen from the social and community context key area is the portion of the population that identifies as Latinx or Non-Hispanic Black. As mentioned earlier, racial and ethnic minorities suffer from higher rates of chronic conditions and generally worse health outcomes in the United States (Price et. al. 2013; Lukachko et. al. 2014, 42–50). Insurance rates are the variable for the health and healthcare key area. Having health insurance is consistently shown to increase the usage of healthcare services, improve health outcomes, and decrease mortality (Freeman, et. al. 2008, 1023–32). Finally, the housing tenure of the neighborhood is the variable selected for the neighborhood and built environment key area. Poor housing quality is associated with higher rates of chronic disease and poor mental health (Hwang, et. al. 1999, 57-75; Kruger, et. al. 2007, 261–71). Rohe, et. al. (2001, 8-11) review the available literature to find that neighborhood quality is highly associated with homeownership rates, and that homeownership is associated with better physical health, though the literature struggles to disentangle homeownership from confounding variables of wealth and neighborhood condition.

METHODOLOGY

Data from Allentown's Health Bureau on COVID-19 cases by city ward, taken on May 15th, 2020, is compared with statistics from the ACS. While the Census Bureau reports data by ward, the most recent figures are from the 2010 decennial census. Instead, I use block group data from the 2018 ACS and sort the groups into wards. Most block groups lay entirely within a ward.

For the few that straddle multiple wards, I assign the group to the ward in which it is most situated. Aggregate data was taken from Allentown's 86 block groups and sorted into the 19 city wards. A multiple linear regression was run to find beta coefficients for eight independent variables from the SDOH plus median age – chosen due to the general severity in older populations influencing who gets priority testing and thus would become an identified case. The final model omits median household income, median age, high school graduation, and poverty because they prove far from significant when tested alone and are too highly correlated with other variables. Residuals were plotted against fitted values to reveal general random congruity around the mean and low levels of heteroscedasticity, confirmed with a Breusch-Pagan test. Variance inflation factors were assessed and showed low levels of multicollinearity. The model proved significant to the 99% level.

Maps of Allentown's cases by population identifying as Non-Hispanic Black and Hispanic are included. These were produced using ArcGIS software and the same data sets underlying the regression analysis.

RESULT

As of May 15th, 2020, Allentown has reported 2,058 COVID-19 cases. Variables informed by the SDOH plus median age were analyzed to see which predictors were statistically associated with cases per 1,000 residents (Table 1).

Table 1 - Descriptives

Variable	N	Mean	SD	SE
Cases per 1,000		17.54	8.27	1.9
Population Non-Hispanic Black	19	11.47	6.56	1.5
Population Hispanic		54.21	16.81	3.86
Population Uninsured		12.07	3.99	0.92
Homeowner ship Rate		39.16	2132	4.89

Only the percentages of the population that identified as Non-Hispanic Black or Latinx are statistically significant. City wards that have a higher proportion of people identifying as Latinx or Non-Hispanic Black are positively associated with a higher number of COVID-19 cases (Table 2).

Table 2 - Cases per 1,000 Residents

N	Adjusted R²	Model Sig.	
19	0.4956	0.008	

Independent Variable	Coefficient	Standard Error	p>|t|
Population Non-Hispanic Black ***	0.92	0.223	0.001
Population Hispanic **	0.321	0.126	0.024
Population Uninsured	-0.227	0.45	0.622
Homeownership Rate	0.133	0.095	0.182
Constant	0.016	10.671	0.247

*90% confidence; **95% confidence; ***99% confidence

The percentage of the population identifying as Non-Hispanic Black in a city ward is strongly associated with increased prevalence of diagnosed COVID-19 cases (Figure 1). This association is less strong, but still present for percentage of the track identifying as Hispanic (Figure 2). Remarkably, neither variable for the economic characteristics of the wards proves close to significant. Nor does the insurance rate of the ward.
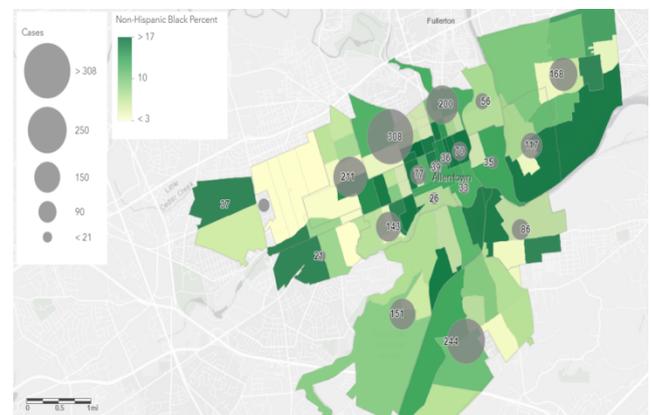

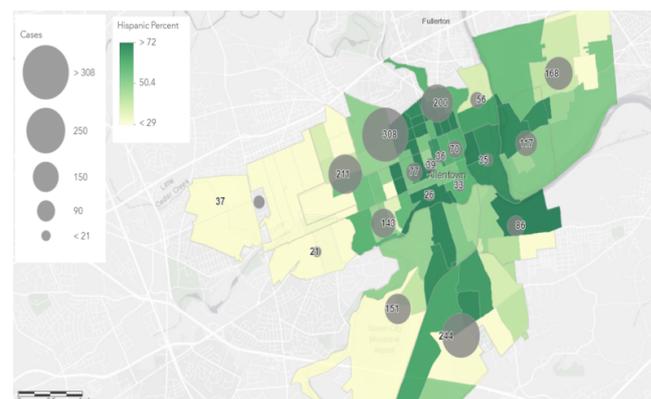**Figure 1** – COVID-19 Cases by Population Percentage Non-Hispanic Black

Figure 2 – COVID-19 Cases by Population Percentage Latinx

DISCUSSION

While neighborhood data cannot leverage the question of racial and ethnic disparities in COVID-19 cases perfectly, it is important in the absence of locally reported patient data. Allentown is a moderately racially and ethnically segregated city. Within the city limits, neighborhoods drastically vary in economic wellbeing, generally along racial and ethnic lines (American Community Survey 2014-2018). Non-Hispanic White median household income was $47,770 in 2018. That same year, the median incomes for Latinx and non-Hispanic Black households were $35,619 and $37,103, respectively. Likewise, non-Hispanic Whites had a poverty rate across the city of 18.7% in 2018. Meanwhile, the poverty rates for Latinx and Non-Hispanic Black residents were 27.1% and 22.9%, respectively. There are clear disparities in economic resources by race and ethnicity in Allentown. And yet, despite the levels of segregation and disparities in resources, economic indicators do not seem to be predictive of neighborhoods experiencing heavy COVID-19 caseloads. There is something unique to race and ethnicity driving this disparity.

One possible explanation not captured in the model is the rates of underlying health conditions that are associated with more severe COVID-19 responses. The CDC recognizes several conditions as high-risk for severe COVID-19 illness including, but not limited to, diabetes, serious heart conditions, severe obesity, and moderate to severe asthma (Centers for Disease Control 2020). Local hospitals in the Allentown area have, or have had, policies to only test those at higher risk (Huang 2020). Different races and ethnicities experience these diseases at different rates – not disconnected from the SDOH – like Non-Hispanic Blacks suffering the highest rates of heart disease in America (Centers for Disease Control 2019). Yet, there is also a systematic underdiagnosis of some of these comorbidities in racially and ethnically marginalized communities (Muncan 2018, 1-11; Sumner 2009, 7-11). Therefore, if documented risk is a precondition to testing and the epiphenomenal interventions to stop viral transmission, underdiagnosis could contribute to delayed or completely missed opportunities to intercede in community spread among Non-Hispanic Black and Latinx households.

Another plausible explanation is the density of living arrangements in neighborhoods that have higher percentages of Non-Hispanic Black and Latinx residents. Decennial census data from 2010 shows that the average Non-Hispanic White led household in Allentown had 2.31 occupants. Meanwhile Non-Hispanic Black led households had 3.03 and Latinx led households had 3.45 occupants.

Additionally, the primary occupations of different wards might have an effect. According to national data through the Bureau of Labor Statistics for 2018, 41% of workers identifying as White worked in a managerial or professional job (Bureau of Labor Statistics 2018). Meanwhile, only 31% of workers who identified as Black and 22% of workers who identified as Latinx worked in managerial or professional jobs. Likewise, 16% of White workers

were in service jobs while 24% of both Black and Latinx workers were. These varying industries involve different levels of risk to exposure of SARS-CoV-2 with managerial and professional jobs being more easily conducted from home at decreased risk for infection. Conversely, service jobs are harder to conduct in safer socially-distant ways. Furthermore, White workers have more access to paid sick leave and paid leave to care for a sick family member than both Black and Latinx workers (Bureau of Labor Statistics 2019). The differential rates of exposure due to the primary occupations of these wards, based on the way racial groups have access to different education and employment, could contribute to the disparate cases by neighborhood.

Some dynamic is contributing to increased cases in neighborhoods with higher populations of Black and Hispanic or Latino residents. Interestingly, while the literature often cites economic explanations for health disparities, this analysis found two primary economic indicators, median household income and poverty, to be insignificant predictors of wards' case rate. Likewise, wards' insurance rates and homeownership rates also proved insignificant. Indeed, only race and ethnicity could explain the disparate rates. This is likely due to manifold and highly interlocking ways that social and economic conditions work to disenfranchise and disadvantage communities of color.

The model is only as good as the data available. In this case, that public data is extremely limited. Public health officials in Allentown ought to release data that is more demographically and economically detailed, without personally identifying the cases and deaths to respect privacy, so that the city and other organizations can respond to the crisis accurately and with the equitable lens that is required.

CONCLUSION

While all people are susceptible to SARS-Cov-2, it has impacted certain communities particularly hard. Throughout the country, Black residents have suffered disproportionate rates of infection and death. There is no data publicly available to tell if this is true for Allentown, the third largest city in Pennsylvania. Using the only data made public through the Allentown Health Bureau, this study looks to explain why certain wards of the city are more impacted than others. Of the variables informed by the Social Determinants of Health, only race and ethnicity are significantly associated with an increase caseload by ward. The neighborhoods in Allentown that have higher percentages of Black and Latinx residents are the ones that are particularly impacted. These findings should help the city and other organizations steer their resources in a race-informed manner to eliminate infection inequities and motivate local health authorities to provide more detailed data to improve the collective response to this ongoing health crisis.

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