

Environmental Health Disparities and COVID-19: How air pollution is worsening outcomes for Black communities in Cancer Alley

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Background

- Several studies have been conducted to determine how air pollution affects an individual's risk of contracting and dying from Coronavirus Disease 2019 (COVID-19).
- Known risk factors such as hypertension, diabetes, cardiovascular disease, and respiratory system diseases are all exacerbated by chronic exposure to atmospheric contamination.
- PM 2.5 (Particulate Matter 2.5) can lodge deep in the lungs and bloodstream and serve as a carrier for other chemicals. It can lead to illnesses that make COVID-19 deadlier.
- Long-term exposure to PM 2.5 increases an individual's risk of hypertension, diabetes, and respiratory diseases, and an increase in long-term PM 2.5 exposure is associated with an increase in COVID-19 mortality.
- This effect has already been observed in Italy. Although the population of Italy trends older, it was shown that those who lived in regions with poor air quality had worsened COVID-19 outcomes.

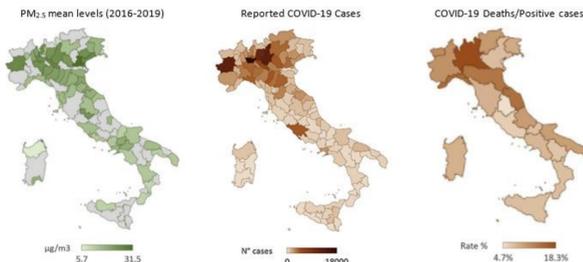


Fig. 1: PM_{2.5} levels in Italy, reported COVID-19 cases and deaths/positive cases.

Cancer Alley

- Like Italy, a similar effect may also be occurring in "Cancer Alley," an area along the Mississippi River in Louisiana with over 150 petrochemical facilities. The industrial plants along this area release more than 30,000 tons of PM 2.5 annually creating an environmental injustice on this population.
- Residents of the 85-mile stretch of Cancer Alley are mostly low-income Blacks, and according to the Environmental Protection Agency (EPA) have a higher risk of getting cancer from polluted air than >95% of the US population.
- Areas with a higher number of COVID-19 and high morbidity and mortality rates have a higher percentage of Blacks, demonstrating the disproportionate impact the virus has on Black communities.
- The disproportionate burden of COVID-19 deaths on racial minorities is in part attributable to adverse environmental conditions such as air pollution, which can also lead to an increased risk of chronic health conditions such as diabetes and hypertension.

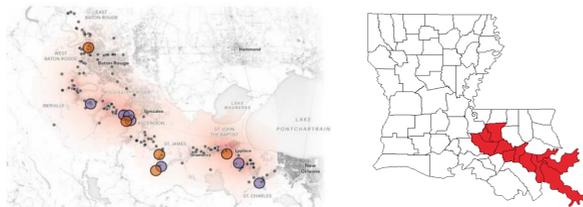


Fig. 2: Air pollution in Cancer Alley. The circles represent plants.

Methods

- The COVID-19 cases and deaths for the 11 Louisiana parishes along the Mississippi River and the state of Louisiana were gathered from the Louisiana Department of Health on June 14th, 2020.
- Case, death, and case fatality rates of the parishes were calculated and compared to that of the entire state of Louisiana.
- The relative risk ratios, which measure the outcome of one group compared to another, was calculated for cases and deaths for the 11 parishes and compared to the remaining 53 Louisiana parishes. Additionally, we determined the relative risk of deaths among Blacks compared to Whites.
- The "*" and "&" in the data indicate per 100,000 and percent, respectively.

Results

Table 1: COVID-19 case, death, and case fatality rates of the 11 Mississippi River parishes and the state of Louisiana.

Location	Case Rate*	Death Rate*	Case Fatality&
Louisiana	1070.77	64.38	6.01
Ascension	738.52	45.81	6.2
East Baton Rouge	960.33	58.63	6.11
Iberville	1876.29	132.26	7.05
Jefferson	1937.37	107.75	5.56
Orleans	1894.94	132.77	7.01
Plaquemines	982.89	73.29	7.46
St. Bernard	1204.39	48.68	4.04
St. Charles	1242.94	86.63	6.97
St. James	1459.99	127.99	8.77
St. John the Baptist	2079.98	193.76	9.32
West Baton Rouge	770.83	117.14	15.2

Fig. 3: COVID-19 case, death, and case fatality rates.

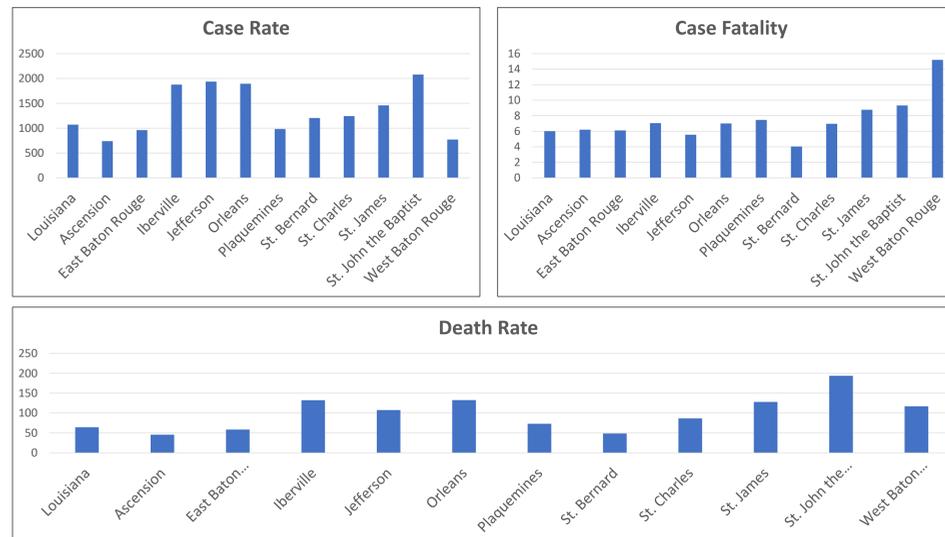
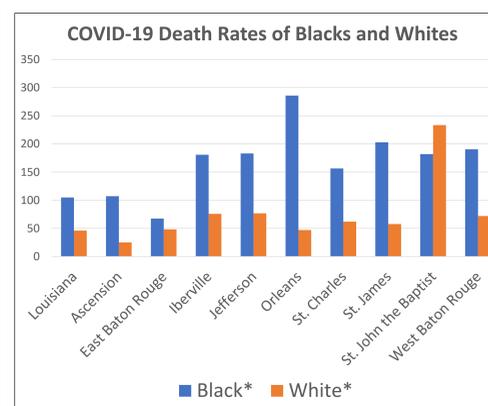


Table 2: COVID-19 death rates among Blacks and Whites in the 11 Mississippi River Parishes and the state of Louisiana. Race information was not provided for Plaquemines and St. Bernard.

Location	Black *	White *
Louisiana	104.79	45.93
Ascension	107.1	24.85
East Baton Rouge	67.21	48.02
Iberville	180.57	75.64
Jefferson	183.01	76.6
Orleans	285.78	46.84
Plaquemines	N/A	N/A
St. Bernard	N/A	N/A
St. Charles	156.34	61.7
St. James	202.74	57.58
St. John the Baptist	181.74	233.45
West Baton Rouge	190.35	71.79

Fig. 4: COVID-19 death rates of Black and White populations in the 11 Mississippi River Parishes and the state of Louisiana.



Relative Risk Ratios

Table 3: Relative Risk Ratios of COVID-19 cases and deaths in the 11 Mississippi River parishes compared to the remaining 53 Louisiana parishes.

	Cases	Deaths
The 11 Mississippi River Parishes	1.77	2.03
Ascension	0.88	0.97
East Baton Rouge	1.14	1.24
Iberville	2.23	2.8
Jefferson	2.3	2.28
Orleans	2.25	2.81
Plaquemines	1.17	1.55
St. Bernard	1.33	1.03
St. Charles	1.48	1.83
St. James	1.73	2.71
St. John the Baptist	2.47	4.1
West Baton Rouge	0.92	2.48

Fig. 5: The relative risk of COVID-19 cases and deaths of the 11 Mississippi River parishes compared to the remaining 53 Louisiana parishes. Any value over 1.00 indicates an average greater than that of the remaining 53 Louisiana Parishes.

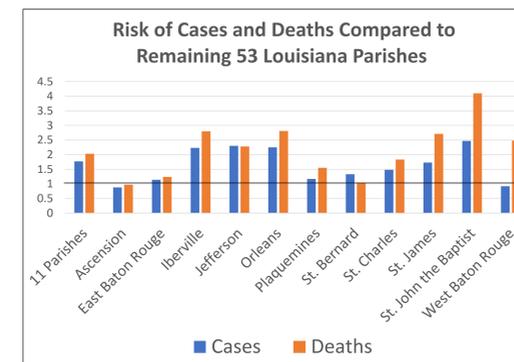
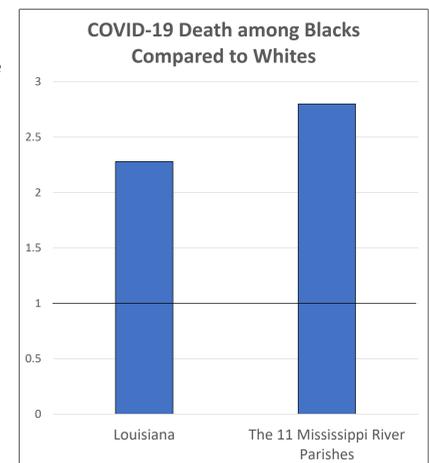


Table 4: The relative risk ratios of deaths among Blacks compared to Whites in Louisiana and the 11 parishes.

	Deaths among Blacks Compared to Whites
Louisiana	2.28
The 11 Mississippi River Parishes	2.8

Fig. 6: The relative risk of COVID-19 deaths among Blacks compared to Whites in the 11 Mississippi River parishes compared to the entire state of Louisiana. Any value over 1.00 indicates an average greater for Blacks compared to Whites.



Summary of Results

- The majority of the 11 parishes have higher case, death, and case fatality rates than the state of Louisiana.
- The Black population in the state of Louisiana and 10 of the 11 Mississippi River parishes have a higher death rate than the White Population.
- Most of the 11 Mississippi River parishes have a higher death rate in their Black population than the Black population of the entire state of Louisiana.
- Compared to the remaining 53 Louisiana parishes, the 11 Mississippi River parishes have a higher risk of COVID-19 cases and deaths.
- Compared to the state of Louisiana, the 11 parishes have greater risk of COVID-19 deaths in the Black population than the White population.

Conclusions

- This study shows the disproportionate effect of air pollution on the COVID-19 cases and deaths in Black communities in Cancer Alley.
- The health disparities in the Black population is related to historical and current inequities and injustices in social, political, economic, and environmental factors.
- Further research, policies, and system actions are needed to dismantle the systemic inequities and injustices that contribute to the disparities in health outcomes.